

Assessment & Industry Report on Crude Oil, Natural Gas and Oilfield Services Market

BVishal Oil & Energy Limited

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Abbreviation

GDP	Gross Domestic Product
UK	United Kingdom
IMF	International Monetary Fund
US	United States
EMDEs	Emerging Markets and Developing Economies
CAGR	Compound Annual Growth Rate
RBI	Reserve Bank of India
PFCE	Private Final Consumption Expenditure
IIP	Index of Industrial Production
GVA	Gross Value Added
GST	Goods & Service Tax
PLI	Production Linked Incentive
IBC	Insolvency and Bankruptcy Code
SDP	State Domestic Product
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
LNG	Liquefied Natural Gas
OPEC	Organization of the Petroleum Exporting Countries
MMT	Million Metric Tons
BCM	Billion Cubic Meters
FWI	Full Waveform Inversion
MWD	Measurement While Drilling
LWD	Logging While Drilling
AI	Artificial Intelligence
ML	Machine Learning
CSEM	Controlled Source Electromagnetic
AUV	Autonomous Underwater Vehicle
EV	Electrical Vehicle
IEA	International Energy Agency
EPA	Environmental Protection Agency
BLM	Bureau of Land Management
CNPC	China National Petroleum Corporation
CNOOC	China National Offshore Oil Corporation
ADNOC	Abu Dhabi National Oil Company
KPC	Kuwait Petroleum Corporation
KEPA	Kuwait Environment Public Authority
ONGC	Oil and Natural Gas Corporation
OIL	Oil India Ltd
MMSCM	Million Standard Cubic Meter
UAE	United Arab Emirates
HELP	Hydrocarbon Exploration and Licensing Policy
FDI	Foreign Direct Investment
CBG	Compressed Biogas
CGD	City Gas Distribution

Consulting

SATAT	Sustainable Alternative Towards Affordable Transportation
ISPRL	Indian Strategic Petroleum Reserve Limited
SPR	Strategic Petroleum Reserves
CNG	Compressed Natural Gas
LPG	Liquified Petroleum Gas
PNG	Piped Natural Gas
NELP	New Exploration Licensing Policy
NGHP	National Gas Hydrate Programme
E&P	Exploration and Production
PEMEX	Petroleos Mexicanos
DSF	Discovered Small Field
JAPEX	Japan Petroleum Exploration
PSC	Production Sharing Contract
RSC	Revenue Sharing Contract
ECS	Extended Continental Shelf
GLKM	Ground Line Kilometers
SKM	Square Kilometers
IoT	Internet of Things
EOR	Enhanced Oil Recovery
CEOR	Chemical Enhanced Oil Recovery
ASP	Alkaline Surfactant Polymer
FPSOs	Floating Production Storage and Offloading Vessels
TEG	Triethylene Glycol
GDU	Gas Dehydration Unit
DPD	Dew Point Depression
CCS	Carbon Capture & Storage
CSS	Cyclic Steam Stimulation
PCP	Progressive Cavity Pump
ESP	Electrical Submersible Pump
OALP	Open Acreage Licensing Policy
NDR	National Data Repository
BVOEL	BVishal Oil & Energy Ltd
SPO	Surface Production Operation
O&M	Operation & Maintenance
EBITDA	Earnings Before Interest, Taxes, Depreciation, and Amortization
PAT	Profit After Tax
ROE	Return on Equity
ROCE	Return on Capital Employed

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1 Global Macroeconomic Overview

1.1 Review and outlook of Global GDP

Global real GDP growth in 2025 is estimated at ~3.2%, setting the base for the current macroeconomic environment and confirming that the world economy has stabilized into a structurally low-growth regime rather than entering a fresh expansion cycle. This outcome is shaped by a combination of tight financial conditions, elevated sovereign and corporate debt, weak productivity growth, and persistent geopolitical fragmentation. Although inflation has eased from its peak and monetary tightening is largely absorbed, high real interest rates continue to restrain investment and consumption, particularly in advanced economies. At the same time, global trade remains structurally weaker due to policy-driven fragmentation rather than cyclical weakness.

The reinstatement of Trump-era tariffs in 2025 sent immediate shockwaves through the global trading system, reigniting deep-seated concerns about a slide into protectionism and sustained geopolitical fragmentation. Critics warned of a potential cascade of retaliatory measures, shrinking multilateral cooperation, and a costly division of the world economy into competing blocs. However, rather than triggering a purely destructive trade war, the policy acted as a stark catalyst, compelling a rapid and strategic realignment of US trade policy. This shift manifested not in a retreat from global engagement, but in a deliberate pivot towards forging a series of targeted, sector-specific bilateral trade deals with key allied and partner nations. The United States moved decisively to negotiate accords with countries like the United Kingdom, Japan, and Vietnam, moving beyond broad tariff reduction to focus on securing mutual advantages in strategic areas such as critical minerals for green technology, advanced semiconductors and telecommunications, and diversified manufacturing bases for essential goods.

These agreements were fundamentally designed as instruments of economic resilience and strategic autonomy. Their primary aim was to secure vulnerable supply chains and systematically reduce critical dependencies on single geographic sources—most notably China—which had been exposed as a profound risk during prior periods of disruption. Collectively, the bilateral pacts fostered the intentional development of a more regionally oriented, "friend-shored" trade network. This new architecture prioritizes trade flows between geopolitical and economic allies, valuing security and predictability alongside efficiency. Thus, the initial disruptive shock of the tariffs paradoxically accelerated the construction of a more segmented, but arguably more resilient and strategically coherent, framework for international trade in the decade ahead.

This current scenario follows a clear deceleration from the post-pandemic normalization phase during 2022–2024, when global growth slowed from 3.8% to 3.3% amid aggressive monetary tightening, energy price volatility, and weaker industrial output. The 2021 growth spike of 6.6% was a statistical rebound driven by base effects, massive fiscal stimulus, and pent-up demand following the -2.7% contraction in 2020, rather than a sustainable acceleration. Even before COVID-19, global growth during 2015–2019 had already begun to soften due to rising trade tensions, slowing productivity, and demographic headwinds. In this context, the 2025 growth base reflects a world economy constrained not by demand collapse, but by policy choices, fragmented trade architecture, and structural inefficiencies, with India positioned as a relative beneficiary but not yet a decisive growth engine in the evolving global order.

Further, the evolving geopolitical environment, including the recent escalation of conflict in the Middle East involving Iran and Israel, has further heightened uncertainty in the global macroeconomic landscape and has direct implications for the upstream oil and gas industry. Disruptions to key energy infrastructure and critical transit routes such as the Strait of Hormuz—through which a significant portion of global crude oil and LNG supplies flows—have underscored the vulnerability of global energy supply chains and contributed to heightened price volatility and supply-side risks. While elevated oil and gas prices may support upstream realizations and incentivize increased exploration and production activity in the near term, the prevailing uncertainty has also led to cautious capital allocation, and increased operational risks across regions. Additionally, the conflict has reinforced the strategic importance of energy security,

diversification of supply sources, and development of domestic resources, thereby influencing long-term upstream investment trends. In essence, the current environment reflects a complex interplay of supportive pricing dynamics and heightened geopolitical and operational risks, which may shape the global upstream oil and gas sector in the near to medium term.

Advanced Economies and Emerging Market & Developing Economies

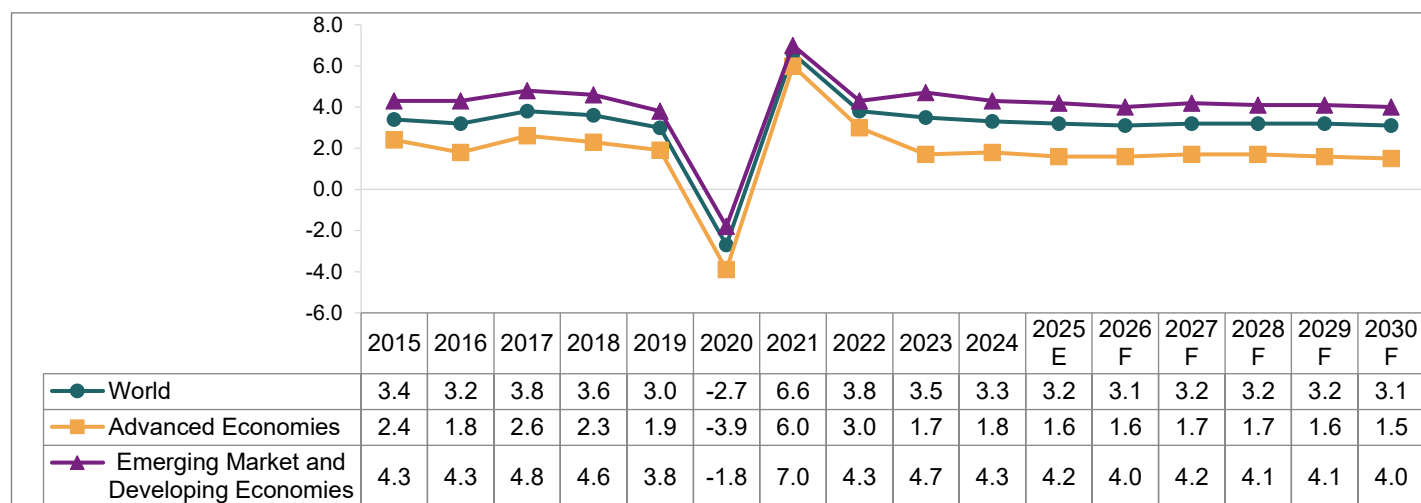
Real GDP growth trends highlight a clear and persistent divergence between advanced economies and emerging market & developing economies (EMDEs), with emerging economies increasingly positioned as the primary drivers of global growth. In 2025, emerging economies are projected to grow at ~4.2%, more than 2.5x the pace of advanced economies (~1.6%), reinforcing their role as the engine of incremental global GDP expansion. Despite a modest overall global growth environment, this acceleration underscores the resilience, structural momentum, and adaptive capacity of emerging markets, supported by favourable demographics, rising domestic consumption, and continued investment in infrastructure and manufacturing.

Looking ahead, emerging economies are expected to maintain a solid growth trajectory of ~4.0–4.2% through 2029, signalling sustained economic dynamism even amid global uncertainties. This performance is underpinned by urbanization, expanding middle-class demand, supply-chain diversification benefiting Asia and parts of Latin America, digital adoption, and selective policy support aimed at boosting domestic investment. Additionally, comparatively lower debt burdens and more accommodative monetary flexibility in several emerging markets provide room to support growth, even as global financial conditions remain tight. While external risks persist—such as geopolitical fragmentation and trade volatility—emerging economies appear structurally better positioned to absorb shocks and capture long-term growth opportunities.

In contrast, advanced economies are expected to experience subdued growth, stabilizing at ~1.6–1.7% from 2025 onward, reflecting a structurally constrained outlook rather than a cyclical downturn. This modest expansion follows a gradual slowdown from 3.0% in 2022 to 1.7–1.8% in 2023–2024, driven by tight monetary policy, aging populations, weak productivity growth, and high public debt levels. Even as inflation eases, high real interest rates continue to weigh on capital expenditure, housing markets, and discretionary consumption. The growth rebound seen in 2021 (6.0%) was largely a temporary, stimulus-driven recovery from the sharp -3.9% contraction in 2020 and did not translate into sustained momentum.

Structurally, the growth gap between emerging and advanced economies reflects divergent fundamentals. Advanced economies face long-term headwinds from demographic aging, slower labour force expansion, and limited productivity gains, constraining potential output. Emerging economies, by contrast, benefit from younger populations, faster capital formation, industrialization, and increasing integration into global value chains, even as they navigate inflation, currency volatility, and geopolitical spillovers.

Figure 1: Real GDP Growth (%) 2015-2030F



Note: E-Estimated, F-Forecast

Source: International Monetary Fund (IMF) World Economic Outlook October 2025

1.2 Economic Outlook on Key Economies

Table 1: Real GDP Growth of Key Economies

Year	Brazil	Russia	European Union	China	USA
2014	0.5	0.7	1.7	7.5	2.5
2015	-3.5	-2	2.5	7	2.9
2016	-3.3	0.2	2	6.8	1.8
2017	1.3	1.8	3	6.9	2.5
2018	1.8	2.8	2.3	6.8	3
2019	1.2	2.2	2	6.1	2.6
2020	-3.3	-2.7	-5.5	2.3	-2.1
2021	4.8	5.9	6.4	8.6	6.2
2022	3	-1.4	3.7	3.1	2.5
2023	3.2	4.1	0.6	5.4	2.9
2024	3.4	4.3	1.1	5	2.8
2025E	2.4	0.6	1.4	4.8	2
2026F	1.9	1	1.4	4.2	2.1
2027F	2.2	1.1	1.6	4.2	2.1
2028F	2.3	1.1	1.5	4	2.1
2029F	2.4	1.1	1.5	3.7	1.9
2030F	2.5	1.1	1.4	3.4	1.8

Note: E-Estimated, F-Forecast

Source: International Monetary Fund (IMF) World Economic Outlook October 2025

Brazil experienced a severe recession from 2014 to 2016, followed by a gradual recovery until 2019. The COVID-19 pandemic caused a significant contraction in 2020, but the economy rebounded strongly in 2021 with 4.8% growth due to stimulus measures. Growth moderated to around 3% in 2022, with Brazil' central bank estimates showing 3.4% growth in 2024 before slowing to about 2.4% and 1.9% in subsequent years. While inflation remains a concern, the market anticipate that Brazil's official inflation measure IPCA will hit 5.65% in 2025, significantly exceeding the

3% target established by the National Monetary Council. This forecast surpasses even the upper threshold of 4.5%, which represents the maximum allowable deviation of 1.5 percentage points from the central target. For 2026, the central bank sees inflation easing to 4.5%. Food and energy prices continue to drive inflation, with the IPCA rising 0.56% in March 2025 and 5.48% over the previous 12 months. In an effort to control the inflation, the Central Bank has maintained elevated interest rates, standing at 14.25%. This rate is expected to climb up to 15% by end of 2025, followed by a decline to 12.5% in 2026.

Natural resources have played a crucial role in Russia's economic development. As the world's largest natural gas reserves holder and a major oil producer, the energy sector has been the primary driver of economic growth. However, this reliance on natural resources has created structural challenges, including the need for economic diversification and vulnerability to commodity price fluctuations. The country also possesses vast reserves of minerals and metals, though their economic potential hasn't been fully realized. Russia's economy experienced significant volatility between 2014 and 2023, moving from recession, -2.0% in 2015, due to falling oil prices and sanctions to recovery, peaking at 2.8% in 2018, before contracting again during the COVID-19 pandemic to -2.7% in 2020. A remarkable rebound followed in 2021, 5.9% growth, but the Russia-Ukraine war caused another contraction in 2022 (-1.4%). Despite initial dire predictions, the economy showed unexpected resilience with 4.1% growth in 2023, driven by increased government spending on the military and war-related industries. The Russian economy has slowed sharply in recent months and may be at further risk if a fall in oil prices and global market turmoil persist. The country's economy has expanded by over 4% annually during the past two years, primarily driven by expenditures related to the ongoing Ukraine conflict. However, this growth has created significant economic challenges, as widespread labour shortages across numerous sectors have triggered a wage-price spiral, pushing inflation rates beyond 10%. To control the inflation, the central bank has raised its key interest rate to 21%, the highest level since the early 2000s. The economy ministry and the central bank have flagged lower oil prices, budget constraints and a rise in bad corporate debt as risks to the economy.

The EU economy demonstrated remarkable stability from 2014-2019, maintaining moderate growth rates between 1.7% and 3.0%, before experiencing a dramatic contraction of -5.5% in 2020 due to the COVID-19 pandemic. The post-pandemic period saw an impressive recovery with growth surging to 6.4% in 2021, followed by a moderation to 3.7% in 2022 and a significant slowdown to 0.6% in 2023. This sharp decline in 2023 resulted from multiple converging factors: the energy crisis triggered by the Russia-Ukraine war, persistent high inflation prompting ECB monetary tightening, weakening global demand, and widespread business investment hesitancy due to increased operational costs and economic uncertainty. In 2024 as per European central bank, the GDP increased slightly to 1.1% and further to 1.4% and 1.6% in subsequent years. Inflation remains elevated but is expected to moderate gradually, with headline HICP inflation projected at 2.3% in 2025. The European union economy faces short term challenges from trade uncertainties and competitiveness issues but is positioned for moderate growth supported by consumption, investment recovery and improving productivity in a gradually easing inflation environment.

China's economy has undergone significant transformation since 2014, with growth gradually declining from 7.5% to 6.1% by 2019. The COVID-19 pandemic caused a sharp drop to 2.3% in 2020, though China uniquely maintained positive growth while other major economies contracted. A recovery to 8.6% in 2021 was followed by volatility, with growth falling to 3.1% in 2022 before rebounding to 5.4% in 2023. In 2024, the GDP grew by 5.0% driven by robust manufacturing and high export demand. In first quarter of 2025, the country's GDP outstripped expectation with growth of 5.4%, underpinned by solid consumption and industrial output, but economists suggest momentum could shift sharply lower as US tariffs pose the biggest risk to the country's economic growth. US imposed 245% tariffs on China, heightening the tension between two economies. On the other hand, China's real estate is facing challenges, the value of the housing sold dropped by a quarter and the average prices of these houses also has plunged. China is currently confronting dual significant challenges: domestically, the continuing deterioration of its property market, while internationally, it navigates an exceptionally severe trade conflict with US.

Pre-pandemic, growth remained steady between 1.8-3.0% from 2014 to 2019, reflecting mature economic expansion. The COVID-19 pandemic caused a sharp -2.1% contraction in 2020, followed by an exceptional 6.2% rebound in 2021 due to stimulus measures and economic reopening. The economy then normalized with 2.5%, 2.9% and 2.8% growth in 2022, 2023 and 2024 respectively, slightly above pre-pandemic averages. Looking forward, the US economy is uncertain due to the tariff imposed by US and other countries, although as per IMF projections a gradual decline to 2.0% in the near term, with uncertainty surrounding new administration policies, before stabilizing around 2.1% from 2026-2029, reflecting structural factors like demographic changes and technological advancement.

Government policies around pollution control for major economies

Major economies have implemented targeted pollution-control policies that materially shape industrial, transport and energy-sector behavior. The European Union has led global regulatory tightening through its Ambient Air Quality Directives, Euro-VI/VI-D vehicle standards and industrial emissions rules, driving accelerated fuel switching and efficiency improvements. China’s “Blue Sky” and Air Pollution Prevention and Control Action Plans delivered significant reductions in SO₂, NO_x and PM emissions by mandating clean-fuel use, restricting coal in urban clusters, and enforcing ultra-low-emission norms for industry and power generation. The United States has strengthened air-quality compliance through the Clean Air Act, National Ambient Air Quality Standards (NAAQS), and vehicle emission norms, which have substantially lowered criteria pollutants over the past two decades.

Other key jurisdictions have also advanced impactful measures: Brazil has enforced vehicle-emission standards (PROCONVE-P8) and expanded natural-gas and biofuel use to curb transport-related pollution; Russia has implemented Euro-equivalent vehicle norms and industrial emissions controls in major cities under its environmental modernisation programs. Collectively, these initiatives have driven cleaner-fuel adoption, stricter emission compliance, and sustained improvements in urban air-quality trends across their respective regions.

1.3 Global Inflation Overview

Table 2: Inflation Rate (Average Consumer Prices) (%) 2015-2030F

Year	World	Advanced Economies	Emerging markets & developing economies	United States	China	India
2015	2.7	0.3	4.8	0.1	1.5	4.9
2016	2.7	0.7	4.3	1.3	2	4.5
2017	3.3	1.7	4.5	2.1	1.6	3.6
2018	3.7	2	4.9	2.4	2.1	3.4
2019	3.6	1.4	5.2	1.8	2.9	4.8
2020	3.3	0.7	5.3	1.3	2.5	6.2
2021	4.7	3.1	5.9	4.7	0.9	5.5
2022	8.7	7.3	9.7	8	2	6.7
2023	6.7	4.6	8.2	4.1	0.2	5.4
2024	5.8	2.6	7.9	3	0.2	4.6
2025E	4.2	2.5	5.3	2.7	0	2.8
2026F	3.7	2.2	4.7	2.4	0.7	4.0
2027F	3.4	2.1	4.2	2.2	1.4	4.0
2028F	3.3	2.1	4.1	2.2	1.8	4.0
2029F	3.2	2.1	3.9	2.2	1.9	4.0
2030F	3.2	2.1	3.9	2.2	2.0	4.0

Note: E-Estimated, F-Forecast

Source: International Monetary Fund (IMF) World Economic Outlook October 2025

Post-pandemic inflation in US surged due to supply chain disruptions, strong consumer demand, fiscal stimulus, and energy price spikes following Russia's invasion of Ukraine. The exceptionally tight labour market also pushed up wages, further contributing to inflationary pressures. The Fed's primary goal was to cool demand to bring inflation back toward its 2% target. The Federal Reserve implemented a series of aggressive interest rate hikes beginning in March 2022 to combat inflation that had reached 40-year highs. The federal funds rate increased from near-zero to a range of 5.25-5.50% through multiple increases. These higher rates had significant economic impacts, mortgage rates more than doubled, cooling the housing market substantially. Business investment slowed as borrowing costs increased, and consumer spending on interest-sensitive goods declined. Importantly, inflation began moderating from its peak level of 8.0% in 2022, suggesting the policy was having its intended effect. As inflation continued to ease, the Federal Reserve cut the interest rate in the range of 4.25-4.5%. Last interest rate cut was done in December 2024 by 0.25%. Currently, the Federal Reserve has hold interest rates steady at 4.5% for a second straight meeting and projections reveal expectations of slower growth and higher core inflation by year-end. This partially reflects the expected impact of recently implemented U.S. tariffs and consequential retaliation.

The inflation rate in emerging markets and developing economies (EMDEs) has shown a distinctive pattern over the period from 2015 to 2030, characterized by a period of relative stability, followed by a sharp increase, and then a projected gradual decline. From 2015 to 2021, EMDEs generally experienced moderate inflation, with rates fluctuating between 4.2 percent and 5.8 percent. Specifically, inflation stood at 4.8 percent in 2015, saw a slight decrease to 4.3 percent in 2016, and then progressively climbed to 5.9 percent by 2021. The most significant shift occurred in 2022, when the inflation rate surged to 9.7 percent, and remained elevated at 8.2 percent in 2023 and 7.9 percent in 2024. Looking ahead, projections indicate a steady reduction in inflation, with forecasts showing a decrease to 5.3 percent in 2025 and a further decline to 3.9 percent by 2029.

Several interconnected factors, both global and domestic, have been identified as key drivers behind these inflation trends in EMDEs. Global shocks have played a particularly significant role in shaping recent inflation dynamics. These shocks encompass widespread supply disruptions and robust demand pressures that emerged in the aftermath of the COVID-19 pandemic, alongside sharp increases in commodity prices, notably exacerbated by the conflict in Ukraine. On average, for a typical economy, global demand shocks, supply shocks, and oil price shocks together accounted for approximately one-quarter of the variation in domestic inflation since 2001. The impact of oil price shocks became more pronounced over time, with their share in inflation variance rising from 4.0% prior to 2000 to about 9.0% between 2001 and 2022, which contributed to the steep inflation surge from mid-2021 to mid-2022.

Domestic factors also exert considerable influence on inflation in EMDEs. These include currency depreciation and instances of political instability within certain countries. The recent surge in global inflationary pressures has led to an increase in near-term inflation expectations across many EMDEs, and in some cases, even long-term inflation expectations have risen. In regions such as Latin America and the Caribbean, South Asia, Europe and Central Asia, the rise in inflation expectations has been linked to higher energy and food prices, currency depreciation, and a resurgence in domestic demand. Furthermore, research suggests that a more democratic environment and an increase in capital flows relative to GDP can help reduce the probability of inflation. Conversely, some studies indicate that cost shocks or output gaps may not be significant factors affecting inflation evolution in these economies.

Monetary and fiscal policy responses are critical in managing inflation in EMDEs. Many EMDEs adopted a proactive stance by initiating monetary policy tightening in mid-2021, ahead of advanced economies. This early intervention aimed to anchor inflation expectations and mitigate the adverse effects of rising global interest rates. However, persistent inflation in the services sector and robust wage growth in many EMDEs have continued to exert upward pressure on prices. Additionally, the sharp tightening of monetary policy in advanced economies, particularly the United States, has historically triggered financial stress or crises in EMDEs. While EMDEs have shown resilience in the recent tightening cycle due to two decades of reforms that reduced credit and currency risks, sustained high

inflation can lead to increased financial vulnerabilities. Fiscal policy also plays a crucial role; while broad fiscal support can fuel inflation, fiscal restraint can aid in disinflation and reduce financial risks. Therefore, strengthening fiscal frameworks, enhancing debt transparency, and improving revenue and expenditure management are essential to prevent fiscal dominance, which could otherwise push up long-term inflation expectations.

1.4 Global Population

The total population has more than doubled since the 1950s and is forecasted to surpass the 8.3 billion mark by 2029. Populous middle-income countries account for a considerable share of the growth in world population between 2010-25. Just five nations – China, India, Indonesia, Pakistan, and Nigeria – are expected to account for around 3.6 billion people in 2024. If the current trend continues, the majority of the next billion is destined to be born in low- and middle-income countries. However, the median age of the existing population in these nations – especially Nigeria, Pakistan, and India at an estimated 19.3 years, 22.9 years, and 29.8 years, respectively in 2024 underscore the massive demographic dividend potential. A young and cost-effective labour will drive the attractiveness of these nations as offshore manufacturing destinations.

Table 3: Population (billions of people) 2010-2030F

Year	World	Advanced Economies	Emerging markets & developing economies	China	India
2010	6.8	1.0	5.8	1.3	1.2
2011	6.9	1.0	5.9	1.3	1.3
2012	7.0	1.0	6.0	1.4	1.3
2013	7.1	1.0	6.1	1.4	1.3
2014	7.2	1.1	6.1	1.4	1.3
2015	7.3	1.1	6.2	1.4	1.3
2016	7.4	1.1	6.3	1.4	1.3
2017	7.5	1.1	6.4	1.4	1.4
2018	7.5	1.1	6.5	1.4	1.4
2019	7.6	1.1	6.5	1.4	1.4
2020	7.7	1.1	6.6	1.4	1.4
2021	7.8	1.1	6.7	1.4	1.4
2022	7.8	1.1	6.7	1.4	1.4
2023	7.9	1.1	6.8	1.4	1.4
2024E	7.9	1.1	6.8	1.4	1.4
2025F	8.0	1.1	6.9	1.4	1.5
2026F	8.1	1.1	7.0	1.4	1.5
2027F	8.1	1.1	7.0	1.4	1.5
2028F	8.2	1.1	7.1	1.4	1.5
2029F	8.3	1.1	7.2	1.4	1.5
2030F	8.4	1.1	7.3	1.4	1.5

Note: E-Estimated, F-Forecast

Source: International Monetary Fund (IMF) World Economic Outlook October 2025

2 India Macroeconomic Overview

2.1 India GDP Overview

As of 2025, India's real GDP growth is estimated at ~6.6%, setting a stable and credible base for the medium term rather than indicating an overheated expansion. This growth rate reflects an economy that has transitioned from post-pandemic rebound to structural normalization, where momentum is driven more by fundamentals than by one-off boosts. Importantly, 2025 also marks a major structural milestone, with India emerging as the world's 4th largest economy. This achievement is not the result of a sudden surge in growth but of sustained outperformance relative to other large economies, many of which have faced prolonged stagnation, fiscal stress, or demographic headwinds. India's economic expansion in 2025 is underpinned by resilient domestic consumption, continued public infrastructure spending, and strong services-sector performance, even as external demand remains subdued.

Looking at the immediate past, growth dynamics over 2023 and 2024 clearly show a process of moderation rather than deterioration. In 2023, India recorded a strong growth rate of about 9.2%, largely driven by post-COVID normalization, pent-up consumer demand, and an aggressive public capital expenditure cycle. However, this pace was inherently unsustainable and benefited from favourable base effects. By 2024, growth eased to approximately 6.5%, reflecting the fading of these temporary supports, tighter global financial conditions, and weaker export demand amid slowing global growth. Despite this deceleration, India avoided a sharp downturn, as domestic demand and government-led investment cushioned the impact of global headwinds. Compared to most major economies, where growth slowed more abruptly, India's moderation was relatively mild, reinforcing its position as one of the most resilient large economies.

The longer-term trend highlights India's growing ability to absorb shocks and recover quickly. Between 2016 and 2019, growth steadily slowed due to structural adjustments, balance-sheet stress in the financial sector, and subdued private investment. This was followed by the sharp contraction of -5.8% in 2020 due to the pandemic, the deepest shock in recent history. However, the subsequent rebound in 2021, with growth of 9.7%, and the sustained expansion thereafter indicate that the underlying drivers of the economy, favourable demographics, and a strong services base.

In response to the economic challenges posed by the COVID-19 pandemic, India implemented a series of comprehensive structural reforms aimed at revitalizing its manufacturing sector and enhancing its global competitiveness. The government's disinvestment strategy underwent a significant transformation, the new approach facilitated landmark privatizations such as Air India's acquisition by the Tata Group. The primary objectives behind this disinvestment push were to reduce the fiscal burden on government finances, improve operational efficiency through private sector management, and generate substantial resources for funding critical development programs.

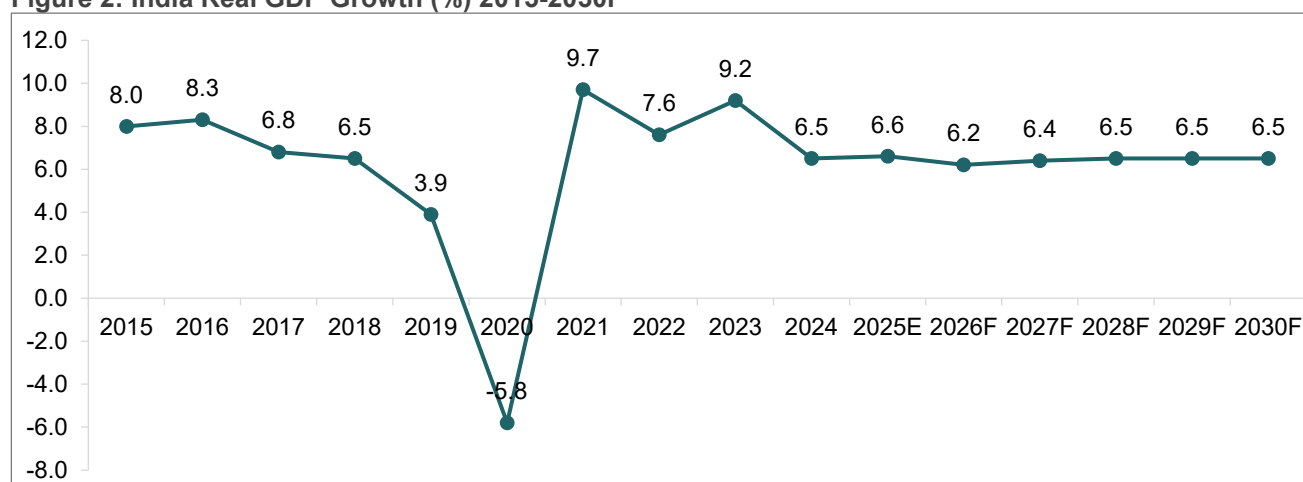
Concurrent with disinvestment efforts, India substantially liberalized its Foreign Direct Investment (FDI) regime across multiple sectors to attract global capital and expertise. The defense manufacturing sector witnessed a significant policy shift with the FDI limit under the automatic route being raised from 49% to 74%, enabling greater foreign participation while maintaining Indian control over sensitive technologies. Similarly, the insurance sector saw its FDI cap increase from 74% to 100%, potentially bringing in much-needed capital and global best practices.

A cornerstone of India's post-pandemic industrial strategy was the National Logistics Policy (NLP), launched in September 2022 to address one of the most persistent challenges facing the manufacturing sector—high logistics costs. The NLP set ambitious targets to reduce logistics costs from the prevailing 14-18% of GDP to the global average of approximately 8% by 2030, while simultaneously improving India's ranking in the Logistics Performance Index. The policy established a comprehensive framework comprising the Unified Logistics Interface Platform (ULIP) to integrate digital systems across transport modes, the Ease of Logistics Services (E-LogS) for streamlining rules, the Comprehensive Logistics Action Plan (CLAP) for identifying specific interventions, and the System Improvement

Group (SIG) to monitor implementation progress. By creating an integrated, efficient logistics ecosystem, the NLP aimed to enhance the competitiveness of Indian manufacturing by reducing transportation times and costs.

India's economy showed signs of gradual recovery as restrictions eased, and vaccination coverage expanded. Grassroots consumption began to pick up, supported by government interventions such as MGNREGA and insurance packages under the Pradhan Mantri Garib Kalyan Package, which collectively bolstered rural incomes and consumer confidence. Although rural consumption was recovering, it remained below the pre-COVID benchmark, indicating an uneven pace compared to urban consumption. Urban demand, driven by pent-up spending and improved consumer sentiment, led to the overall recovery. In parallel, the transportation sector started regaining momentum with increased cargo volumes and traffic levels recovering to about 70-85% by mid-2020, and further progress as mobility restrictions relaxed.

Figure 2: India Real GDP Growth (%) 2015-2030F



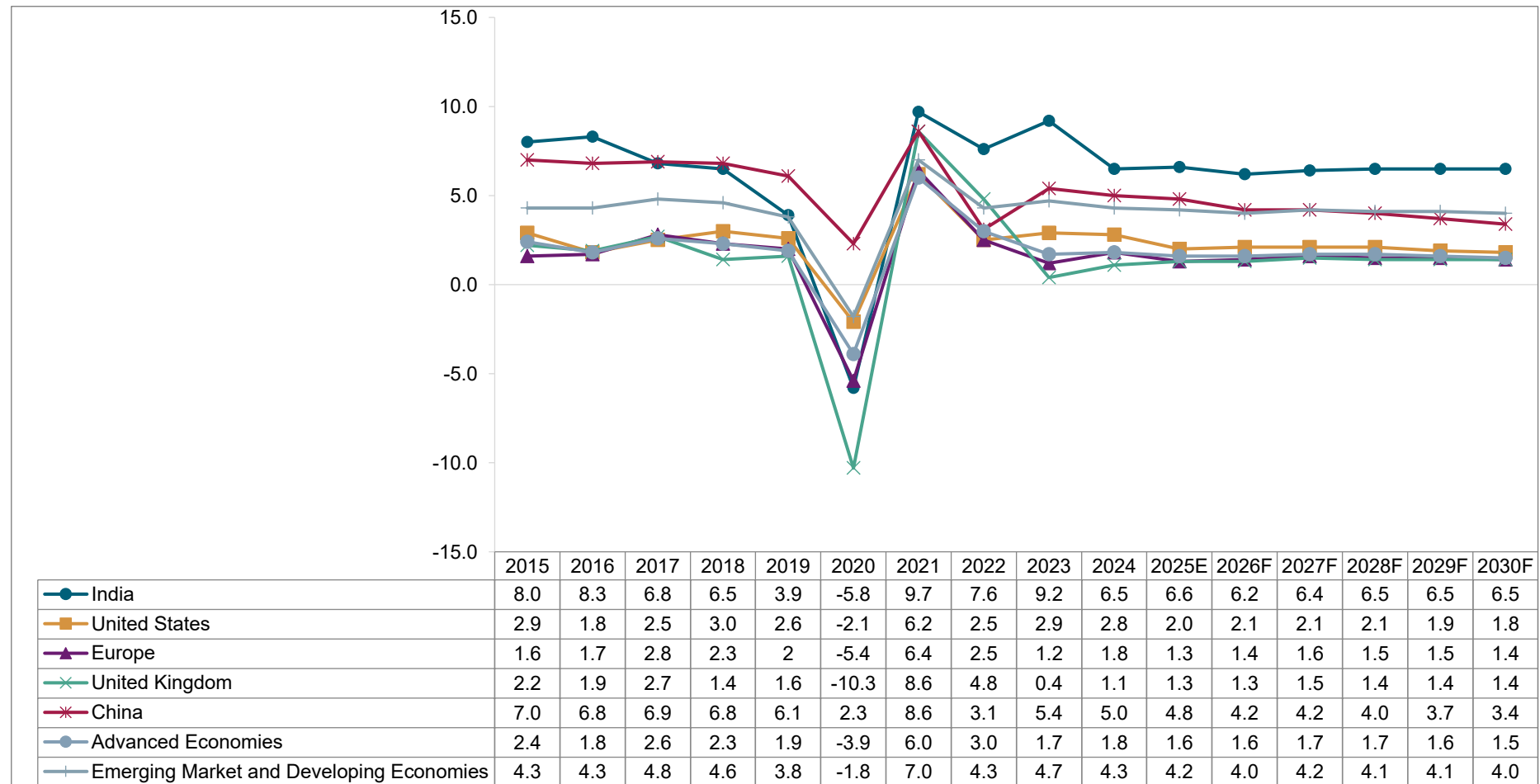
Note: E-Estimated, F-Forecast

Source: International Monetary Fund (IMF) World Economic Outlook October 2025

IMF World Economic Outlook October 2025 clearly positions India as the fastest-growing major economy over the medium term, especially when compared with developed economies and even other large emerging markets. From 2015 onward, India consistently records real GDP growth rates well above the global average, with growth largely in the 6–9% range before the pandemic, a sharp but temporary contraction in 2020, and a strong rebound thereafter. Crucially, IMF forecasts indicate that India's growth is expected to stabilise around 6.2–6.6% through the second half of the 2020s up to 2030, which is structurally higher than both advanced economies and the broader emerging market and developing economies (EMDEs). This persistence matters more than one-off spikes, because it signals sustained momentum rather than cyclical recovery alone.

In contrast, developed economies such as the United States, Europe, and the United Kingdom exhibit structurally lower growth trajectories. Even in their stronger years, real GDP growth in these economies rarely exceeds 2–3%, and post-pandemic forecasts converge closer to 1–2% over the medium term due to ageing populations, saturated consumption, slower productivity gains, and tighter macroeconomic constraints. While India returns to a high growth path after 2021, advanced economies settle into a low-growth equilibrium and is growing at roughly three times the pace of most developed economies, widening the relative gap in aggregate output over time, even if absolute income levels remain far apart.

Figure 3: Real GDP Growth Comparison (%) 2010-2030F



Note: E-Estimated, F: Forecast

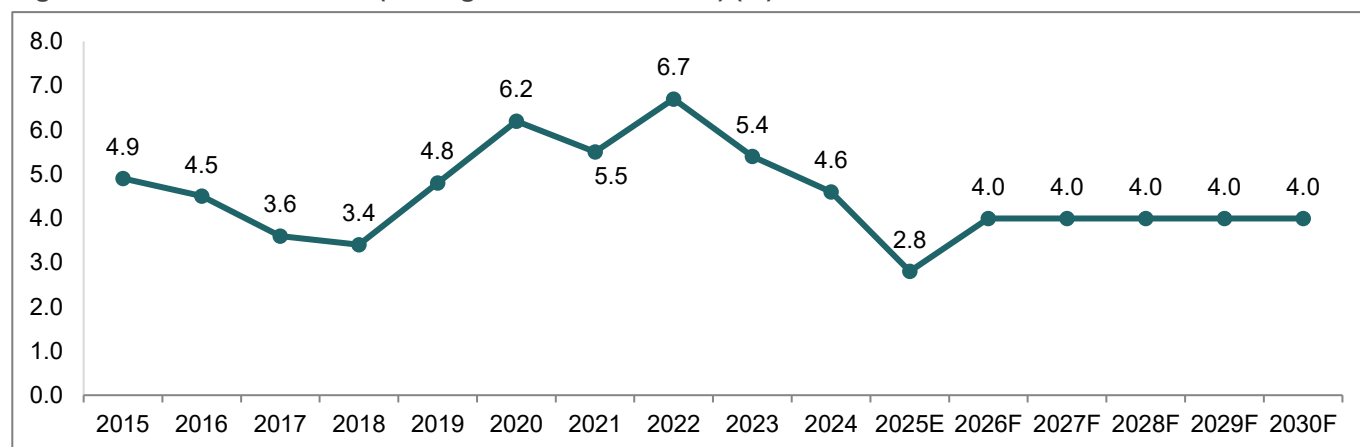
Source: International Monetary Fund (IMF) World Economic Outlook October 2025

When compared with other emerging and developing economies, India still stands out. The EMDEs aggregate grows faster than advanced economies, typically around 4–5%, but this average masks wide divergence. India sits decisively above this group throughout the forecast horizon, indicating that it is not merely benefiting from the general “emerging market premium” but outperforming its peers. Historically, China and India followed similar high-growth paths, but the chart and IMF projections show a clear deceleration in China’s growth—from 6–7% in the past to around 3–4% by the latter half of the 2020s. Structural factors such as demographic ageing, high debt levels, and a maturing economic model are weighing on China’s outlook. India, by contrast, retains a younger labour force, stronger consumption growth, and greater headroom for urbanisation and productivity catch-up, allowing it to grow faster even as China slows.

The drivers behind India’s superior growth performance are structural rather than accidental. Domestic consumption plays a central role, supported by favourable demographics and rising urbanisation, which gives India a large and relatively resilient demand base compared with export-dependent economies. Investment has been supported by public infrastructure spending and gradual improvement in the business environment, while digital public infrastructure and formalisation have improved efficiency and tax compliance. IMF assessments explicitly highlight structural reforms, macroeconomic stability, and domestic demand strength as key reasons India’s growth outlook remains robust despite global headwinds. This explains why India rebounds more sharply after the pandemic shock and maintains higher growth even as global conditions normalise.

2.2 India’s Inflation

Figure 4: India Inflation Rate (Average Consumer Prices) (%) 2010-2030F



Note: E-Estimated, F-Forecast

Source: International Monetary Fund (IMF) World Economic Outlook October 2025

Inflation rose to 6.2% due to Covid-19 in 2020 and dropped to 5.5% later in 2021. Following a surge in India’s annual inflation to 6.7% in 2022 amidst the adverse impacts of the Russia-Ukraine war on global commodity prices and supply chain disruptions, inflation for 2023 stood at 5.4%. International Monetary Fund estimated inflation at 4.6% in 2024. Consumer price inflation in India has remained relatively moderate in recent months, with CPI-based inflation recorded at 2.74% in January 2026 and 3.21% in February 2026, remaining within the Reserve Bank of India’s target band of 2%–6%. The inflation trajectory has been influenced by moderation in food prices during earlier periods, although recent months have witnessed some uptick driven by food and commodity price movements. Core inflation has remained stable, reflecting contained price pressures in non-food segments, while housing and services inflation have exhibited moderate trends.

2.3 India's Population Growth

India's population has grown by more than 1 billion since 1950. India's population stood at 1.2 billion in 2010 and has grown with a CAGR of 1.1% till 2023 to reach 1.4 billion surpassing China to become the most populous country in the world. It is estimated that India's population will surpass 1.5 billion people by the end of the decade and will continue to slowly increase until 2064, when it will peak at 1.7 billion people.

People under the age of 25 account for more than 40% of India's population. Adults with age 65 and above comprise only 7% of India's population, compared with 14% in China and 18% in the US. As per United Nations projections, the share of Indians who are 65 and above is likely to remain under 20% until 2063 and will not approach 30% until 2100.

Table 4: Population (billions of people) 2010-2030F

Year	World	Advanced Economies	Emerging markets & developing economies	China	India
2010	6.8	1.0	5.8	1.3	1.2
2011	6.9	1.0	5.9	1.3	1.3
2012	7.0	1.0	6.0	1.4	1.3
2013	7.1	1.0	6.1	1.4	1.3
2014	7.2	1.1	6.1	1.4	1.3
2015	7.3	1.1	6.2	1.4	1.3
2016	7.4	1.1	6.3	1.4	1.3
2017	7.5	1.1	6.4	1.4	1.4
2018	7.5	1.1	6.5	1.4	1.4
2019	7.6	1.1	6.5	1.4	1.4
2020	7.7	1.1	6.6	1.4	1.4
2021	7.8	1.1	6.7	1.4	1.4
2022	7.8	1.1	6.7	1.4	1.4
2023	7.9	1.1	6.8	1.4	1.4
2024	7.9	1.1	6.8	1.4	1.4
2025E	8.0	1.1	6.9	1.4	1.5
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2029F	8.3	1.1	7.2	1.4	1.5
2030F	8.4	1.1	7.3	1.4	1.5

Note: E-Estimated, F-Forecast

Source: International Monetary Fund (IMF) World Economic Outlook October 2025

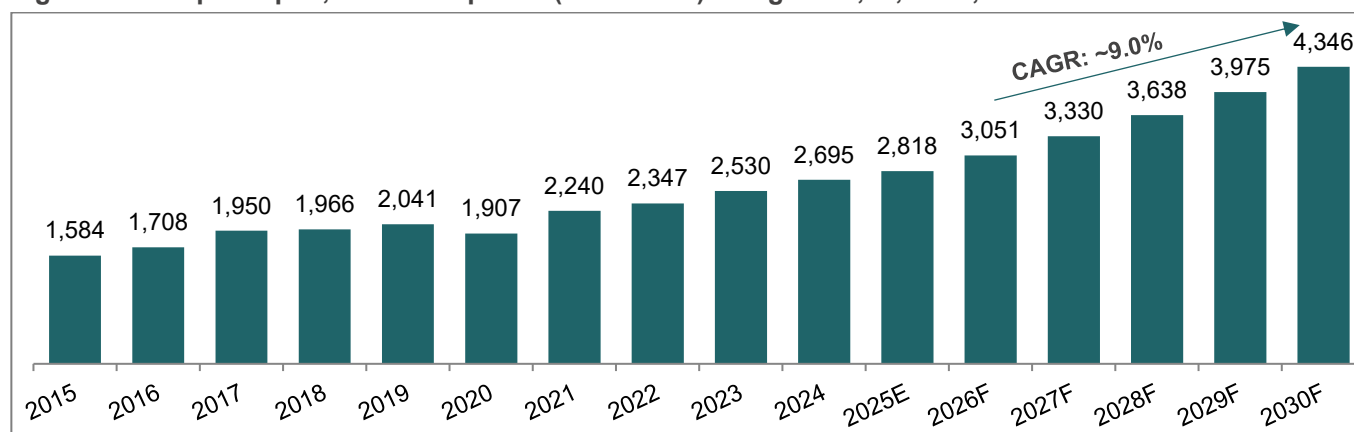
2.4 GDP per capita at current prices and its growth

India's GDP Per Capita (at current prices) is likely to reach ~USD 3,975 by 2029, growing at a CAGR of 9.0% between 2025 and 2029. This boost in per capita GDP levels will play a crucial role in propelling India's vision to become a USD 5 trillion economy by 2030. This upward trend in per capita GDP levels will be supported by domestic

structural reforms, fiscal prudence, monetary policy stability, reduced input costs, falling price pressures, political stability, and rapid urbanization.

Expansion of capacity utilisation and productivity across critical sectors such as manufacturing, transport, infrastructure, construction, chemicals, telecom, and financial services will lead to a sustained growth in GDP per capita levels, with positive spillovers being witnessed in India’s economic growth.

Figure 5: GDP per capita, at current prices (US Dollars) and growth, %, India, 2015-2030F



Note: F-Forecast

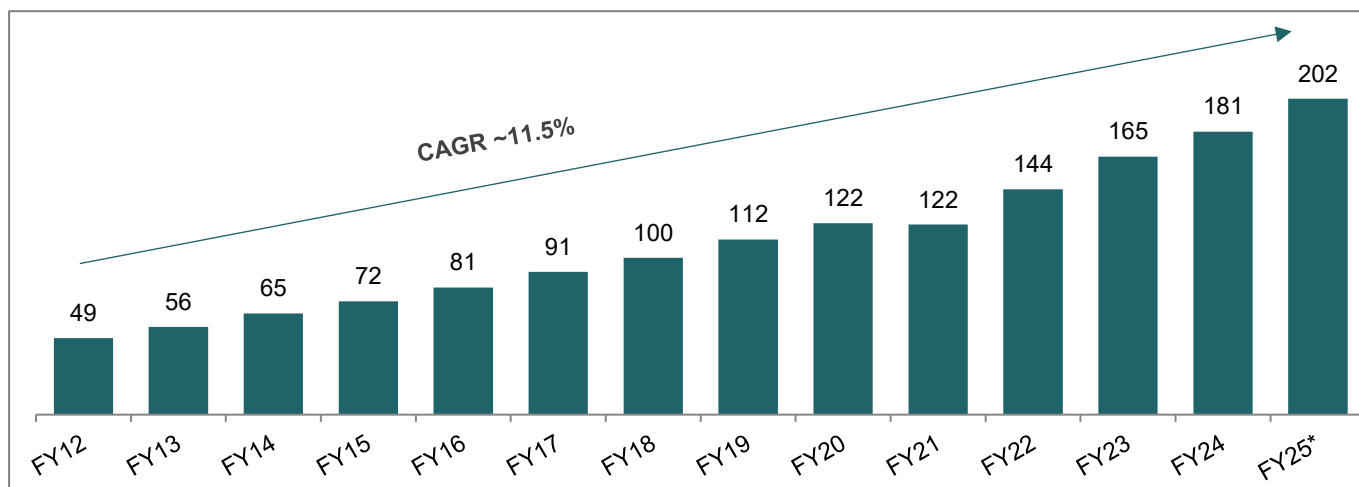
Source: International Monetary Fund (IMF) World Economic October 2025

Increased infrastructural investment inflows, an accelerating green transition, strengthening energy and commodity supply chains, and building multi-industry economies of scale for the digital economy will boost competitiveness, enhance efficiency, and create new job opportunities, thus promoting India’s transition to an upper-income country over the coming decade. However, geopolitical tensions, extreme climate events, and international financial sector volatility can present short-term to medium-term challenges to this growth outlook.

2.5 PFCE (% of GDP) and growth

Private Final Consumption Expenditure (PFCE) has remained an important factor in insulating the Indian economy, contributing to over 60.0% of the country’s GDP. In FY25, PFCE continued its upward trajectory, increasing by 12% y-o-y, reflecting sustained consumption demand. The consumption pattern indicates continued strength in discretionary and premium segments, supported by urban demand, while mass and entry-level segments have shown relatively moderate growth. PFCE picked up steam after a brief plunge in 2020 due to the pandemic. In FY24, PFCE witnessed growth of 9.7% compared to the previous year. A pattern has been emerging in India’s demand recovery thus far, by which demand growth for mid-premium products has been stronger, while that for budget and entry-level products has been weaker. Looking at automotive sales, for example, sales for entry-level cars saw some challenges in 2023, while luxury car sales growth was strong.

Figure 6: Private Final Consumption (INR 000'Bn), %, India, FY12 to FY25



*FY25 number is based on Provisional Estimates (PE) by MOSPI

Source: MOSPI

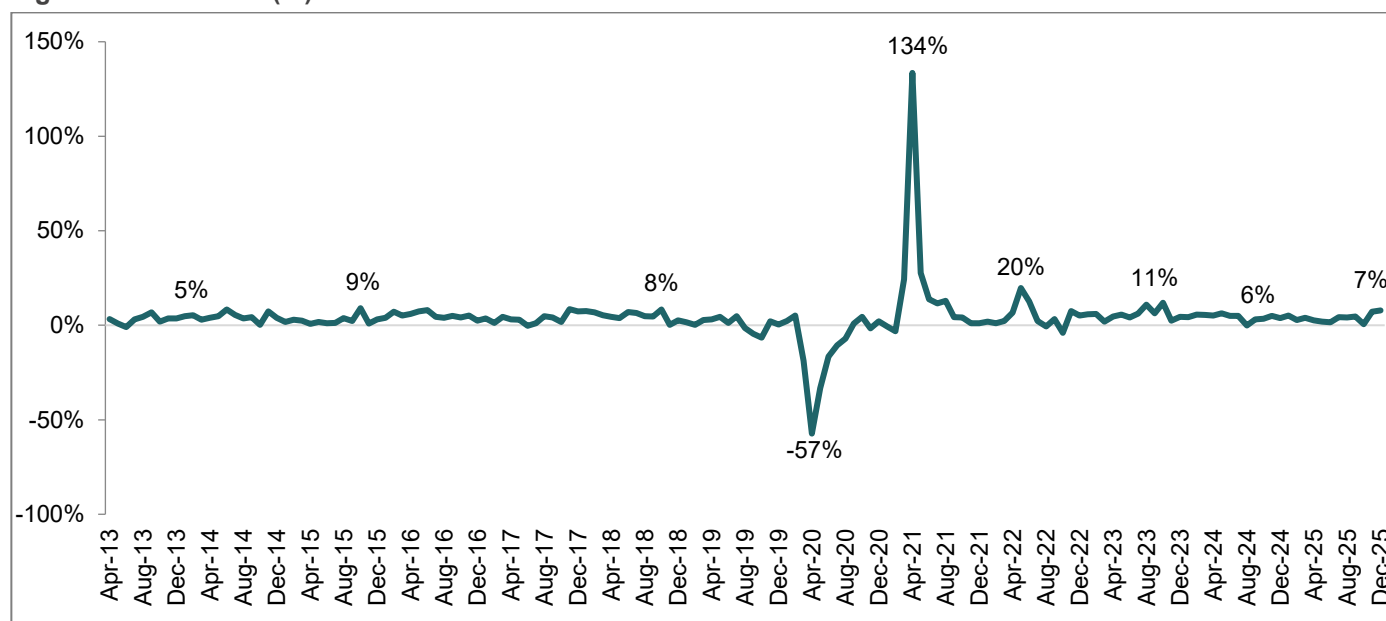
2.6 Index of Industrial Production IIP & its growth

Industry momentum strengthened in December 2025 as the Index of Industrial production rose by 7.8%, reaching its highest level in over 2 years, after registering a high growth of 7.2%(RE) in November 2025. Growth in IIP in December 2025, is driven by across the board surge in Manufacturing (8.1%), mining (6.8%) and electricity (6.3%).. Consumer durables IIP, as per the use-based classification¹, posted the largest growth at 7.9% in FY-25 compared to the previous fiscal, infrastructure/construction goods and the capital goods categories at 6.7% and 5.6%, respectively. In June 2025, the highest IIP year-on-year growth was posted by infrastructure/construction goods and intermediate goods at 7.2% and 5.5%, respectively, whereas capital goods and consumer durable goods' IIP growth stood at 3.5% and 2.9%, respectively.²

¹ 6 Use-based categories have been defined: Primary Goods, Capital Goods, Infrastructure/ Construction Goods, Intermediate Goods, Consumer Durables, Consumer Non-durables. Full definitions on page 4 of [IIP FAQ](#)

² MOSPI

Figure 7: IIP Growth (%) 2013-2025



Source: MOSPI

2.7 Gross Value Added (GVA) in Industry Sector

Table 5: GVA by Industry at Constant Prices, INR Crores, FY-19 to FY-26*

Industry	FY-19	FY-20	FY-21	FY-22	FY-23	FY-24	FY-25	FY-26*
Agriculture, forestry and fishing	1,878,598	1,994,326	2,074,212	2,170,106	2,305,978	2,367,287	2,476,805	2,554,071
YOY (%)		6.20%	4.00%	4.60%	6.30%	2.70%	4.60%	3.12%
Mining and quarrying	326,815	317,134	291,075	309,276	319,733	330,007	338,884	336,550
YOY (%)		-3.00%	-8.20%	6.30%	3.40%	3.20%	2.70%	-0.69%
Manufacturing	2,328,992	2,259,706	2,329,160	2,561,033	2,516,364	2,825,935	2,953,647	3,161,364
YOY (%)		-3.00%	3.10%	10.00%	-1.70%	12.30%	4.52%	7.03%
Electricity, gas, water supply & other utility services	294,147	300,798	288,213	317,966	352,331	382,776	405,296	413,702
YOY (%)		2.30%	-4.20%	10.30%	10.80%	8.60%	5.90%	2.07%
Construction	1,026,789	1,043,429	995,371	1,193,532	1,302,245	1,437,788	1,572,285	1,682,792
YOY (%)		1.60%	-4.60%	19.90%	9.10%	10.40%	9.40%	7.03%
Other Services	6,878,456	7,320,707	6,709,313	7,324,926	8,081,377	8,807,683	9,440,529	10,301,349
YOY (%)		6.40%	-8.40%	9.20%	10.30%	9.00%	7.19%	9.12%
GVA at basic prices	12,733,798	13,236,100	12,687,345	13,876,840	14,878,028	16,151,477	17,187,446	18,449,828

YOY (%)		3.90%	-4.10%	9.40%	7.20%	8.60%	6.40%	7.34%
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Note: GVA for FY26 is basis First Advance Estimates by MOSPI

Other services include trade, repair, hotels and restaurants, financial services, real estate, ownership of dwelling & professional services, public administration and defence, transport, storage, communication & services related to broadcasting, education, health, recreation and other personal services

Source: MOSPI

India's Gross Value Added (GVA) at basic prices expanded from INR ~127.3 lakh crore in FY19 to INR ~184.5 lakh crore in FY26, reflecting sustained economic expansion despite pandemic-related disruptions during FY21. After contracting by 4.1% in FY21, GVA rebounded strongly with 9.4% growth in FY22, followed by steady expansion in subsequent years, reaching 7.34% growth in FY26. The growth trajectory highlights the resilience of the Indian economy, supported by infrastructure spending, recovery in manufacturing activity, and continued expansion in the services sector.

Sector-wise, agriculture, forestry and fishing demonstrated stable growth, increasing from INR ~18.8 lakh crore in FY19 to INR ~25.5 lakh crore in FY26, with annual growth largely in the 3–6% range, indicating structural stability in the sector. Mining and quarrying exhibited relatively volatile performance due to fluctuations in commodity demand and supply disruptions, reaching INR 3.37 lakh crore in FY26, with a marginal 0.7% contraction in FY26 following moderate growth in prior years. Manufacturing, one of the largest contributors to GVA, expanded from INR 23.3 lakh crore in FY19 to INR 31.6 lakh crore in FY26, registering a 7.0% growth in FY26, supported by improving industrial activity and policy initiatives aimed at boosting domestic manufacturing.

Electricity, gas, water supply and other utility services recorded consistent expansion from INR 2.9 lakh crore in FY19 to INR 4.14 lakh crore in FY26, reflecting rising energy demand and infrastructure development. Construction emerged as a key driver of economic growth, increasing from INR 10.3 lakh crore in FY19 to INR 16.8 lakh crore in FY26, with 7.0% growth in FY26, supported by government-led infrastructure development and real estate activity. Meanwhile, the services sector (including trade, hotels, transport, financial services, real estate, public administration, education and health) remained the largest contributor to the economy, expanding from INR 68.8 lakh crore in FY19 to INR 103.0 lakh crore in FY26, and recording 9.1% growth in FY26, underscoring India's continued transition towards a service-led economic structure.

2.8 State Domestic Product (SDP)

Table 6: State Domestic Product at Constant Prices, INR Lakhs, FY-19 to FY-25

State/ Union Territory	FY-19	FY-20	FY-21	FY-22	FY-23	FY-24	FY-25
Andaman & Nicobar Islands	686,699	726,574	671,487	708,144	778,437	812,606	NA
Andhra Pradesh	62,661,420	64,981,035	65,967,773	70,679,141	75,279,653	79,939,982	86,501,323
Arunachal Pradesh	1,666,838	1,914,031	1,843,452	1,864,920	1,930,051	2,044,856	2,242,331
Assam	23,103,956	24,070,724	24,781,923	25,813,969	28,979,318	32,455,580	34,981,426
Bihar	38,138,253	39,832,923	36,896,986	38,725,556	43,690,911	48,912,616	53,137,172
Chandigarh	2,986,579	3,167,934	2,859,329	3,058,180	3,486,751	3,818,573	NA
Chhattisgarh	24,457,916	25,154,906	25,119,230	26,703,254	28,581,697	30,671,211	32,975,231
Delhi	56,532,692	58,616,836	53,363,448	57,205,064	61,365,437	66,986,283	71,148,567
Goa	5,306,301	5,481,154	5,260,542	5,316,815	5,986,675	6,413,700	NA
Gujarat	118,301,975	126,527,733	124,111,783	136,558,743	146,599,753	NA	NA
Haryana	53,299,604	54,512,396	49,964,332	55,992,163	58,417,087	62,949,066	67,703,325
Himachal Pradesh	11,641,398	12,122,701	11,589,374	12,119,085	12,918,661	13,734,297	14,520,669

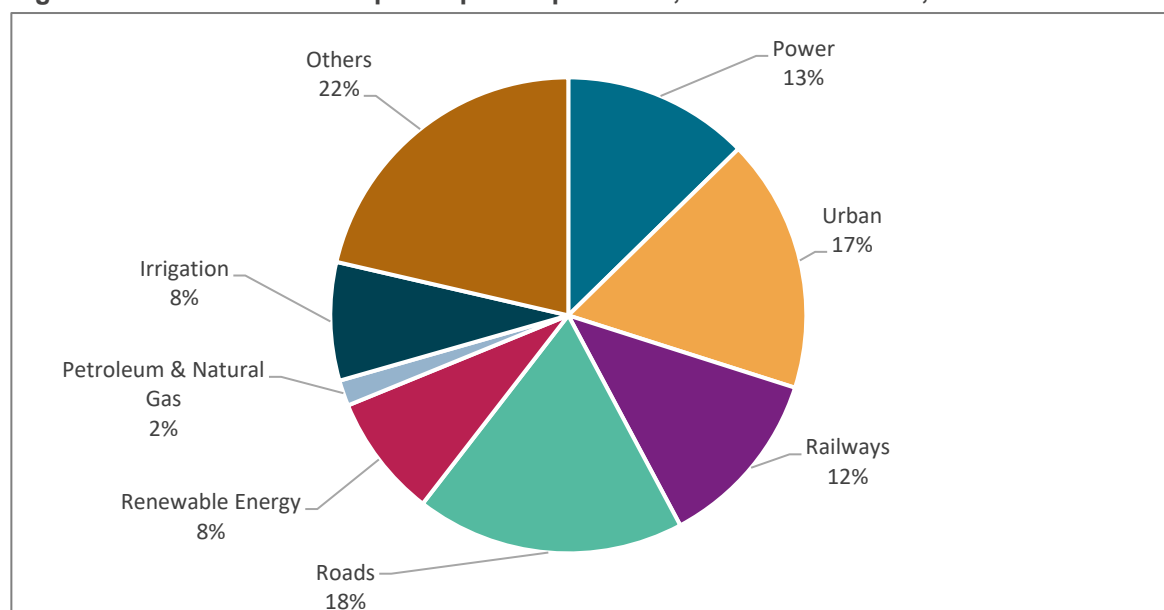
Jammu & Kashmir*	11,506,196	11,391,908	11,240,016	11,540,239	12,263,978	13,342,097	14,364,887
Jharkhand	22,927,447	23,175,539	21,948,331	24,585,559	26,353,058	28,328,396	30,317,823
Karnataka	108,510,063	115,139,320	112,431,068	124,865,369	138,006,542	146,257,769	157,029,777
Kerala	55,422,831	55,919,418	51,170,292	57,198,296	60,463,274	64,531,002	68,528,316
Madhya Pradesh	54,327,196	56,752,504	54,060,425	59,366,481	62,825,620	67,163,553	71,226,044
Maharashtra	195,738,075	204,661,365	185,213,247	205,884,506	225,570,788	243,525,921	261,226,310
Manipur	1,826,222	1,918,718	1,807,340	1,998,122	2,117,410	2,284,860	NA
Meghalaya	2,371,885	2,492,339	2,296,691	2,487,569	2,725,501	3,015,435	3,306,654
Mizoram	1,610,037	1,788,426	1,642,736	1,766,189	1,966,195	2,166,397	NA
Nagaland	1,686,771	1,847,679	1,767,309	1,829,215	1,870,098	2,060,989	NA
Odisha	38,673,286	39,742,750	38,897,906	45,283,628	45,178,536	48,350,933	51,657,546
Puducherry	2,620,889	2,641,198	2,413,674	2,460,446	2,516,725	2,716,402	2,931,644
Punjab	39,701,889	41,329,463	40,726,411	43,737,282	46,839,555	49,776,354	52,823,945
Rajasthan	64,327,828	67,831,563	66,596,319	72,546,375	77,919,609	84,059,861	90,629,367
Sikkim	1,862,497	1,949,204	1,955,700	2,124,027	2,294,796	2,490,231	NA
Tamil Nadu	120,466,736	124,383,550	124,465,002	134,281,685	142,573,553	155,782,101	173,218,858
Telangana	60,840,139	64,096,810	60,243,463	66,976,874	71,872,486	77,268,385	83,509,962
Tripura	3,675,396	3,806,335	3,640,386	3,951,628	4,263,303	4,622,534	5,026,163
Uttar Pradesh	112,247,470	116,903,465	111,546,600	124,079,891	133,306,365	145,203,275	158,263,609
Uttarakhand	18,608,274	18,974,039	16,678,624	17,463,481	18,947,327	20,431,484	21,781,681
West Bengal	73,892,038	76,179,371	70,404,231	78,600,391	83,125,109	88,189,219	94,185,372

Note: NA- Data Not Available

Source: RBI, MOSPI

2.9 Capital Expenditure in Infrastructure

Figure 8: Sector wise breakup of capital expenditure, INR 111 lakh crore, FY-20 to FY-25



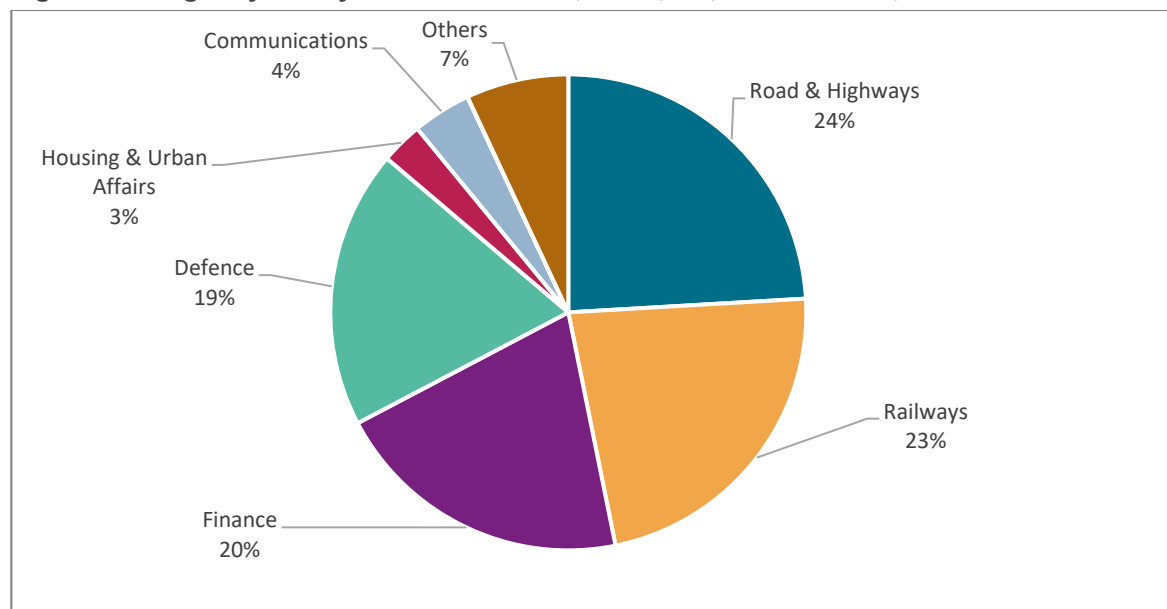
Others include Atomic Energy, Ports, Digital Communication, Agricultural, Education, etc

Source: Department of Economic Affairs

Roads command the largest share at 18%, reflecting a strong government focus on infrastructure development and connectivity, which is crucial for economic growth and logistics efficiency. The urban sector follows with 17%, highlighting investments in urban infrastructure, smart cities, housing, and municipal services to support rapid urbanization. Power accounts for 13%, emphasizing continued efforts to expand electricity generation, transmission, and distribution to meet rising demand. Railways take 12%, pointing towards modernization, electrification, and network expansion initiatives.

Irrigation and renewable energy each contribute 8%, indicating priority towards agricultural productivity and green energy transition respectively. However, Petroleum & Natural Gas has a relatively small share at 2%, suggesting that capital deployment in this sector is either slowing or being replaced with renewable and cleaner energy investments. The remaining 22% is classified as Others, which includes critical sectors such as atomic energy, ports, digital communication, agriculture, and education, underlining a balanced allocation for overall development.

Figure 9: Budgetary Outlay Towards Sectors, INR 1,221,752.53 Crores, FY2026-27



Others include Atomic Energy, Ports, Aviation, Consumer Affairs, Agriculture & Farmers Welfare, etc
Source: Union Budget 2026-27

The Union Budget 2026–27 reflects the Government of India’s continued focus on infrastructure development, economic resilience, and long-term structural growth. The total budgetary outlay towards key sectors amounts to INR 12,21,752.53 crore, with allocations distributed across strategic sectors including transportation infrastructure, financial services, defence, digital infrastructure, and urban development. Among these, Roads & Highways account for the largest share at 24%, followed by Railways at 23%, underscoring the government’s strong emphasis on strengthening physical connectivity and improving logistics efficiency across the country. Investments in transport infrastructure are expected to facilitate faster freight movement, enhance supply chain efficiency, and reduce logistics costs, which remain relatively high in India compared to global benchmarks.

The financial sector accounts for 20% of the total outlay, reflecting the government’s continued emphasis on strengthening financial systems, expanding access to credit, and supporting development finance initiatives that can catalyse investment across sectors. Defence receives 19% of the sectoral allocation, highlighting the government’s focus on national security and defence modernization, including initiatives aimed at enhancing domestic defence manufacturing and technological capabilities. Meanwhile, communications account for 4% of the outlay, indicating continued investments in digital infrastructure and telecommunications expansion to support digital governance, e-

commerce growth, and connectivity in underserved regions. Housing and Urban Affairs receive 3% of the allocation, supporting initiatives related to affordable housing, urban infrastructure, and sustainable city development. The remaining 7% categorized as “Others” includes sectors such as atomic energy, ports, aviation, agriculture and farmers’ welfare, and consumer affairs, reflecting the government’s efforts to support diversified economic development.

In addition to sectoral allocations, the Union Budget 2026–27 introduces several policy initiatives aimed at strengthening India’s long-term economic competitiveness and innovation ecosystem. The government announced a strategy to scale up manufacturing across seven strategic and frontier sectors, with targeted investments and policy support designed to enhance industrial capacity and integrate India more deeply into global value chains. As part of this effort, the Biopharma SHAKTI initiative, with an outlay of INR 10,000 crore over five years, aims to position India as a global hub for biopharmaceutical manufacturing through investments in research, technology development, and industry-academia collaboration.

The budget also places significant emphasis on strengthening the manufacturing and capital goods ecosystem, including the announcement of a ₹10,000 crore container manufacturing scheme and new high-technology tool room initiatives to support industrial capacity development and reduce import dependence in key sectors. These initiatives are expected to strengthen domestic manufacturing capabilities, enhance industrial productivity, and generate employment opportunities across related supply chains.

Further, the government has continued to support the growth of micro, small and medium enterprises (MSMEs) through expanded financial support mechanisms, including additional allocations to the Self-Reliant India Fund, aimed at improving access to risk capital for micro enterprises. The budget also proposes measures to enhance ease of doing business and trade facilitation, including the development of a single interconnected digital customs clearance system, which is expected to streamline trade processes, reduce compliance costs, and improve efficiency in cross-border trade.

3 Global Crude Oil & Natural Gas Market

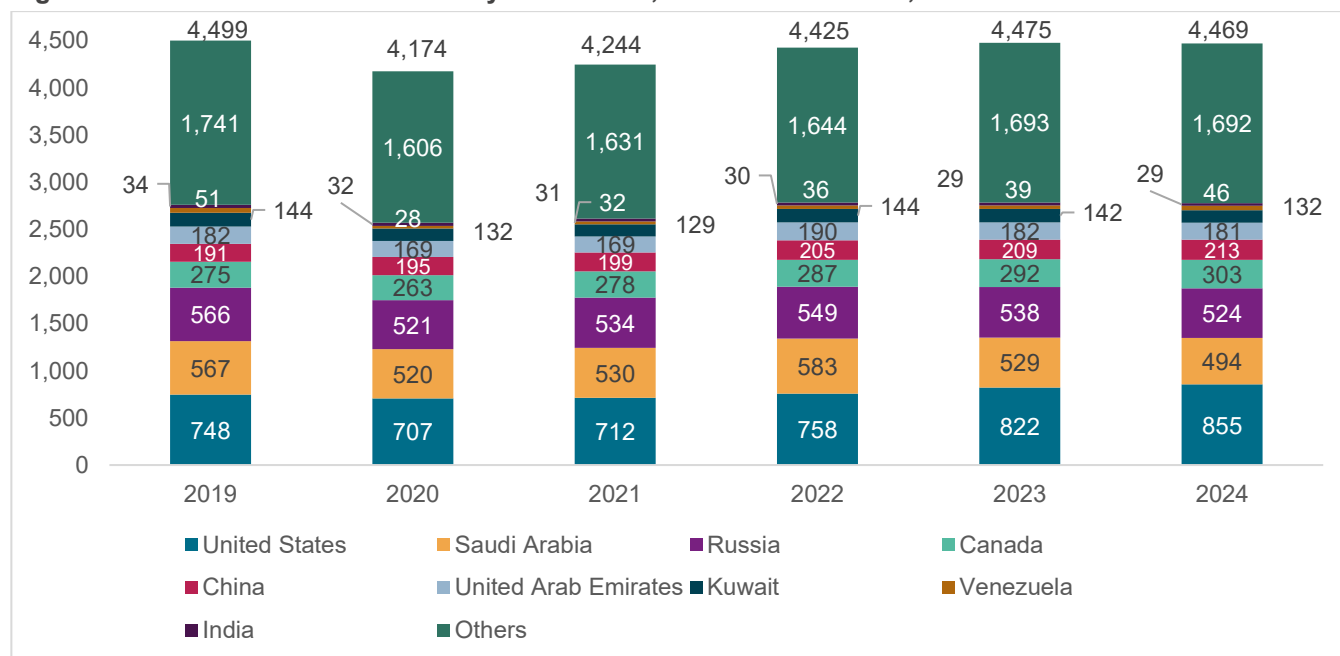
The global crude oil and natural gas industry represents one of the world's most significant and complex economic sectors, forming the backbone of modern energy systems. In the crude oil segment, the industry operates through a sophisticated three-tier supply chain structure. The upstream sector involves exploration and production activities, where companies utilize advanced technologies for discovering and extracting resources. The midstream sector encompasses transportation and storage infrastructure, including vast networks of pipelines, shipping terminals, and storage facilities. The downstream sector focuses on refining crude oil into usable products and distributing them to end-users through various channels.

In the natural gas sector, the United States, Russia, and Iran lead global production, with Russia, Iran, and Qatar holding the largest proven reserves. The natural gas market has been transformed by the growing importance of Liquefied Natural Gas (LNG), which has enabled global trade beyond traditional pipeline constraints. This development has created new market dynamics and trading patterns, particularly in serving Asian markets.

Market dynamics in both oil and gas sectors are influenced by multiple factors. Price fluctuations respond to geopolitical events, supply-demand balances, weather patterns, economic growth rates, and increasing competition from alternative energy sources. The industry faces significant challenges, including environmental concerns, carbon emission regulations, substantial investment requirements, geopolitical risks, and the ongoing energy transition toward renewable sources.

3.1 Crude Oil & Natural Gas Production

Figure 10: Crude Oil Production in Key Economies, Million Metric Tons, 2019 to 2024



Source: Enerdata, OPEC, PPAC CRISIL Intelligence

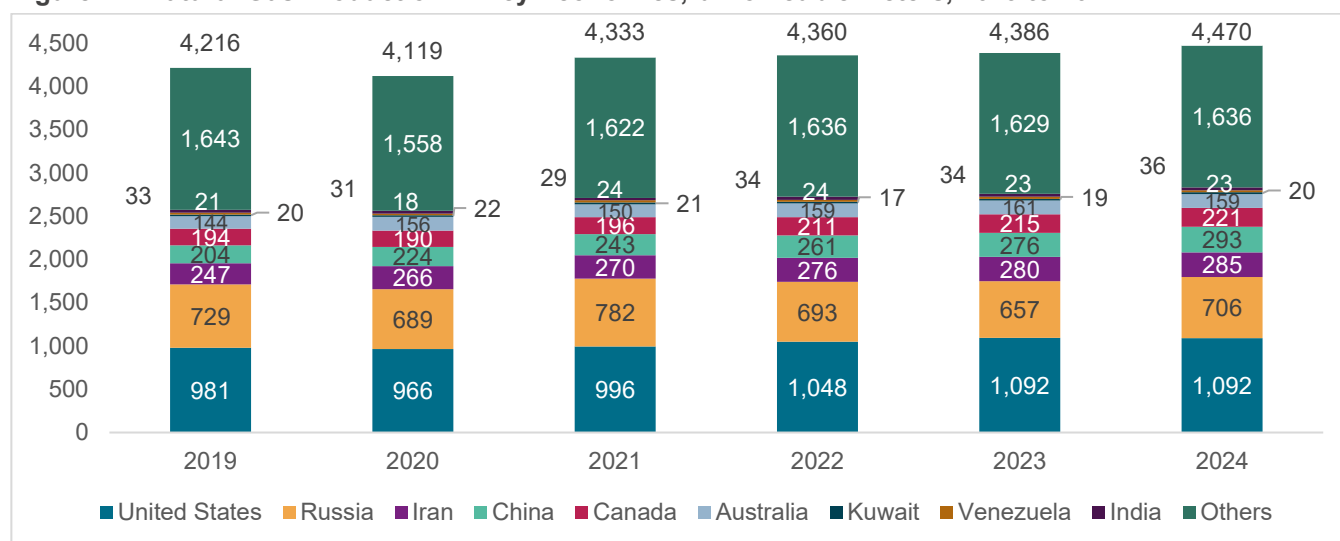
The United States remained the top producer, increasing its output from 748 million metric tons (MMT) in 2019 to 855 MMT in 2024, growing with a CAGR of 2.7%. Despite the sharp dip in 2020, U.S. production recovered due to advancements in shale oil extraction and improved operational efficiency. Saudi Arabia, on the other hand, saw a slight decline in production from 567 MMT in 2019 to 494 MMT in 2024, reflecting a -2.7% CAGR. The country's

production cuts were likely influenced by OPEC+ agreements aimed at stabilizing global oil prices. Similarly, Russia faced a more significant decline, with production decreasing from 566 MMT in 2019 to 524 MMT in 2024 (-1.5% CAGR), likely due to geopolitical challenges, western sanctions, and economic pressures affecting its oil industry.

Canada and China both showed steady growth, with Canada increasing its production from 275 MMT in 2019 to 303 MMT in 2024 (2.0% CAGR), while China grew from 191 MMT to 213 MMT (2.2% CAGR). These moderate increases suggest stable domestic demand and continued investments in oil extraction infrastructure.

OPEC members such as UAE and Kuwait displayed controlled and modest output changes. UAE production slightly dipped in 2020 but steadily rose to 181 MMT by 2024. Kuwait's production remained almost flat with minor fluctuations, from 144 MMT in 2019 to 132 MMT in 2024.

Figure 11: Natural Gas Production in Key Economies, billion cubic meters, 2019 to 2024



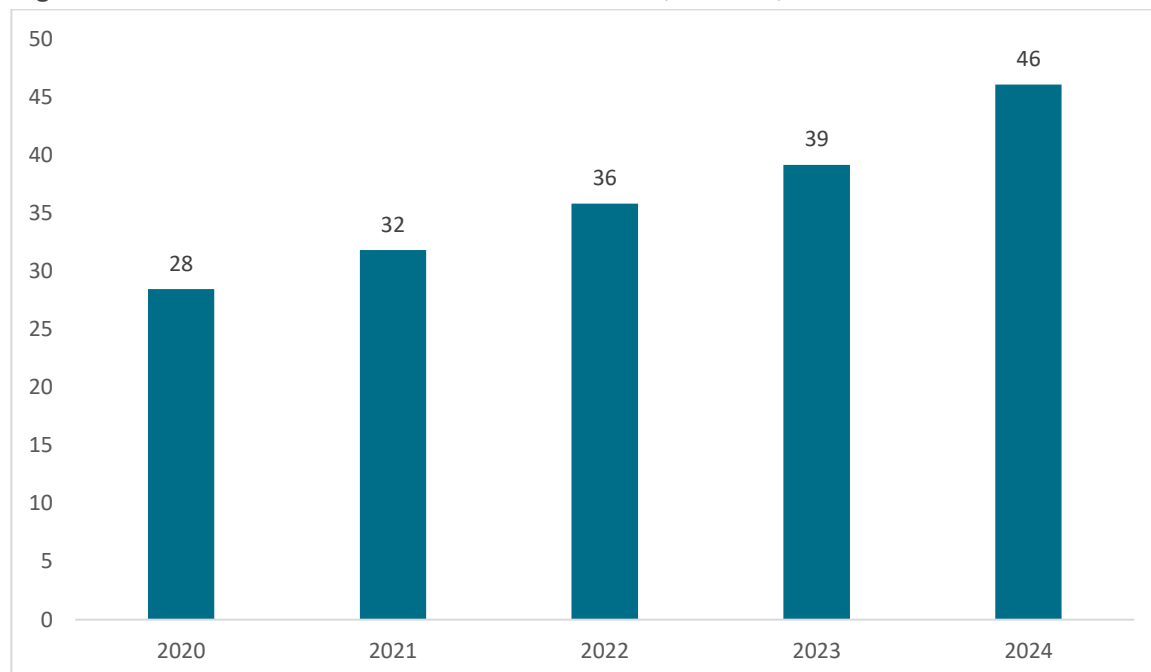
Source: Enerdata, OPEC, PPAC, CRISIL Intelligence

The United States remains the largest producer, consistently increasing its output from 981 bcm in 2019 to 1,092 bcm by 2024, reflecting steady investment in shale gas production and technological advancements. Russia, the second-largest producer, shows a slight decline from 1,697 bcm in 2019 to 1,694 bcm in 2024, largely due to geopolitical factors, sanctions, and changing export markets.

Iran's production shows gradual growth from 247 bcm in 2019 to 285 bcm in 2024, supported by its large reserves and domestic demand. China displays a continuous increase from 204 bcm in 2019 to 293 bcm in 2024, driven by policies to expand cleaner energy sources and reduce coal dependency. Canada and Australia maintain relatively stable production with minor fluctuations, reflecting mature gas industries and limited capacity expansions. Kuwait's contribution remains very small but consistent.

3.2 Crude Oil Production Trend in Venezuela

Figure 12: Crude Oil Production Trend in Venezuela, MMTPA, 2020 - 2024



Source: OPEC Statistical Bulletin 2025, Crisil Intelligence

Venezuela’s crude oil production has shown a gradual recovery over the period 2020–2024, following a sharp decline in the late 2010s due to economic sanctions, operational challenges, and declining investment in the oil sector. Crude oil production in Venezuela increased from approximately 28 MMTPA in 2020 to around 46 MMTPA in 2024, reflecting a steady improvement in output levels. This represents an overall increase of roughly 64% during the period, indicating a gradual stabilization of the country’s upstream oil sector.

The recovery trend is largely attributable to the reopening of certain oil fields, improved operational efficiencies within the state-owned oil company *Petróleos de Venezuela, S.A. (PDVSA)*, and the involvement of foreign partners in joint ventures. On a daily production basis, Venezuela’s crude oil output increased from historically low levels during the pandemic period to ~0.9–0.95 million barrels per day in 2024, up from significantly lower levels earlier in the decade.

Despite this improvement, Venezuela’s production levels remain significantly below historical peaks. The country produced over 3 million barrels per day in the late 1990s and early 2000s, supported by large investments and relatively advanced upstream infrastructure. However, a combination of economic sanctions, underinvestment, operational disruptions, and infrastructure deterioration led to a prolonged decline in production capacity over the past decade.

The gradual increase in production between 2020 and 2024 can also be attributed to partial easing of international sanctions and the resumption of operations in several upstream projects. Joint venture operations between PDVSA and international energy companies have supported output recovery, particularly in the Orinoco Belt, which contains some of the world’s largest heavy oil reserves. However, structural challenges such as aging infrastructure, limited access to investment capital, and the technical complexity associated with producing extra-heavy crude continue to constrain the pace of recovery.

Furthermore, given Venezuela’s position as the country with the largest proven crude oil reserves globally, estimated at over 300 billion barrels, sustained investment, improved infrastructure, and stable policy frameworks could support further production recovery in the medium to long term.

3.3 Crude Oil Production Trend in India

Figure 13: Crude Oil Production Trend in India, MMTPA, 2020 - 2025



Source: PPAC, Crisil Intelligence

India’s domestic crude oil production has exhibited a moderate declining trend between FY-2020 and FY-2025, reflecting the structural challenges faced by the country’s upstream oil sector. According to data from the Petroleum Planning and Analysis Cell, crude oil production declined from ~32 MMTPA in FY-2020 to around 29 MMTPA in FY-2025, indicating a gradual reduction in domestic output over the period. Production decreased to ~31 MMTPA in FY-2021 and further to 30 MMTPA in FY-2022, before stabilizing at around 29 MMTPA in both FY-2024 and FY-2025.

The decline in crude oil production is largely attributable to the maturing nature of several key oil fields, particularly those operated by public sector companies such as Oil and Natural Gas Corporation and Oil India Limited. Many of India’s major producing basins, including the Mumbai Offshore Basin, have been in operation for several decades and are experiencing natural reservoir depletion. As production from these mature fields gradually declines, maintaining output levels has become increasingly challenging despite enhanced oil recovery techniques and technological interventions.

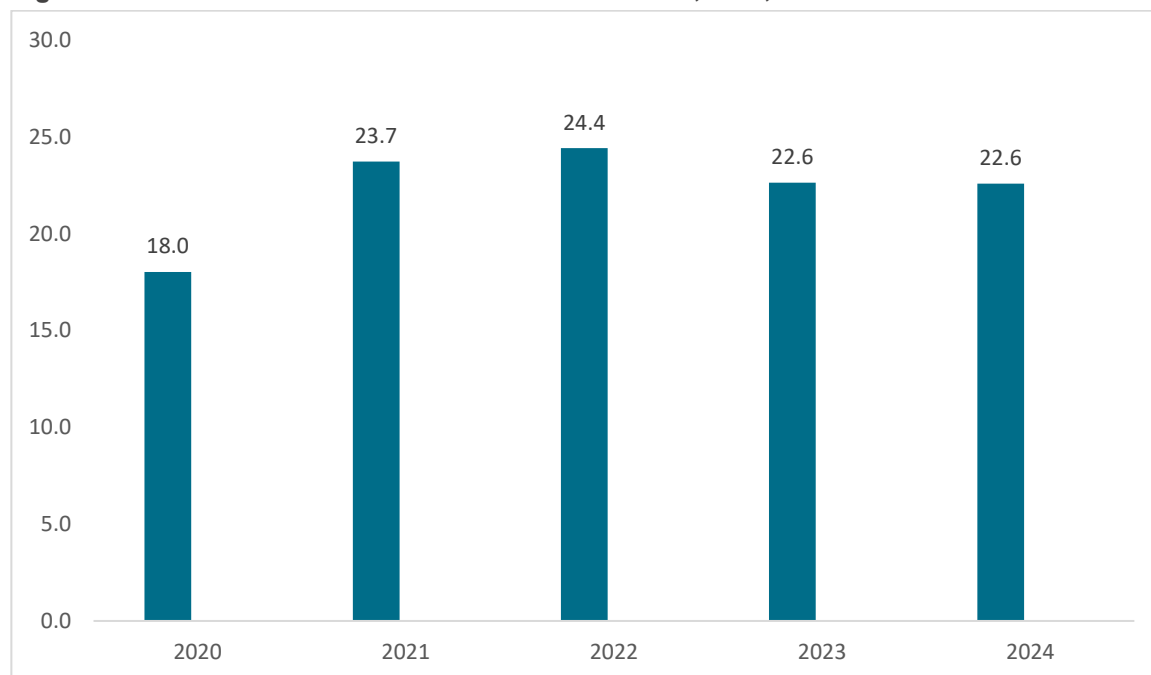
In addition to geological factors, limited exploration success and declining output from older fields have contributed to the stagnation in production levels. While new discoveries and development projects have been undertaken in recent years, they have not been sufficient to fully offset the decline from mature assets. Consequently, domestic crude production has remained relatively flat at around 29–30 MMTPA in recent years.

Recognizing the need to strengthen domestic hydrocarbon production, the government has introduced several policy initiatives aimed at encouraging exploration and investment in the upstream sector. These include the Hydrocarbon

Exploration and Licensing Policy (HELP) and the Open Acreage Licensing Policy (OALP) launched by the Ministry of Petroleum and Natural Gas, Government of India, which aim to provide greater operational flexibility to exploration companies and attract private and international investment into India’s upstream sector. Additionally, initiatives to promote enhanced recovery from existing fields and the development of new offshore and deepwater blocks are expected to support production over the medium to long term.

3.4 Natural Gas Production Trend in Venezuela

Figure 14: Natural Gas Production Trend in Venezuela, bcm, 2020 - 2024



Source: OPEC Statistical Bulletin 2025, Crisil Intelligence

Venezuela’s natural gas production has demonstrated moderate growth followed by relative stabilization during the period 2020–2024, reflecting gradual improvements in the country’s upstream hydrocarbon sector. According to data compiled from the Organization of the Petroleum Exporting Countries Statistical Bulletin and industry sources, natural gas production in Venezuela increased from ~18 bcm in 2020 to ~24 bcm in 2021, representing a significant year-on-year recovery following earlier disruptions in the energy sector. Production remained stable at approximately 24 bcm in 2022, indicating a period of operational stabilization in the country’s gas production infrastructure.

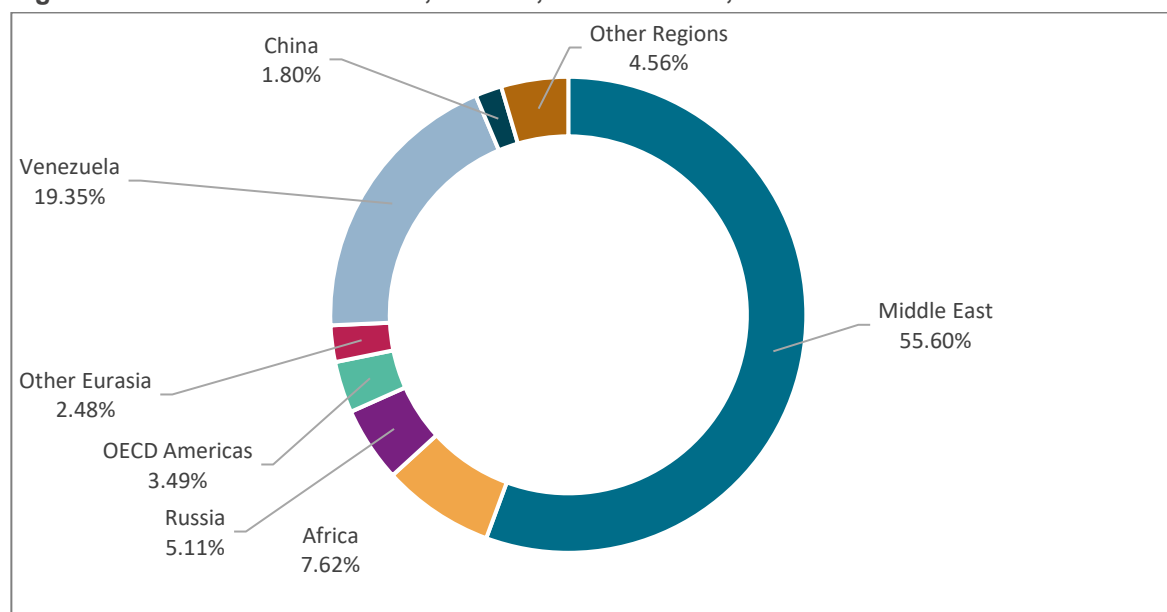
In subsequent years, natural gas production experienced a moderate decline to around 23 bcm in 2023, where it remained broadly stable in 2024 at approximately 23 bcm. The slight reduction reflects ongoing structural challenges in Venezuela’s hydrocarbon sector, including aging infrastructure, limited investment in upstream gas development, and operational constraints within the state-owned energy company *Petróleos de Venezuela, S.A.*. Despite these constraints, production levels have largely stabilized since 2022, indicating some degree of operational recovery in the country’s natural gas sector.

Venezuela possesses substantial natural gas reserves, particularly in offshore regions such as the *Mariscal Sucre* and *Plataforma Deltana* projects, which are considered key to the country’s long-term gas development strategy. However, the full development of these resources has been constrained by financial limitations, infrastructure gaps, and international sanctions, which have restricted foreign investment and technological collaboration. As a result, Venezuela’s gas production remains below its long-term potential despite the availability of large reserves.

Furthermore, natural gas is increasingly being viewed as an important component of Venezuela’s future energy strategy, particularly for supporting domestic electricity generation, industrial consumption, and potential regional exports. Continued policy reforms, improved investment conditions, and the development of offshore gas projects could support gradual growth in Venezuela’s natural gas production over the medium to long term.

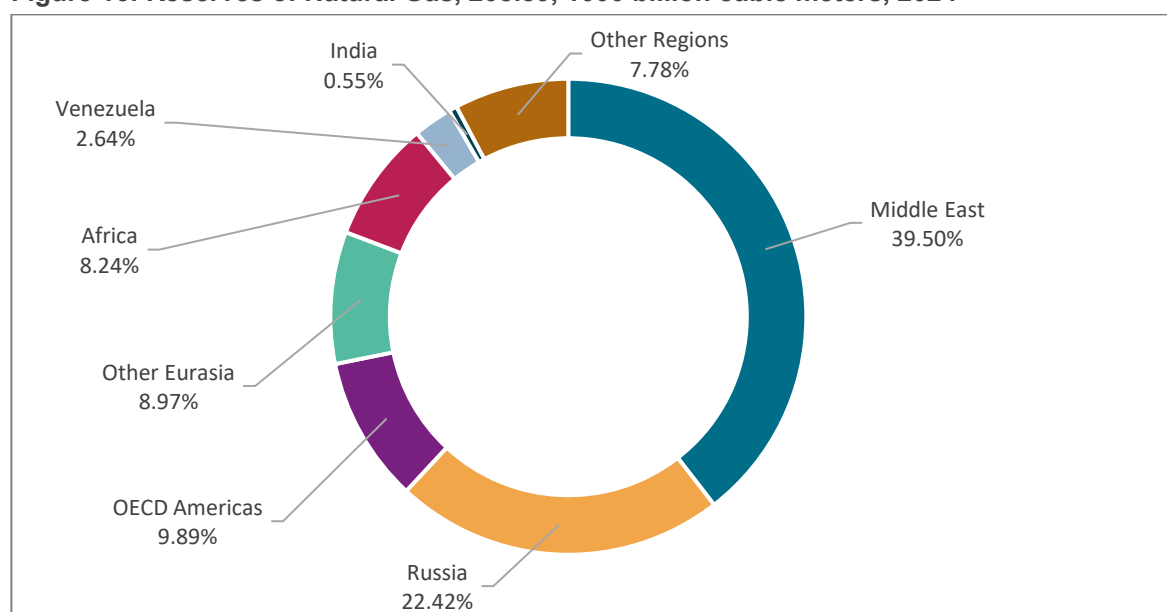
3.5 Oil & Gas Reserves

Figure 15: Reserves of Crude Oil, 1566.87, billion barrels, 2024



Source: OPEC, CRISIL Intelligence

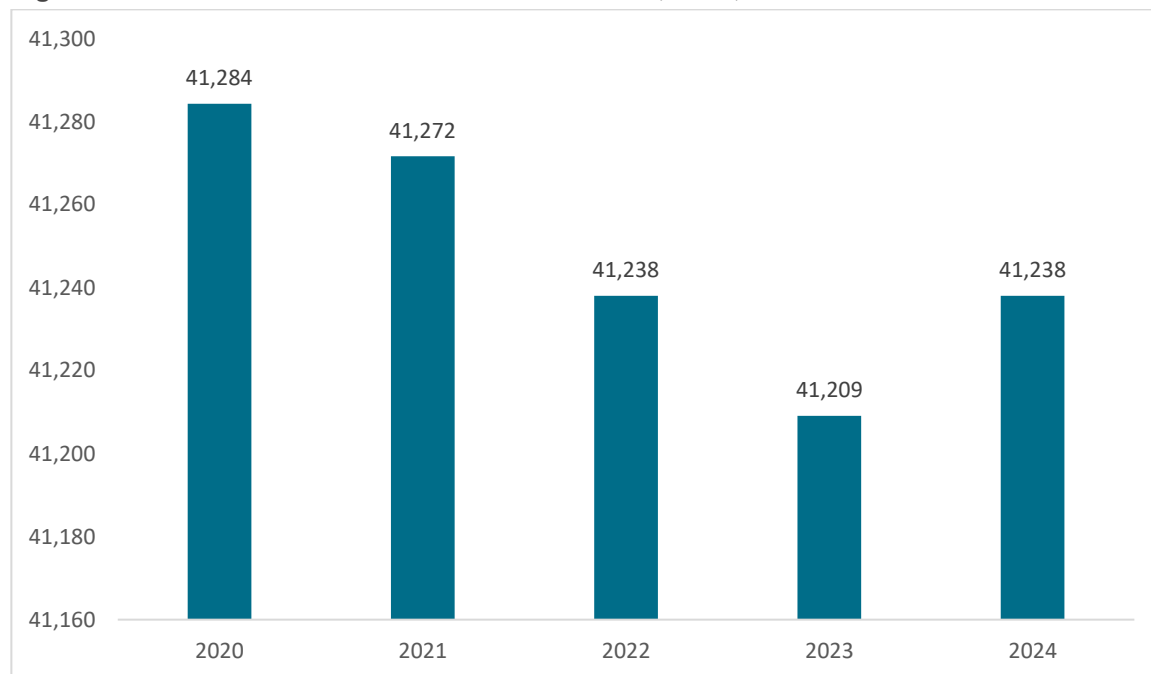
Figure 16: Reserves of Natural Gas, 208.89, 1000 billion cubic meters, 2024



Source: OPEC, CRISIL Intelligence

3.1 Oil & Gas Reserves in Venezuela

Figure 17: Proven Crude Oil Reserves in Venezuela, MMT, 2020-2024



Source: OPEC Statistical Bulletin 2025, Crisil Intelligence

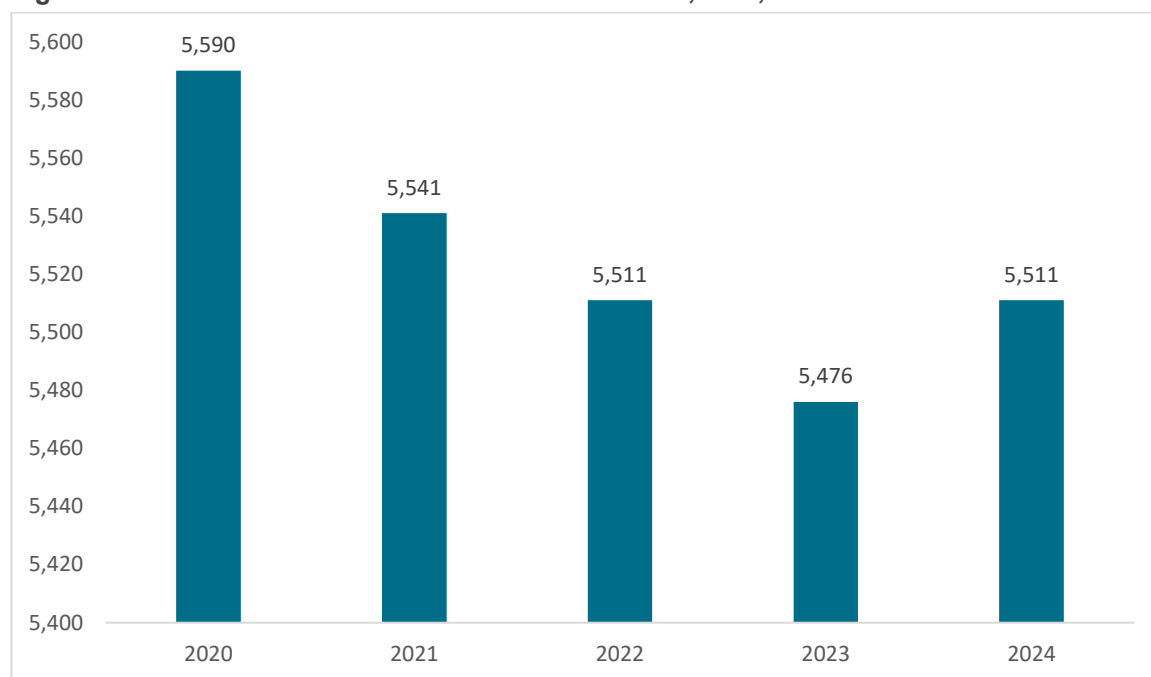
Venezuela holds the largest proven crude oil reserves globally, primarily concentrated in the Orinoco Belt, which contains vast deposits of extra-heavy crude oil. Venezuela’s proven crude oil reserves have remained broadly stable over the period 2020–2024, reflecting the country’s substantial and relatively unchanged hydrocarbon resource base.

Despite minor year-to-year fluctuations, the overall trend suggests that Venezuela’s proven reserves have remained largely stable at around 41,200–41,300 MMT during the period, highlighting the country’s significant long-term hydrocarbon potential. The slight variations observed in the data are typically attributable to technical revisions in reserve estimation methodologies, production activities, and updates to field development plans, rather than major new discoveries or large-scale depletion.

A substantial portion of Venezuela’s crude reserves consists of extra-heavy crude located in the Orinoco Oil Belt, one of the largest hydrocarbon accumulations in the world. While these reserves provide significant long-term production potential, the extraction and upgrading of extra-heavy crude require advanced technology, specialized infrastructure, and significant capital investment, which has historically constrained the pace of production development.

Notwithstanding these challenges, Venezuela’s extensive reserve base positions the country as a strategically important player in the global oil market. With appropriate investment, technological support, and stable regulatory frameworks, the development of these reserves could support increased production capacity over the long term.

Figure 18: Proven Natural Gas Reserves in Venezuela, bcm, 2020-2024



Source: OPEC Statistical Bulletin 2025, Crisil Intelligence

Venezuela possesses significant natural gas reserves, positioning the country as an important holder of hydrocarbon resources in Latin America. Venezuela’s proven natural gas reserves have remained broadly stable between 2020 and 2024, with only moderate fluctuations observed during the period.

Venezuela’s natural gas reserves have remained relatively stable within the range of approximately 5,470–5,590 bcm during the period, reflecting the country’s substantial natural gas resource potential. The observed fluctuations are generally attributable to technical revisions in reserve estimates, changes in field development plans, and periodic updates in reservoir assessments, rather than large-scale discoveries or significant depletion.

A large share of Venezuela’s natural gas reserves is located in offshore basins in the Caribbean Sea, including projects such as Mariscal Sucre and Plataforma Deltana, which are considered key areas for future gas development. However, the pace of development of these reserves has historically been constrained by limited investment, infrastructure challenges, and operational limitations within the upstream sector.

Nevertheless, Venezuela’s extensive gas reserves provide long-term opportunities for expanding domestic gas production, supporting electricity generation, and potentially enabling regional gas exports, subject to improvements in investment conditions and upstream infrastructure development.

3.2 Technological Advancements in Exploration

Seismic Imaging Technologies: Advanced seismic imaging has revolutionized oil exploration through several key developments.

- **4D Seismic Technology:** This adds the dimension of time to traditional 3D imaging, allowing companies to monitor reservoir changes over time and optimize production strategies.
- **Wide-Azimuth Surveys:** Provides better subsurface imaging by collecting data from multiple angles, particularly useful in complex geological formations.

- **Full Waveform Inversion (FWI):** Uses advanced algorithms to create highly detailed subsurface models, improving accuracy in reservoir characterization.

Artificial Intelligence and Machine Learning Applications: The integration of AI/ML has transformed exploration capabilities.

- **Pattern Recognition:** AI algorithms analyze vast amounts of geological and seismic data to identify potential hydrocarbon deposits more accurately.
- **Predictive Analytics:** Machine learning models predict reservoir behavior and optimize drilling locations.
- **Automated Interpretation:** AI-powered systems can rapidly process and interpret seismic data, reducing analysis time and human error.

Advanced Drilling Technologies: Modern drilling techniques have enhanced exploration efficiency.

- **Directional Drilling:** Allows precise control of well paths to reach multiple targets from a single surface location.
- **Measurement While Drilling (MWD):** Provides real-time data about drilling conditions and formation characteristics.
- **Logging While Drilling (LWD):** Enables immediate analysis of formation properties during drilling operations.

Digital Twin Technology: This innovation creates virtual replicas of physical assets.

- **Real-time Monitoring:** Enables continuous monitoring of exploration and drilling operations.
- **Scenario Planning:** Allows testing of different exploration strategies in a virtual environment.
- **Risk Management:** Helps identify potential issues before they occur in actual operations.

Remote Sensing and Satellite Technology: Modern remote sensing capabilities enhance exploration.

- **Hyperspectral Imaging:** Identifies surface indicators of hydrocarbon presence.
- **Satellite-based Gravity and Magnetic Surveys:** Helps identify promising geological structures.
- **Environmental Monitoring:** Ensures compliance with regulations and minimizes environmental impact.

Data Analytics and Cloud Computing: Advanced computing capabilities have transformed data processing.

- **Big Data Analytics:** Processes enormous volumes of exploration data to identify patterns and opportunities.
- **Cloud-based Processing:** Enables rapid analysis of seismic data and collaboration across global teams.
- **Real-time Decision Making:** Facilitates quick responses to changing conditions during exploration.

Electromagnetic Survey Technologies: New electromagnetic methods enhance traditional seismic.

- **Controlled Source Electromagnetic (CSEM) Surveys:** Identifies resistivity contrasts indicating hydrocarbon presence.
- **Magnetotelluric Surveys:** Provides deep imaging of geological structures.
- **Integration with Seismic Data:** Creates more comprehensive subsurface models.

Robotics and Autonomous Systems: Automation has improved exploration efficiency.

- **Autonomous Underwater Vehicles (AUVs):** Conduct seafloor surveys and collect data in deep water.
- **Drone Technology:** Performs aerial surveys and monitors operations.
- **Robotic Drilling Systems:** Increases precision and safety in drilling operations.

Environmental Monitoring Technologies: Advanced monitoring ensures environmental compliance:

- **Leak Detection Systems:** Uses advanced sensors to identify potential environmental hazards.
- **Environmental Impact Assessment Tools:** Evaluates potential environmental effects of exploration activities.
- **Biodiversity Monitoring:** Tracks impact on local ecosystems.

Future Trends and Developments: Emerging technologies continue to shape the industry.

- **Quantum Computing:** May revolutionize data processing and analysis capabilities.

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- **Advanced Materials:** New materials improve drilling equipment durability and efficiency.
- **Edge Computing:** Enables faster processing of exploration data in remote locations.

Integration and Optimization: Modern exploration requires integrated approaches.

- **Multi-physics Integration:** Combines different data types for better understanding.
- **Real-time Optimization:** Adjusts exploration strategies based on incoming data.
- **Cross-disciplinary Collaboration:** Brings together various expertise for better results.

3.3 Growth Across Key Sectors

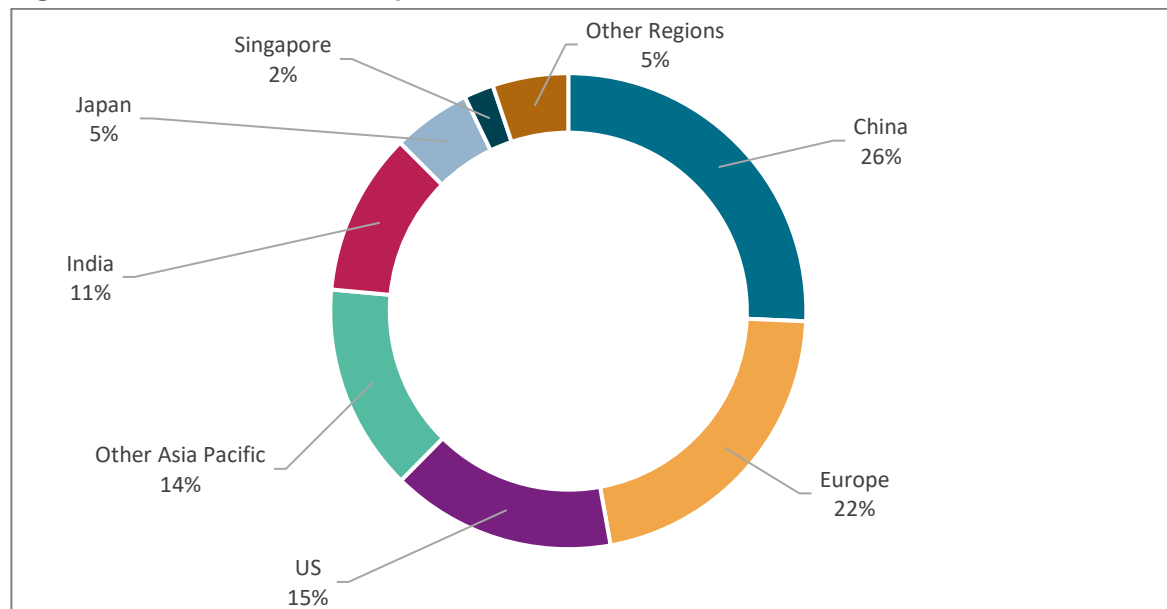
The growth in demand for crude oil and natural gas across key sectors presents a complex and evolving landscape in the global energy market. In the transportation sector, crude oil continues to maintain its position as the predominant fuel source, with particularly robust growth observed in developing economies, especially across Asia. However, this growth is experiencing a gradual slowdown in developed nations due to the increasing adoption of electric vehicles and alternative fuel technologies. The aviation industry's fuel demand is showing signs of recovery post-pandemic, while marine transport maintains a steady growth trajectory. Natural gas in transportation, while less prominent than oil, is gaining traction, especially in heavy-duty vehicles and shipping through LNG applications, though its use in passenger vehicles remains limited. There's also a notable trend of increased natural gas adoption in public transportation systems across various regions.

In the power generation sector, there's a marked shift in the dynamics between oil and natural gas usage. Crude oil's role in power generation is diminishing, with its application primarily restricted to backup fuel systems or remote locations where alternatives are less viable. This decline is largely driven by environmental concerns and the push for cleaner energy sources. Conversely, natural gas is experiencing substantial growth in this sector as many countries transition away from coal-based power generation. Natural gas is increasingly preferred for baseload power generation due to its lower environmental impact and its ability to complement renewable energy sources. The demand for LNG power plants is also on the rise, particularly in regions seeking to diversify their energy mix.

The industrial sector presents a more balanced picture of demand for both fuels. Crude oil maintains steady demand primarily due to its crucial role in petrochemical production and various manufacturing processes, serving as an essential feedstock for numerous industrial products. Natural gas, meanwhile, is experiencing significant growth in industrial applications, particularly in heating processes and manufacturing. Its role as a chemical feedstock is expanding, and there's growing interest in its potential for hydrogen production. The industrial sector's demand for both fuels is largely driven by economic growth, technological advancements, and the ongoing evolution of manufacturing processes. This sector's consumption patterns are also increasingly influenced by environmental regulations and the global push toward cleaner industrial processes, though the transition varies significantly across regions and industries.

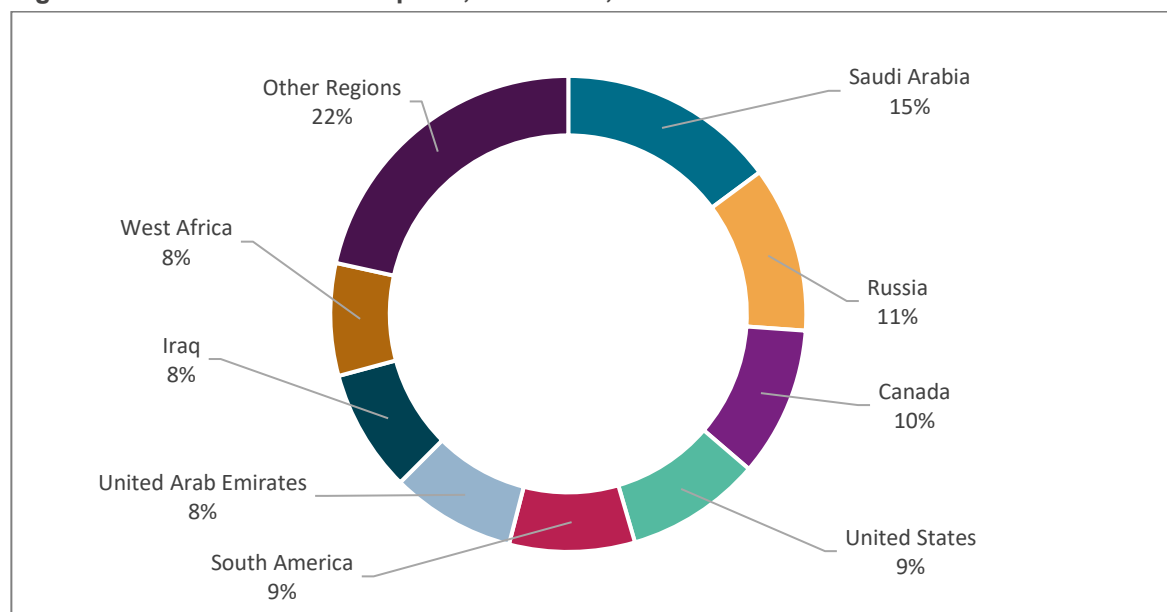
3.4 Global Trade

Figure 19: Global Crude Oil Imports, 2158 MMT, 2024



Source: CRISIL Intelligence

Figure 20: Global Crude Oil Exports, 2127 MMT, 2024



Source: CRISIL Intelligence

3.5 Impact on Crude Oil & Natural Gas Industry with Advancements in Electrical Vehicles (EVs)

The advancement of electric vehicles (EVs) globally is creating significant ripple effects throughout the crude oil and natural gas industry, marking one of the most substantial transformations in the energy sector's history. The transportation sector, which currently accounts for approximately 60% of global oil demand, stands at the forefront of this change. According to International Energy Agency (IEA) projections, the growing adoption of EVs could

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potentially reduce oil demand by 2-4 million barrels per day by 2030, representing a considerable shift in consumption patterns.

This transformation is particularly impacting the crude oil industry through multiple channels. The most immediate effect is the gradual reduction in gasoline and diesel consumption, which is creating downward pressure on oil prices. This price pressure is forcing oil companies to reevaluate their production levels and investment strategies, with some high-cost oil production projects potentially becoming economically unviable. In response, many oil companies are diversifying their portfolios by investing in renewable energy and EV charging infrastructure, while simultaneously reducing capital expenditure in new oil exploration and focusing on optimizing costs in existing operations.

The natural gas industry, however, is experiencing more nuanced effects from the EV revolution. Unlike oil, natural gas may actually benefit from increased electricity demand for EV charging. Natural gas power plants, which often provide baseload power for EV charging, are playing a crucial role as a bridge fuel during the transition to renewables. Their ability to provide flexible power generation to support grid stability makes them an important component of the evolving energy landscape.

Industry adaptation strategies are becoming increasingly sophisticated as companies navigate this transition. Major oil and gas companies are actively investing in renewable energy, developing EV charging networks, and researching alternative fuel technologies. However, the impact varies significantly across regions, with different adoption rates and market opportunities, particularly in developing countries. This transition is expected to occur gradually over several decades, providing time for industry adaptation while accounting for regional differences in adoption rates.

3.6 Government Policies & Environmental Regulations

United States

The United States maintains a predominantly market-based approach to oil and gas regulation, characterized by a complex interplay of federal and state oversight. The federal government, through agencies like the Environmental Protection Agency (EPA) and Bureau of Land Management (BLM), establishes baseline regulations while states retain significant authority over production within their borders. Key federal legislation includes the Clean Air Act, Clean Water Act, and Safe Drinking Water Act, which collectively governs emissions, water quality, and waste disposal in oil and gas operations. The EPA's New Source Performance Standards regulate methane emissions from new and modified facilities, while the BLM oversees leasing on federal lands. Environmental impact assessments are mandatory for major projects, and operators must obtain various permits addressing air quality, water discharge, and waste management. The US maintains the Strategic Petroleum Reserve as a buffer against supply disruptions and has recently emphasized reducing methane emissions and promoting cleaner production technologies. States like Texas, Alaska, and North Dakota have additional regulations specific to their territories, creating a multi-layered regulatory framework.

China

China's oil and gas sector is dominated by state-owned enterprises operating under strict government oversight. The industry is primarily controlled by three national oil companies: CNPC, Sinopec, and CNOOC. Environmental regulations have become increasingly stringent under the Environmental Protection Law and Air Pollution Prevention Law, reflecting China's growing emphasis on environmental protection and climate change mitigation. The country has committed to reaching peak carbon emissions by 2030 and carbon neutrality by 2060, leading to stricter emissions standards and environmental impact assessment requirements for oil and gas operations. China's energy security concerns have driven significant overseas investments through the Belt and Road Initiative while domestic policies focus on increasing natural gas consumption to reduce coal dependency. The government has implemented comprehensive environmental monitoring systems and requires detailed environmental impact assessments for all major oil and gas projects. Recent reforms have introduced market-oriented elements while maintaining strong state control over strategic resources.

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Russia

Russia's oil and gas sector is characterized by strong state influence, primarily through major companies like Gazprom and Rosneft. The regulatory framework is governed by the Federal Law on Environmental Protection and the Subsoil Law, which establish requirements for resource extraction and environmental protection. The country has implemented gas flaring restrictions and environmental impact assessment requirements, though enforcement can be variable. Russia's energy policy emphasizes export markets, particularly to Europe and increasingly to Asia, while maintaining strategic control over resources. The tax system includes incentives for new field development, particularly in challenging Arctic regions. Environmental regulations include waste management requirements and emissions controls, though these are generally less stringent than in Western countries. Recent years have seen increased attention to environmental concerns, particularly regarding Arctic development and methane emissions, though economic priorities often take precedence.

Saudi Arabia

Saudi Arabia's oil and gas sector operates under the near-complete control of Saudi Aramco, the state-owned oil company. The kingdom's policies are closely aligned with OPEC decisions and its Vision 2030 economic diversification plan. Environmental regulations have become more prominent in recent years, with the implementation of Environmental Protection Standards and participation in the Zero Routine Flaring initiative. The country requires environmental impact assessments for major projects and has established the National Environmental Strategy to address environmental challenges. Saudi Arabia has also set ambitious targets for methane emissions reduction and has invested in technologies to improve production efficiency and reduce environmental impact. The kingdom's environmental regulations balance the need for continued oil production with growing international pressure for environmental protection. Recent initiatives include investments in carbon capture technology and renewable energy projects, though oil remains the cornerstone of the economy.

Canada

Canada's oil and gas sector operates under a unique federal-provincial framework, with provinces having primary jurisdiction over natural resources within their boundaries. The industry is characterized by significant private sector participation, particularly in the oil sands region of Alberta. Environmental regulations are governed by the Canadian Environmental Protection Act and the Impact Assessment Act at the federal level, complemented by provincial regulations. Canada has implemented a national carbon pricing system and strict methane emissions regulations. The country requires comprehensive environmental impact assessments for major projects and has specific regulations for oil sands development. Provincial authorities, particularly in Alberta and British Columbia, maintain additional environmental requirements and oversight. Recent years have seen increased focus on balancing resource development with environmental protection, including Indigenous consultation requirements and stricter emissions controls.

United Arab Emirates

The UAE's oil and gas sector are primarily controlled by the Abu Dhabi National Oil Company (ADNOC), operating under the emirate's Vision 2030 economic diversification strategy. Environmental regulations are governed by Federal Environmental Law, which requires comprehensive environmental impact assessments for all major projects. The UAE has implemented a zero flaring policy and strict greenhouse gas emissions regulations while pursuing sustainable development goals. The country has made significant investments in clean energy technologies while maintaining its position as a major oil producer. Environmental regulations emphasize water conservation, given the region's arid climate, and include strict requirements for waste management and emissions control. The UAE has positioned itself as a leader in environmental protection among Gulf states, implementing advanced monitoring systems and investing in carbon capture and storage technology. Recent policies reflect a balance between maintaining oil production capacity and advancing environmental protection goals.

Kuwait

Kuwait's oil and gas industry is fundamentally shaped by robust government policies and stringent environmental regulations, primarily overseen by the Ministry of Oil, the Kuwait Petroleum Corporation (KPC), and the Kuwait Environment Public Authority (KEPA). The Ministry of Oil is responsible for policy formulation and regulation, while KPC, a state-owned entity, manages the entire oil sector through its diverse subsidiaries, known as "K Companies." Environmental oversight is predominantly handled by KEPA, which enforces the Environmental Protection Law. This law mandates strict emission standards for industrial installations and promotes sustainable practices to combat pollution. Additionally, laws requires environmental impact assessments for major projects, ensuring their long-term sustainability. Further regulations, such as Decree No. 2 of 2017, introduce specific requirements for oil and gas facilities to reduce and control emissions. These laws collectively aim to protect Kuwait's natural environment and maintain its ecological balance, reflecting a commitment to integrating environmental considerations into industrial development.

India

India's oil and gas sector operates under a mixed regulatory framework combining strong government oversight with increasing market-oriented reforms. The sector is primarily governed by the Ministry of Petroleum and Natural Gas, with the Directorate General of Hydrocarbons (DGH) responsible for upstream technical regulation and the Petroleum and Natural Gas Regulatory Board (PNGRB) overseeing downstream infrastructure such as pipelines, refining, and gas distribution networks.

India's oil and gas sector is undergoing a major shift toward a more liberalized, market-oriented regime while balancing acute energy security needs. Historically dominated by state-owned enterprises (SOEs) like ONGC and GAIL, the government has increasingly opened the sector to private and foreign investment through the Hydrocarbon Exploration and Licensing Policy (HELP) and Open Acreage Licensing Policy (OALP), which utilize a revenue-sharing model. In early 2026, the regulatory landscape saw significant tightening in response to regional supply crises; the Natural Gas (Supply Regulation) Order, 2026 was enacted, granting the government overriding authority to divert gas from industrial sectors (like petrochemicals) to priority sectors such as domestic LPG and transport.

Environmental regulations are governed by the Ministry of Environment, Forest and Climate Change (MoEFCC), with a growing focus on the Green Hydrogen Mission and Ethanol Blending Program (targeting 20% by 2026). While India mandates rigorous Environmental Impact Assessments (EIAs) for upstream projects, the government has recently streamlined clearances through "single-window" digital systems to accelerate domestic production and reduce import dependency.

Venezuela

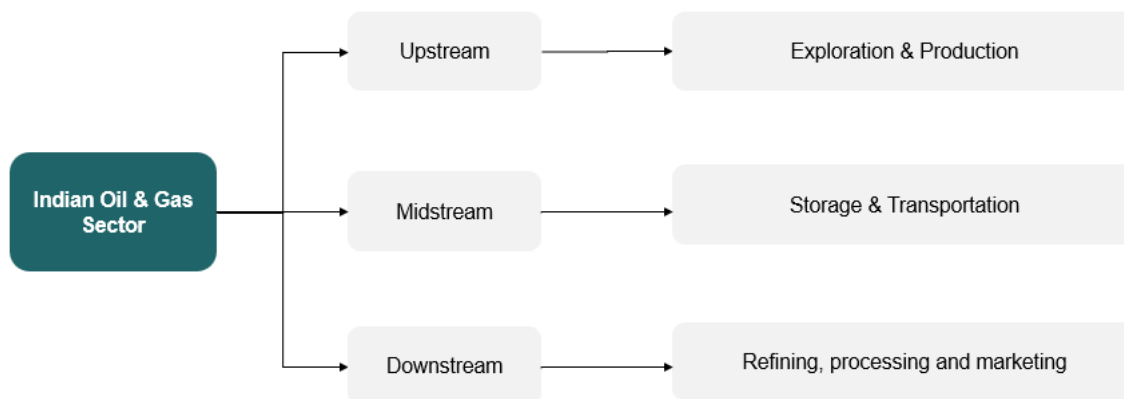
Venezuela's oil and gas sector is characterized by strong state control and centralized regulation, with the industry historically dominated by the national oil company *Petróleos de Venezuela, S.A. (PDVSA)*. The regulatory framework is primarily governed by the Organic Hydrocarbons Law and the Gas Law, which establish the legal basis for exploration, production, transportation, and commercialization of hydrocarbons. Under this framework, private companies typically participate in upstream activities through joint ventures or "mixed companies" in which the Venezuelan state retains majority ownership and operational control.

Oil and gas projects are subject to a comprehensive fiscal regime that includes royalties, extraction taxes, income tax, and additional levies linked to oil price levels. Environmental and operational approvals must be obtained from the Ministry of Oil and the Ministry of the Environment, which oversee permitting, environmental impact assessments, and compliance requirements for hydrocarbon projects. Regulations also mandate environmental safeguards during project development and decommissioning, with operators required to undertake remediation measures and transfer assets to the state upon license expiration.

In recent years, Venezuela has introduced reforms aimed at revitalizing its oil sector and attracting foreign investment, including proposals to expand the role of private operators and allow greater commercialization flexibility while maintaining state ownership of hydrocarbon resources. However, the regulatory environment continues to be influenced by geopolitical factors, economic sanctions, and infrastructure challenges, which shape investment activity and the pace of sector development.

4 India Crude Oil & Natural Gas Market

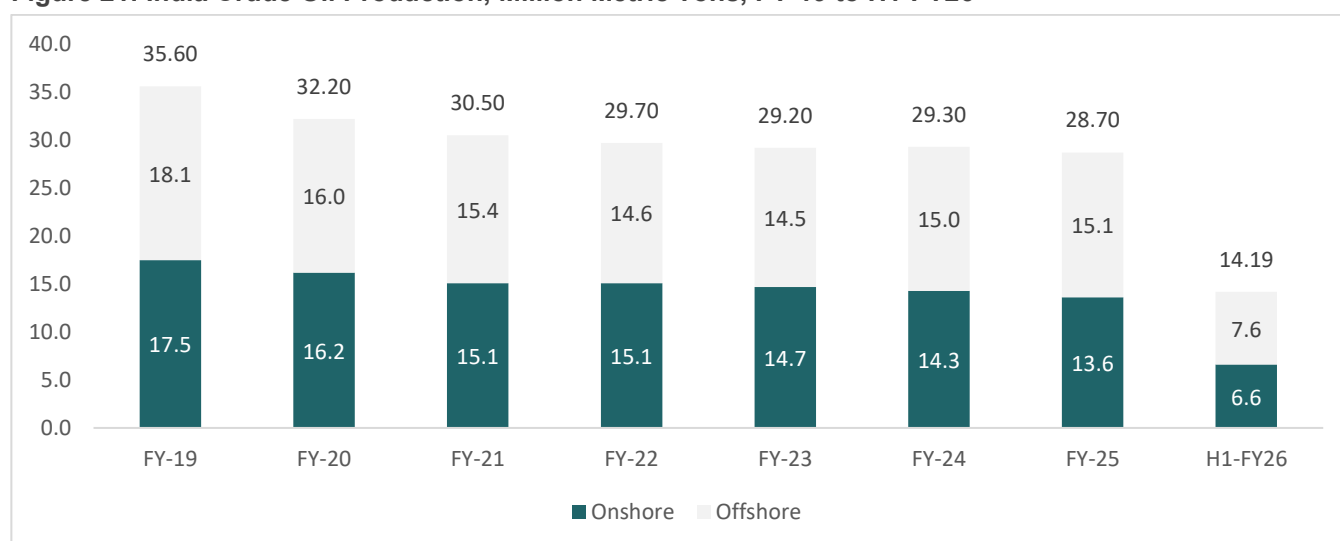
India's crude oil and natural gas industry is a vital component of the country's economy, accounting for a significant share of its energy mix. The oil & gas industry is bifurcated into three streams.



As the world's third-largest energy consumer globally, India relies heavily on imports to meet its growing energy demands. The country's domestic production of crude oil and natural gas is primarily managed by state-owned enterprises such as Oil and Natural Gas Corporation (ONGC) and Oil India Limited (OIL), as well as private players like Reliance Industries and Cairn India. Despite efforts to increase domestic production, India imported ~87% of its crude oil and ~50% of its natural gas requirements in FY-25. India's oil and gas production is expected to achieve a mid-decade peak between 2023-2032, around 2027, driven by the KG-Basin projects operated by Reliance Industries Limited and Oil and Natural Gas Corporation (ONGC). The government has implemented various policies and initiatives to enhance exploration and production activities, improve energy security, and reduce dependence on imports, with a focus on increasing the share of natural gas in the energy mix and promoting the use of cleaner fuels.

4.1 Crude Oil & Natural Gas Production

Figure 21: India Crude Oil Production, Million Metric Tons, FY-19 to H1-FY26



Source: IBEF, PPAC, CRISIL Intelligence

India's crude oil production has been witnessing a consistent decline over the past five years. Total crude oil output fell from 35.6 million metric tonnes (MMT) in FY-19 to 28.7 MMT in FY-25, registering a negative CAGR of 3.5%. This decline has been observed in both onshore and offshore segments, although the onshore segment has experienced a slightly sharper fall. Onshore production decreased from 17.5 MMT in FY-19 to 13.6 MMT in FY-25, with a CAGR of -4.1%, whereas offshore production declined from 18.1 MMT to 15.1 MMT during the same period, with a CAGR of -3.0%.

Table 7: State wise Crude Oil Production in India, MMT, FY-20 to H1-FY26

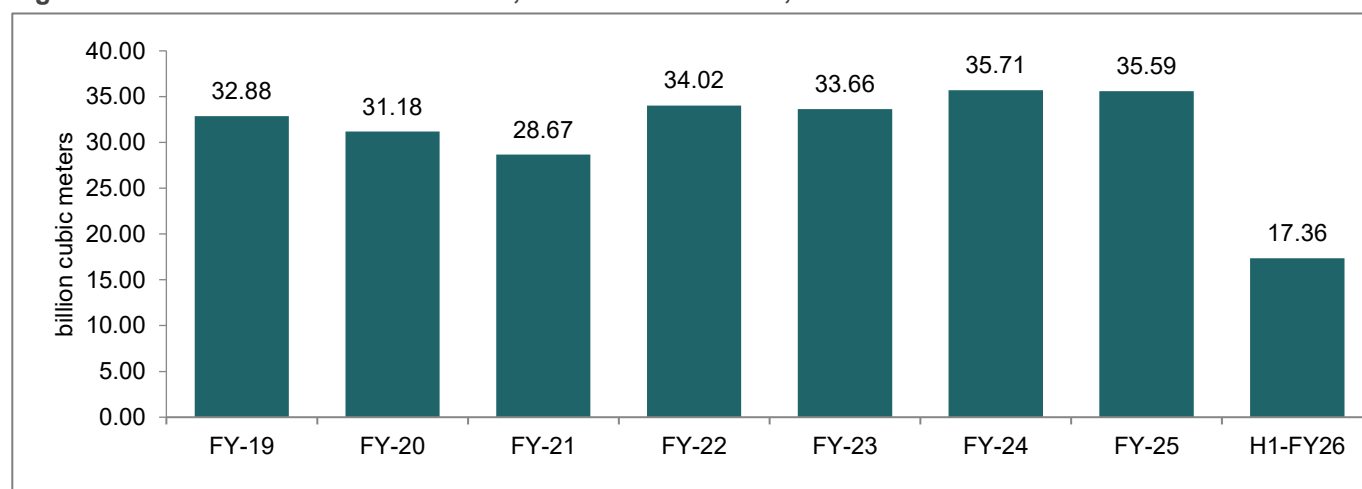
State	FY-20	FY-21	FY-22	FY-23	FY-24	FY-25	H1-FY26
Onshore							
Assam	4.1	3.9	4	4.2	4.4	4.5	2.2
Arunachal Pradesh	0.1	0.1	0	0	0.1	0.1	0.0
Andhra Pradesh	0.2	0.2	0.2	0.2	0.3	0.3	0.1
Gujarat	4.7	4.7	4.6	4.8	5	5.1	2.6
Rajasthan	6.7	5.9	5.9	5.1	4.4	3.4	1.5
Tamil Nadu	0.4	0.4	0.4	0.3	0.3	0.3	0.1
West Bengal	0	0	0	0	0	0	0.0
Onshore Total Production	16.2	15.1	15.1	14.7	14.3	13.6	6.6
Offshore							
Eastern Offshore	0.6	0.7	0.6	0.6	1.5	2.4	1.4
Western Offshore	14.9	14.2	13.6	13.6	13.2	12.5	6.0
Gujarat Offshore	0.6	0.4	0.3	0.4	0.3	0.2	0.1
Offshore Total Production	16	15.4	14.6	14.5	15	15.1	7.6
Total Production (Onshore + Offshore)	32.2	30.5	29.7	29.2	29.3	28.7	14.2

Source: PPAC, Crisil Intelligence

Onshore crude oil production in India has exhibited a mixed trend over the period from FY20 to FY25, with overall production moderating from 16.2 MMT in FY20 to 13.6 MMT in FY25, followed by production of 6.6 MMT in H1 FY26. While Rajasthan witnessed a gradual decline in output from 6.7 MMT in FY20 to 3.4 MMT in FY25, production levels in other key states have demonstrated relative stability or growth. Gujarat has shown a steady increase in production from 4.7 MMT in FY20 to 5.1 MMT in FY25 (2.6 MMT in H1 FY26), while Assam has remained broadly stable, ranging between 3.9 MMT and 4.5 MMT over the same period (2.2 MMT in H1 FY26). Other states, including Andhra Pradesh, Tamil Nadu and Arunachal Pradesh, have continued to contribute marginally to overall production. As of H1-FY26, Assam, Gujarat and Rajasthan together account for ~96% of crude oil production from onshore fields in India.

Offshore production has remained relatively stable over the same period, with total offshore output at 15.1 MMT in FY25 compared to 16.0 MMT in FY20, and 7.6 MMT in H1 FY26. Western offshore fields continue to account for the majority of offshore production, while eastern offshore production has shown an increasing trend, rising from 0.6 MMT in FY20 to 2.4 MMT in FY25 (1.4 MMT in H1 FY26). At national level, total crude oil production (onshore and offshore) stood at 28.7 MMT in FY25 and 14.2 MMT in H1 FY26, indicating relative stability in recent periods, supported by sustained contribution from key producing regions such as Gujarat, Assam and offshore fields.

Figure 22: India Natural Gas Production, Billion Cubic Meters, FY-19 to H1-FY26

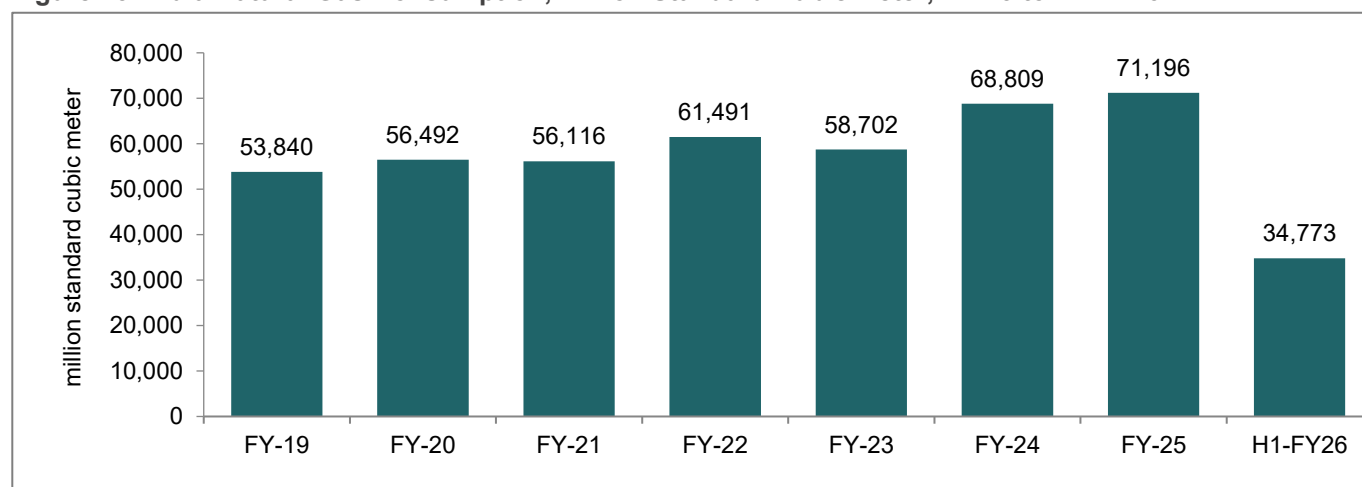


Source: IBEF, PPAC, Crisil Intelligence

India’s natural gas production witnessed a fluctuating trend over the period from FY19 to FY25, followed by a moderation in H1 FY26. Production declined from 32.88 bcm in FY19 to a low of 28.67 bcm in FY21, before recovering to 34.02 bcm in FY22 and remaining relatively stable at 33.66 bcm in FY23. The upward trajectory continued with production increasing to 35.71 bcm in FY24 and 35.59 bcm in FY25. However, production stood at 17.36 bcm in H1 FY26, indicating a relatively stable run-rate with marginal moderation on a sequential basis.

The recovery in production from FY22 onwards can be attributed to enhanced output from key domestic fields, ramp-up in production from newer discoveries, and policy initiatives aimed at increasing domestic gas availability and reducing import dependence. Continued investments in upstream development, improved recovery techniques, and expansion of gas infrastructure have supported production levels in recent periods. However, domestic gas production remains subject to natural reservoir decline in mature fields, variability in output from deepwater and difficult fields, and execution timelines of new developments. The trend reflects a phase of stabilization in domestic gas production, with incremental growth supported by policy measures and ongoing upstream investments, while short-term fluctuations may persist due to operational and reservoir-related factors.

Figure 23: India Natural Gas Consumption, Million Standard Cubic Meter, FY-19 to H1-FY26



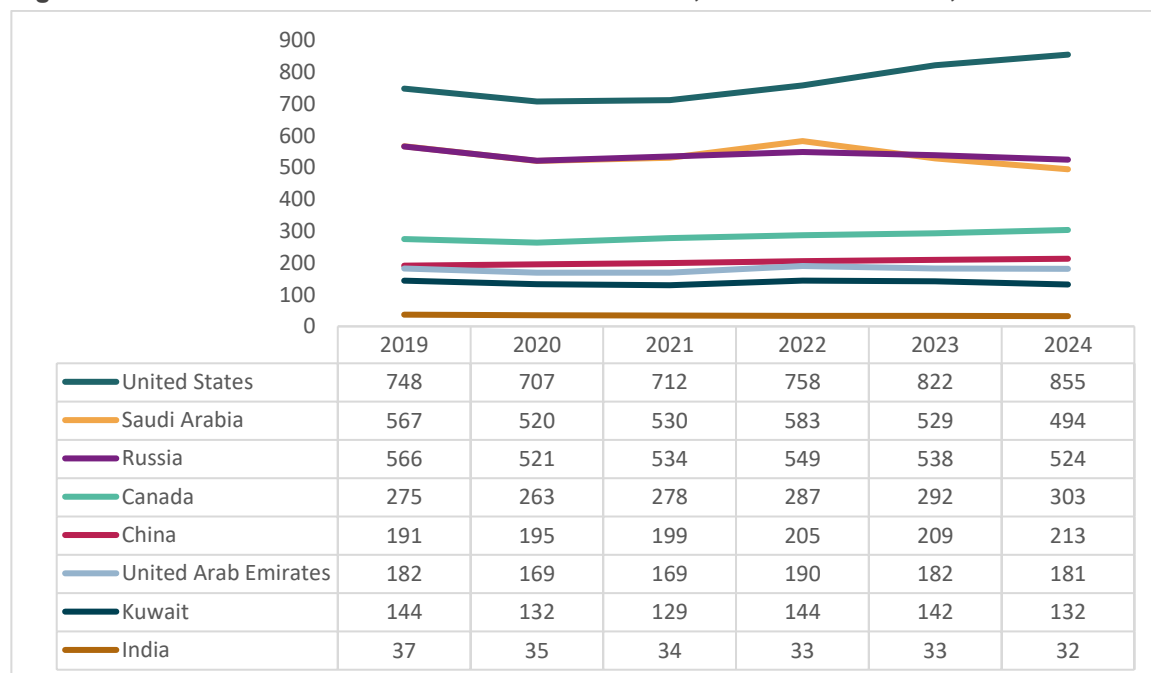
Source: PPAC, Crisil Intelligence

India's natural gas consumption has exhibited a generally upward trend over the period from FY19 to FY25, increasing from 53,840 MMSCM in FY19 to 71,196 MMSCM in FY25, reflecting a CAGR of approximately 4.9%. The growth trajectory, however, has not been linear, with consumption declining in FY21 to 56,116 MMSCM, followed by a recovery to 61,491 MMSCM in FY22, a temporary moderation in FY23 at 58,702 MMSCM, and a subsequent increase in FY24 and FY25. Consumption stood at 34,773 MMSCM in H1 FY26, indicating a relatively stable run-rate with some moderation on a sequential basis.

The growth in natural gas consumption has been supported by increasing penetration of city gas distribution (CGD) networks, rising demand from industrial and fertilizer sectors, and policy initiatives aimed at increasing the share of natural gas in India's energy mix. Expansion of pipeline infrastructure, growth in CNG and PNG connections, and a shift towards cleaner fuels have further supported demand. However, consumption in the near term has remained sensitive to fluctuations in global LNG prices, supply constraints and sectoral demand variability, particularly from power and industrial segments. Notably, moderation in H1 FY26 consumption reflects lower offtake from certain end-use sectors and supply-side constraints, although structural demand drivers, including urbanization, industrialization and policy support, continue to underpin long-term growth in natural gas consumption in India.

4.2 Comparison With leading Oil & Gas Producing Economies

Figure 24: Crude Oil Production in Different Countries, Million Metric Tons, 2019 to 2024



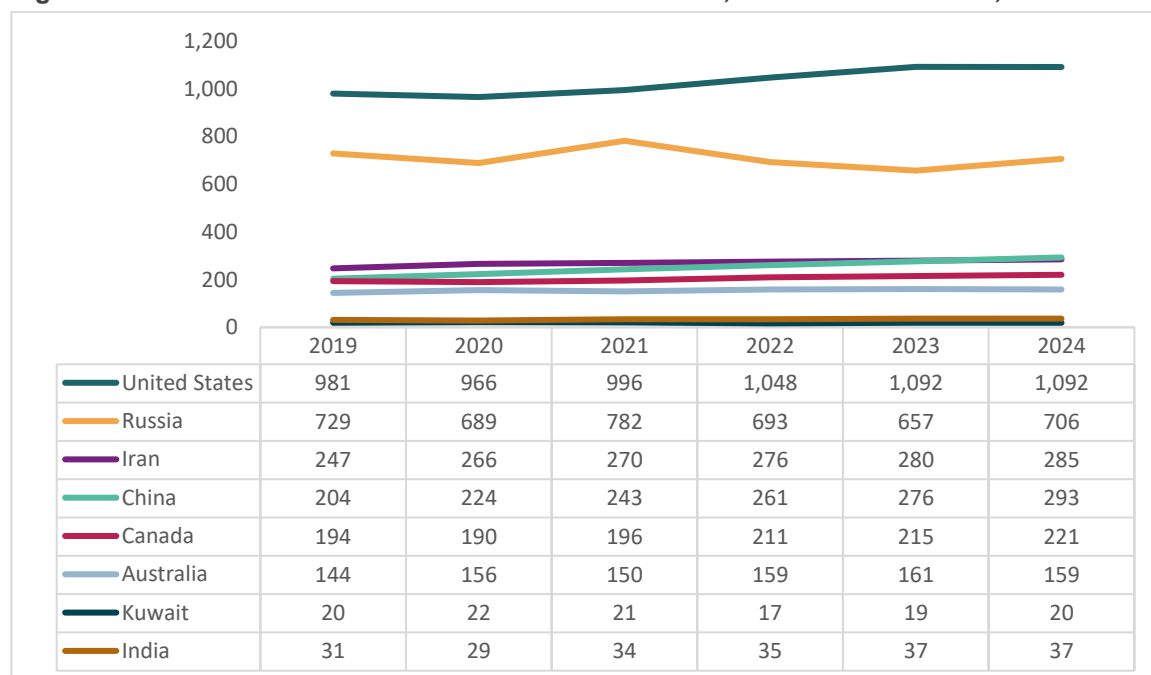
Source: Crisil Intelligence

United States stands out as the highest producer from 2019 to 2023. Its output declined from 748 MMT in 2019 to 707 MMT in 2020, likely due to the global downturn triggered by the pandemic. However, from 2021 onward, US production steadily recovered, reaching 822 MMT in 2023. Saudi Arabia's production slipped from 567 MMT in 2019 to 530 MMT in 2021, rebounded sharply to 583 MMT in 2022, and then dropped to 494 MMT in 2024. Russia experienced a similar pattern, decreasing from 566 MMT in 2019 to 521 MMT in 2020, then recovering to 549 MMT in 2022 before slightly falling again to 524 MMT in 2024. Canada's production, while lower than that of the major Middle Eastern producers, remained relatively stable and showed a gradual upward trend from a low of 263 MMT in 2020 to 303 MMT in 2024, suggesting a steady recovery post-pandemic. Kuwait's production experienced minimal change, with only slight variations, decreasing marginally from 144 MMT in 2019 to 132 MMT by 2024. China and the United Arab Emirates followed somewhat parallel paths, with both seeing modest rises overall but with the UAE

showing a slight dip from 190 MMT in 2022 to 181 MMT in 2024. China, on the other hand, moved upward from 191 MMT in 2019 to 213 MMT in 2024, indicating a steady increase in domestic output.

Compared to these countries, India's crude oil production is significantly lower and demonstrates a persistent decline. Starting at 37 MMT in 2019, it fell to 35 MMT in 2020 and eventually levelled at 32 MMT in 2024. This stagnation stands in contrast to the recovery trends observed in most other countries after the initial pandemic-induced slump. The gap between India and the top producers is vast: in 2024, the United States produced roughly 27 times more crude oil than India, while Canada produced about 9 times more. This highlights India's status as a minor player in global crude oil production, underscoring its heavy reliance on imports to meet rising domestic energy demand.

Figure 25: Natural Gas Production in Different Countries, Billion Cubic Meters, 2019 to 2024



Source: Crisil Intelligence

United States leads as the largest producer, with a generally increasing trend from 981 bcm in 2019 to 1,092 bcm in 2024, despite a minor dip in 2020. This consistent growth highlights the country's strong natural gas infrastructure, technological advancements, and increased production from shale gas reserves. Russia, the second largest producer, shows a fluctuating pattern. Production peaked at 782 bcm in 2021 but declined significantly to 706 bcm in 2024, possibly due to economic sanctions, trade restrictions, or reduced exports. Iran has demonstrated stable growth, rising from 247 bcm in 2019 to 285 bcm in 2024, indicating increased domestic consumption and expanded production capabilities. Similarly, China has seen a steady increase from 204 bcm in 2019 to 293 bcm in 2024, reflecting its strategic push for energy security and reduced dependence on imports. Canada has experienced moderate growth, with production increasing from 194 bcm in 2019 to 221 bcm in 2024, showing stable and sustained output. Australia, another major producer, had slight fluctuations but remained stable, producing 144 bcm in 2019 and reaching 159 bcm in 2024, suggesting a well-balanced supply scenario. Although Kuwait's contribution is relatively minor, it has remained steady and consistent over time.

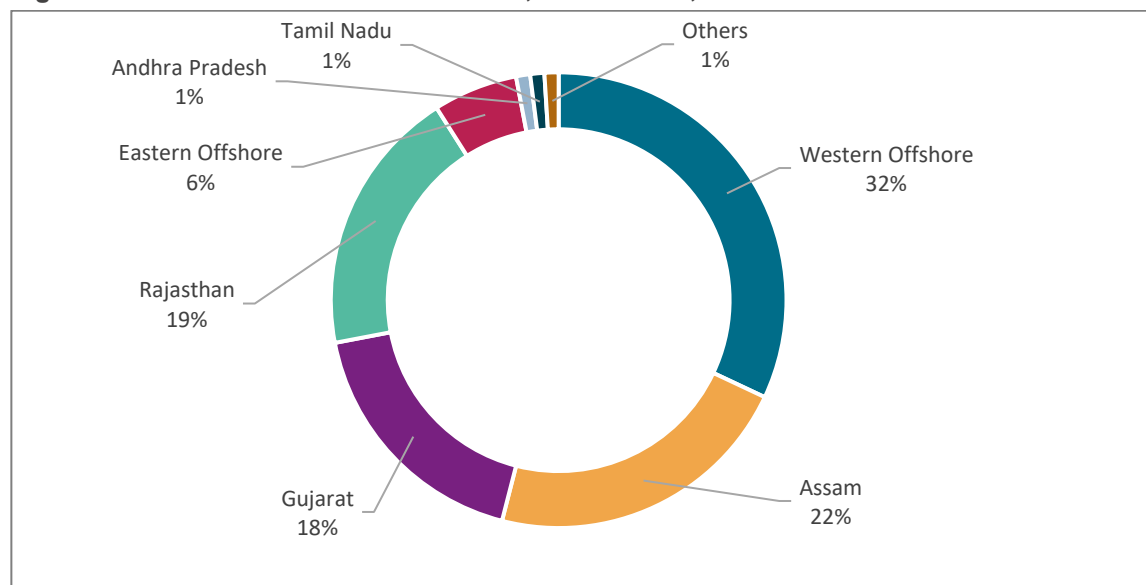
In comparison, India's natural gas production remains significantly lower than all the other countries. India's production fluctuated slightly but showed a marginal increase from 31 bcm in 2019 to 37 bcm in 2024. When compared to leading producers, the difference is stark—the US produced approximately 30 times more than India in 2023, while Russia, despite its declining production, still produced nearly 19 times more. Even relatively smaller producers such as Canada and Australia had output levels 4–6 times higher than India's in 2023. This highlights

India's heavy dependence on natural gas imports and the need to strengthen domestic exploration and production efforts.

4.3 Oil & Gas Reserves

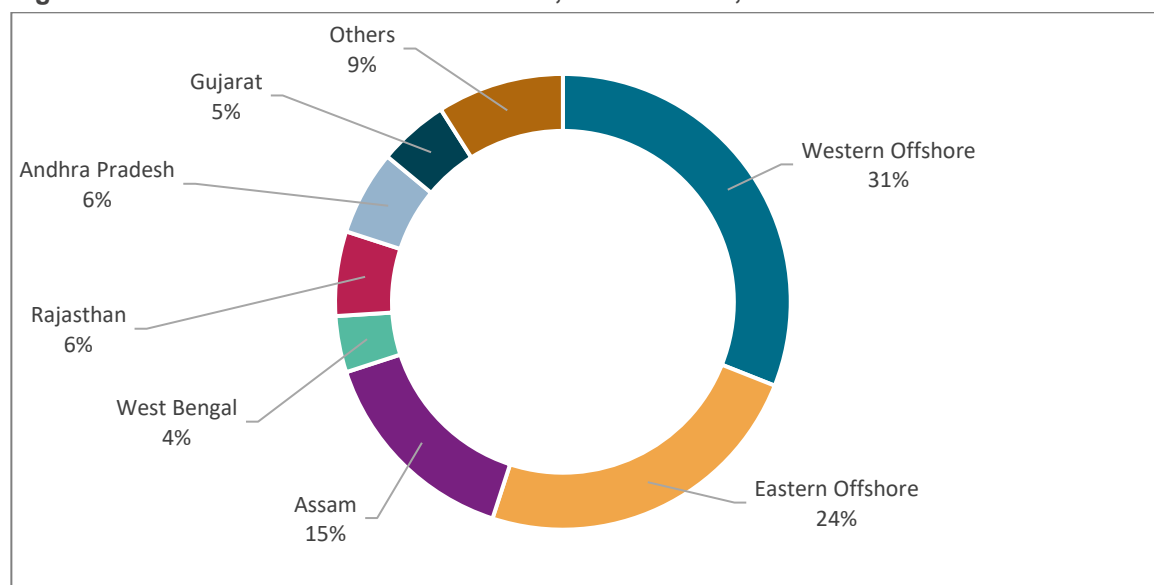
The estimated reserves of crude oil in India as on FY-24 stood at 671.40 million metric tonnes against 669.47 million metric tonnes in FY-23. Geographical distribution of crude oil indicates that the maximum reserves are in the Western Offshore (32%) followed by Assam (22%)

Figure 26: Reserves of Crude Oil in India, 671.40 MMT, FY-24



Others include Arunachal Pradesh, Nagaland, Tripura and West Bengal
Source: MOSPI, CRISIL Intelligence

Figure 27: Reserves of Natural Gas in India, 1094.19 BCM, FY-24



Others include Arunachal Pradesh, Jharkhand and Nagaland
Source: MOSPI, CRISIL Intelligence

The estimated reserves of Natural Gas as on FY-24 was at 1094.19 bcm. The maximum reserves of Natural Gas are in the Western Offshore (31%) followed by Eastern offshore (24%).

The Indian government has implemented several policies to boost domestic oil and gas production.

- **Hydrocarbon Exploration and Licensing Policy (HELP):** This policy aims to award exploration acreages and has shifted from a production sharing mechanism to a revenue sharing mechanism.
- **Policy Reforms:** Implemented on February 28, 2019, these reforms relaxed processes and approvals to promote ease of doing business, removed revenue share from Category II & III type basins (except for windfall gains), and offered a 7-year royalty holiday for deep & ultra-deep blocks. Concessional royalty rates for deepwater and ultra-deepwater blocks and fiscal incentives have been provided for early monetization of fields, along with marketing and pricing freedom for natural gas.
- **Incentives for Gas Producers:** Effective from April 7, 2023, a premium of 20% over the Administered Price Mechanism prices has been allowed for gas produced from new well and well interventions of Oil and Natural Gas Corporation Limited & Oil India Limited from their nomination fields.
- **Foreign Direct Investment (FDI):** The government permits 100% foreign direct investment (FDI) for exploration and production (E&P) of oil and natural gas fields, marketing infrastructure, marketing, pipelines, re-gasification infrastructure for liquefied natural gas (LNG), and for private sector refining through the automatic route, without requiring prior approval from the GOI or the Reserve Bank of India.
- **Compressed Biogas (CBG) Production:** The government has introduced several policy initiatives to support CBG production. As of September 2024, approximately 90 CBG plants were operational, with an additional 508 plants under various stages of development. By 2030, CBG production could reach 0.8 bcm/yr.
- **Target to increase Natural Gas share:** The government has set a target to increase the share of natural gas in the energy mix to 15% in 2030.
- **Single Zone for CNG(T) & PNG(D) under Unified Tariff Zone:** Simplified India's natural gas tariff framework by reducing unified tariff zones from three to two and extended the lower Zone 1 tariff to all CNG and domestic PNG users nationwide.
- **Recalibration of APM Mechanism under Kirit Parikh Committee:** The Kirit Parikh Committee, in its report submitted on 30 November 2022, recommended a market-linked pricing mechanism for domestic natural gas by introducing a fixed band for APM gas, pegged at 10% of India's crude basket with a floor of \$4/MMBtu and a ceiling of \$6.5/MMBtu, subject to annual increments. It also proposed a 20% premium for new well interventions, inclusion of natural gas under GST for uniform taxation, and reforms aimed at lowering CNG/PNG prices, reducing the subsidy burden, and incentivizing upstream investment to support India's transition to a gas-based economy
- **Prioritized allocation of NWG gas for D-PNG & CNG(T):** Revised domestic gas allocation policy to ensure affordable supply for CNG (transport) and PNG (domestic) users. It introduces advance quarterly allocations and includes New Well Gas from ONGC and OIL for CGD entities on a pro-rata basis instead of auctions. Gas pricing is linked to the Indian Crude Basket to maintain stability and lower costs for consumers
- **Expansion of Infrastructure:** This includes the expansion of the National Gas Grid Pipeline and City Gas Distribution (CGD) network, and the setting up of Liquefied Natural Gas (LNG) Terminals.

- **Priority Sector Allocation:** Domestic gas is allocated to Compressed Natural Gas (Transport) / Piped Natural Gas (Domestic) CNG(T)/PNG(D) as a priority sector.
- **Sustainable Alternative Towards Affordable Transportation (SATAT) initiative:** This initiative was launched in India, with the primary goal of promoting Compressed Biogas (CBG) as a sustainable and affordable alternative to fossil fuels for transportation.

Through Indian Strategic Petroleum Reserve Limited (ISPRL), the government has established Strategic Petroleum Reserves (SPR) facilities with total capacity of 5.33 Million Metric Tonnes (MMT) of crude oil at three locations, Vishakhapatnam (1.33 MMT), Mangaluru (1.5 MMT) and (iii) Padur (2.5 MMT) capacity. India aims to commercialise 50% of its SPR to raise funds and build additional storage tanks to offset high oil prices.

To further increase the SPR capacity, the government, had also approved the establishment of two additional commercial-cum-strategic petroleum reserve facilities with total storage capacity of 6.5 MMT at Chandikhol (4 MMT) in Odisha and Padur (2.5 MMT) in Karnataka.

4.4 Impact on Economic Growth

The impact of crude oil and natural gas on India's economic landscape has been profound and far-reaching, touching various sectors and aspects of development. In terms of economic growth, the oil and gas sector plays a pivotal role, contributing ~15% to India's GDP and serving as a crucial element for energy security and economic development. It represents a significant source of government revenue through various taxes and duties. However, India's heavy dependence on oil imports substantially affects its foreign exchange reserves and current account deficit, making the economy vulnerable to global price fluctuations.

The influence on industrial activities is particularly noteworthy, as crude oil and natural gas serve as essential raw materials for the petrochemicals industry and power industrial machinery across various manufacturing sectors. These resources are crucial for fertilizer production and support the manufacturing of plastic and synthetic materials. In the power generation sector, natural gas is extensively used in power plants, providing reliable backup power for industries and supporting various industrial processes that require heat and energy.

The transportation sector has been revolutionized by crude oil and natural gas, with these resources fuelling the majority of vehicles through petrol, diesel, and CNG. This has enabled the growth of public transportation systems and supports the entire logistics and freight movement infrastructure. The aviation sector, in particular, depends heavily on aviation fuel for both domestic and international flights, facilitating air cargo services and contributing to the growth of air transportation networks.

Urbanization in India has been significantly influenced by these energy resources. They enable the operation of construction equipment, support road construction and maintenance, and power urban utilities and services. In terms of urban lifestyle, these resources have become indispensable, providing domestic cooking gas (LPG), supporting urban transportation systems, powering backup systems, and enabling modern amenities and appliances that characterize contemporary urban living.

The path forward focuses on sustainable development, attempting to strike a balance between growth and environmental protection. This includes substantial investments in alternative energy sources and a growing emphasis on energy efficiency. The government and industry stakeholders are increasingly recognizing the need to transition towards more sustainable energy solutions while maintaining economic growth and development. This transition requires careful planning and implementation to ensure that India's energy needs are met while addressing environmental concerns and reducing dependency on fossil fuels.

4.5 CNG Stations & PNG Connections

The growth of CNG stations and PNG connections in India has shown remarkable progress over the past decade, driven by various governmental initiatives and environmental concerns. The number of CNG stations has witnessed a substantial increase, growing from approximately 940 stations in 2014 to 8,616 stations by January 2026. Similarly, domestic PNG connections have seen exponential growth, rising from 2.4 million connections in 2014 to over 16.2 million connections by January 2026, demonstrating the country's commitment to cleaner fuel alternatives.

This significant expansion has been largely supported by robust policy frameworks and initiatives implemented by the Indian government. The City Gas Distribution (CGD) bidding rounds have played a crucial role in expanding the network, while regulations from the National Green Tribunal and the National Clean Air Programme have provided additional impetus to the sector's growth. The government's push for cleaner fuels has been particularly instrumental in driving this transformation, making natural gas more accessible to both vehicles and households.

Several factors have contributed to the successful adoption of CNG and PNG in India. The cost-effectiveness of these fuel options compared to traditional petrol and diesel has been a major attraction for consumers. Additionally, the convenience of piped gas supply for domestic use has made PNG a preferred choice for households. Environmental considerations have also played a significant role, as both CNG and PNG produce fewer emissions compared to conventional fuels, aligning with India's environmental commitments.

However, the sector faces certain challenges that need to be addressed for continued growth. These include substantial infrastructure development costs, limitations in the gas pipeline network, difficulties in land acquisition for new CNG stations, and the initial conversion costs for vehicles switching to CNG. Despite these challenges, the sector has maintained its growth trajectory, particularly in urban areas.

The regional distribution of CNG stations and PNG connections shows higher penetration in western and northern India, with a growing focus on tier-2 and tier-3 cities. Industrial corridors have received special attention in the expansion plans, recognizing the significant potential for natural gas usage in industrial applications. This geographical expansion has contributed to creating a more balanced distribution network across the country.

The impact of this growth has been multifaceted. It has contributed significantly to reducing air pollution in major cities, provided consumers with more economical fuel options, and helped decrease India's dependency on imported fuels. Furthermore, the expansion of gas infrastructure has created numerous employment opportunities in the sector, contributing to economic growth. As India continues its transition towards cleaner energy sources, the growth of CNG stations and PNG connections remains a crucial component of its energy strategy, with promising prospects for further expansion in the coming years.

4.6 Role of Natural Gas in India's Energy Mix

Natural gas plays a crucial yet evolving role in India's energy mix, currently accounting for ~6% of the country's primary energy consumption, which is notably lower than the global average of ~24%. This energy source has gained increasing importance due to its cleaner burning properties and versatility across various sectors, including power generation, fertilizer production, and industrial applications.

The significance of natural gas in India's energy landscape is underscored by its environmental advantages and economic benefits. As a cleaner alternative to traditional fossil fuels like coal and oil, natural gas produces lower carbon emissions, helping India meet its climate change commitments while simultaneously addressing urban air pollution concerns. From an economic perspective, it serves as a more efficient fuel for power generation and provides essential feedstock for the fertilizer industry, thereby supporting industrial growth and economic development.

Infrastructure development has been a key focus area in expanding natural gas utilization across India. The country has been steadily developing its national gas grid through the construction of pipeline networks and LNG terminals. However, significant challenges persist, including supply constraints, limited domestic production, and heavy dependence on imports. The volatility of international gas prices and infrastructure gaps, particularly in terms of pipeline networks and storage facilities, continue to pose challenges to the sector's growth.

The Indian government has demonstrated strong commitment to increasing the role of natural gas in the country's energy mix, setting an ambitious target to raise its share to 15% by 2030. This commitment is supported by various initiatives, including the expansion of city gas distribution networks and significant investments in infrastructure development. The policy framework has evolved to support these objectives, incorporating elements such as marketing freedom for domestic gas producers, unified tariff policies, and open access regulations.

4.7 Shift Towards Natural Gas

The Indian government is focused on transitioning to a gas-based economy by increasing the share of natural gas in its energy mix to from 6% to 15% by 2030. This initiative aims to balance rapid economic growth with the need to reduce emissions and meet climate commitments. The government is taking various steps to achieve this target, including policy reforms, infrastructure development, and promoting the use of natural gas in different sectors. To achieve the target of 15% by 2030, the government is working on expanding the national gas grid, city gas distribution networks, and LNG import terminals. The government aims to have approximately 120 million PNG connections and 17,500 CNG stations. As on January 2026, the total number of CNG station and PNG connections were 8,616 and 16.2 million, respectively.

The government is promoting the use of natural gas across various sectors to drive demand. The city gas distribution (CGD) sector is expected to lead consumption growth between now and 2030, supported by CNG infrastructure expansion and competitive pricing against liquid fuels. The industrial sector, particularly fertilizer factories, is also expected to contribute significantly to gas demand. The government is also encouraging the use of LNG in heavy-duty trucking and promoting CNG as a fuel of choice for the growing middle class.

Despite the government's efforts, several challenges could hinder the transition to a gas-based economy. One major obstacle is the limited domestic gas production, which necessitates increased reliance on LNG imports. Infrastructure limitations, such as the slow expansion of pipeline networks and LNG terminals, also pose a challenge. Price sensitivity of gas consumption and competition from cleaner energy alternatives could also hamper infrastructure expansion and trigger stranded asset risk.

The transition to a gas-based economy is seen as a way to reduce emissions compared to coal and oil. Natural gas emits less CO₂ when combusted in an efficient power plant compared to a typical coal plant. The government is also considering carbon pricing mechanisms to incentivize lower-carbon technologies. Natural gas can help advance India's economic and environmental goals.

4.8 Government Policies & Environmental Regulations

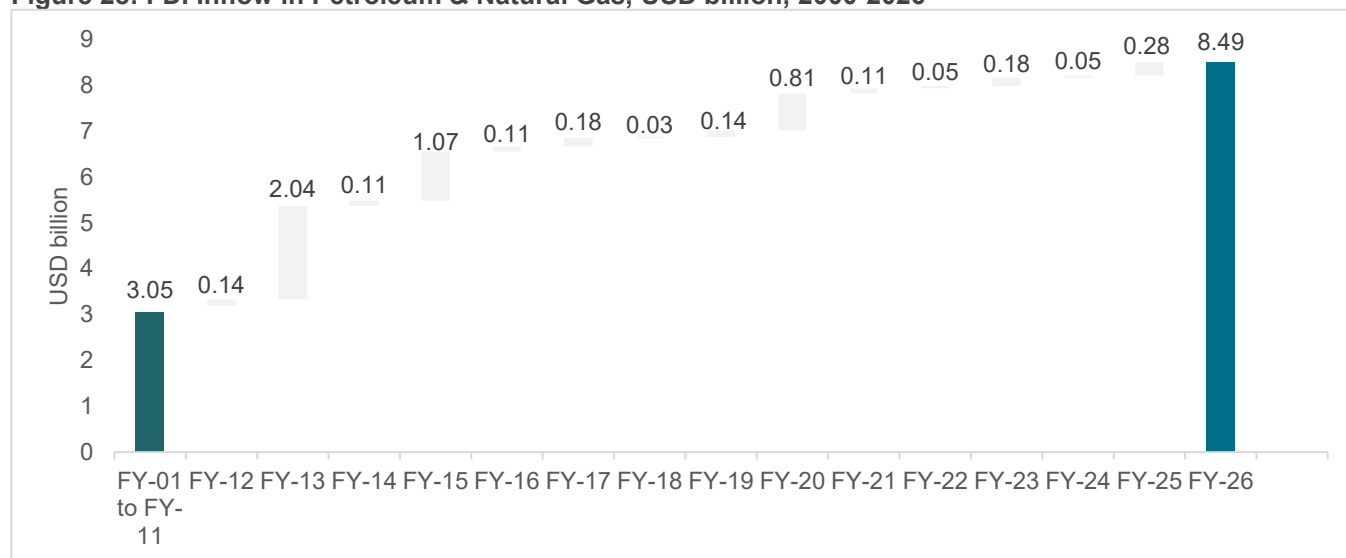
India's oil and gas sector operates under a hybrid model combining state control with private sector participation. The government has implemented significant reforms through the New Exploration Licensing Policy (NELP) and more recently, the Hydrocarbon Exploration and Licensing Policy (HELP), which introduced revenue sharing contracts and marketing freedom for operators. Environmental regulations are governed primarily by the Environmental Protection Act and Forest Conservation Act, with specific provisions for coastal zones under the Coastal Regulation Zone notifications. The Ministry of Environment, Forest and Climate Change oversees environmental clearances for oil and gas projects, requiring detailed impact assessments and public consultations. India has been actively developing its strategic oil reserves and natural gas infrastructure while implementing stricter pollution control standards. The country's environmental regulations have become increasingly stringent, reflecting growing concerns about air quality and climate change. Recent policies emphasize reducing dependency on imported oil while promoting cleaner fuels and renewable energy integration.

Government Initiatives

- The government is working towards increasing the share of gas from 6.3% (July 2022) to 15% of the energy mix by 2030.
- In February 2021, the government announced to invest INR 7.5 lakh crore (~USD 102.49 billion) on oil and gas infrastructure in the next five years.

- In September 2021, the Indian government approved oil and gas projects worth INR 1 lakh crore (~USD 13.46 billion) in Northeast India.
- The Government is planning to invest USD 2.86 billion in upstream oil and gas production to double the natural gas production to 60 BCM and drill more than 120 exploration wells.
- Government of India is planning to invest INR 70,000 crore (~USD 9.97 billion) to expand the gas pipeline network across the country
- The Government initiated the National Gas Hydrate Programme (NGHP), a consortium of national E&P companies and research institutions, to map gas hydrates for use as an alternate source of energy.
- The government has planned a strategic investment plan of USD 67 billion for the Indian gas sector over next 5-6 year
- In Union Budget 2025-26, the government has allocated INR 5,597 crore (~USD 640.46 million) to the petroleum and natural gas (PNG) ministry for phase 2 of the Indian Strategic Petroleum Reserves Ltd project, aimed at turning two vast underground caverns into petroleum storage facilities.
- In budget 2024-25, INR 497.25 crore (~USD 59.75 million) allocated to scheme for Development of Pipeline infrastructure for injection of Compressed Biogas (CBG) in City Gas Distribution (CGD) Network.
- In the Union Budget 2023-24, government has set target to setting up coal gasification and liquefaction capacities of 100 MT by 2030 to reduce import of natural gas, methanol and ammonia.

Figure 28: FDI Inflow in Petroleum & Natural Gas, USD billion, 2000-2026*



Note: FY26 data is till December 2025

Source: IBEF, Crisil Intelligence

Over the years, the petroleum and natural gas sector has witnessed fluctuating investment trends, with certain periods showing significant inflows while others experienced minimal investment activity. From FY-01 to FY-11, cumulative FDI inflows stood at USD 3.05 billion, indicating a strong initial interest from foreign investors in India's energy sector. However, in the years that followed, FDI inflows became inconsistent. Notably, FY-12 saw a

considerable investment of USD 2.04 billion, while FY-15 also recorded a relatively high inflow of USD 1.07 billion. Despite these occasional peaks, the sector struggled to attract consistent foreign investments, with most other years receiving minimal FDI, typically below USD 0.2 billion.

Between FY--16 and FY24, the inflows remained mostly low, reflecting subdued investor sentiment. FY-20 recorded USD 0.81 billion, the highest during this period, but subsequent years saw negligible inflows, often below USD 0.2 billion. These fluctuations suggest that foreign investors may have faced regulatory challenges, uncertainties in global crude prices, or a shifting focus toward alternative energy sectors. The cumulative FDI inflow till FY-26 (December 2025) recorded to be USD 8.48 billion.

The sector has witnessed inconsistent FDI patterns, with long periods of low inflows interrupted by occasional surges. In July 2021, the government has In July 2021, the Department for Promotion of Industry and Internal Trade (DPIIT) approved an order allowing 100% foreign direct investments (FDIs) under automatic route for oil and gas PSUs. The FDI limit for public sector refining projects has been raised to 49% without any disinvestment or dilution of domestic equity in existing PSUs.

5 Oilfield Service Market

Oilfield services represent a crucial sector in the oil and gas industry, encompassing a wide range of supporting activities and services essential for exploration, development, and production operations. These services span the entire lifecycle of oil and gas fields, from initial exploration to ongoing production and eventual field abandonment. The sector is dominated by major companies such as Schlumberger, Halliburton, Baker Hughes, Weatherford, etc which provide comprehensive service portfolios to oil and gas operators worldwide.

The industry is characterized by its cyclical nature, being heavily influenced by oil prices and upstream investment cycles. This volatility requires service companies to maintain flexible operations and efficient cost structures. Additionally, the sector is increasingly technology-driven, with continuous innovation in areas such as digitalization, automation, and artificial intelligence. Companies must invest significantly in research and development to maintain competitive advantages and meet evolving client demands.

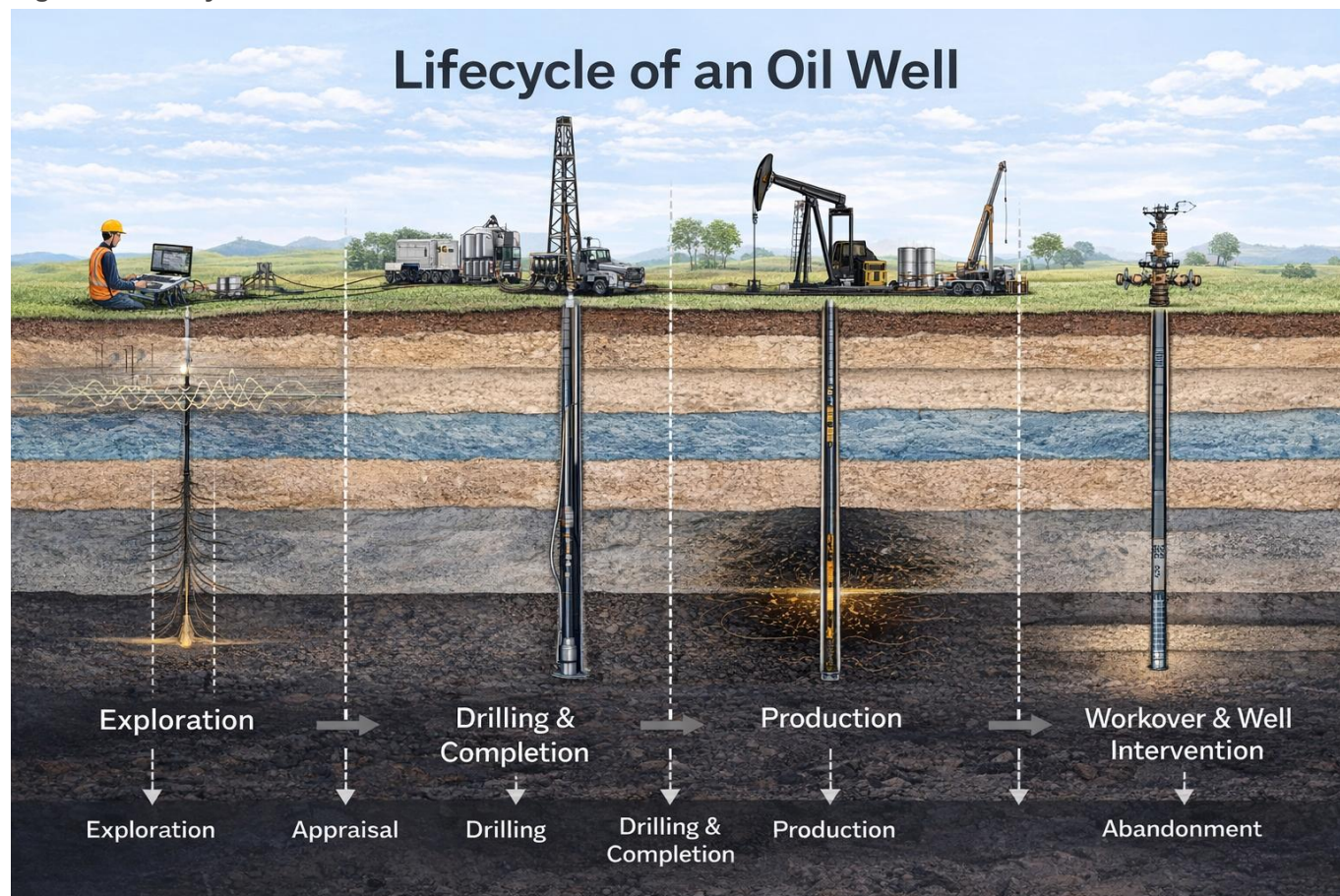
Environmental considerations and sustainability have become increasingly important in recent years. Service companies are now focusing on developing and implementing environmentally friendly technologies, reducing carbon footprints, and supporting the energy transition. This includes innovations in areas such as carbon capture, green technologies, and more efficient operational practices. The industry also faces ongoing challenges related to workforce development, safety requirements, and regulatory compliance across different geographic regions.

Looking ahead, the oilfield services sector is expected to continue evolving with technological advancement and changing market demands. Digital transformation is reshaping operations through the implementation of IoT, advanced analytics, and remote operations capabilities. Market dynamics are driving consolidation and new business models, including integrated service offerings and performance-based contracts. The industry is also adapting to the energy transition, with many companies diversifying their service offerings to include renewable energy solutions while maintaining their core oil and gas services.

The sector faces several ongoing challenges, including market volatility, environmental concerns, technical complexities, and workforce issues. Successful companies must navigate these challenges while maintaining operational efficiency and service quality. This requires balanced investment in technology, people, and assets, along with strategic adaptation to changing market conditions. The future of oilfield services will likely be shaped by continued technological innovation, increased focus on sustainability, and the evolution of energy markets globally.

5.1 Lifecycle of an Oil Well

Figure 29: Lifecycle of an Oil Well



Source: Crisil Intelligence

The lifecycle of an oil well comprises multiple stages, including exploration, appraisal, drilling and completion, production, and workover and well intervention, followed by eventual abandonment. The process begins with exploration, wherein geological, geophysical and seismic surveys are conducted to identify potential hydrocarbon-bearing formations. Upon identification of prospective reserves, the appraisal phase is undertaken to assess the size, quality and commercial viability of the reservoir through exploratory and delineation wells. This stage is critical in determining development plans and capital allocation decisions.

Subsequently, the well progresses to the drilling and completion phase, involving the drilling of the wellbore, installation of casing and cementing to ensure structural integrity and zonal isolation, followed by completion activities such as perforation and installation of production tubing and wellhead equipment. The production phase represents the primary revenue-generating stage, during which hydrocarbons are extracted using natural reservoir pressure (primary recovery) and, where required, enhanced techniques such as water flooding, gas injection or chemical methods (secondary and tertiary recovery). Over time, as reservoir pressure declines and production efficiency reduces, operators undertake workover and well intervention activities, including maintenance, stimulation, artificial lift installation and recompletion, to optimize output and extend the productive life of the well. Finally, upon reaching economic limits, the well is abandoned and decommissioned, involving plugging with cement and restoration of the site in accordance with regulatory and environmental standards.

5.2 Exploration & Production Activities

Exploration and production (E&P) activity has shown significant evolution, characterized by several key developments and trends. Following the industry's recovery from the pandemic-induced slowdown, there has been a measured increase in drilling projects, with companies adopting a more strategic approach focused on short-cycle projects and efficient capital deployment. The industry has witnessed a notable shift toward offshore drilling activities, particularly in deepwater areas, while unconventional drilling projects, especially in North America, continue to play a crucial role in global energy supply.

Several regions have emerged as significant hotspots for E&P activity. The Guyana-Suriname Basin has become a major focal point for offshore development, with multiple substantial discoveries driving investment and infrastructure development. Brazil's pre-salt fields continue to attract significant attention, while the East Mediterranean region has seen increased activity in gas project development. African offshore regions are also experiencing growing exploration interest, with several countries positioning themselves as emerging energy producers.

TotalEnergies plans to invest USD 600 million in the Republic of Congo to strengthen exploration and production activities in 2024. Petroleos Mexicanos (PEMEX) invested USD 34.42 billion in 2024, with 84.1% allocated to exploration. Japan Petroleum Exploration (Japex) is prioritizing investment in oil and gas exploration and production (E&P) through 2030, revising an earlier plan to aggressively expand its renewables businesses. BP will grow oil and gas investment by about 20% to USD 10 billion per year and production between 2.3 million and 2.5 million barrels of oil equivalent per day in 2030.

The Indian government has been actively promoting investment in the E&P sector through various policy reforms and initiatives, with the aim to attract USD 100 billion investments by 2030. Key policies include the Hydrocarbon Exploration and Licensing Policy (HELP) and the Discovered Small Field (DSF) policy, which operate under a revenue-sharing mechanism to enhance transparency, operational flexibility, and investor appeal. The government has also taken steps to streamline processes, digitize operations, and expedite approvals to improve the ease of doing business in the E&P sector. These measures include the launch of online portals for contract management, license applications, and data monitoring, as well as the establishment of committees to facilitate clearances and coordination between various stakeholders. The government permits 100% foreign direct investment (FDI) for exploration and production of oil and natural gas fields and marketing.

Table 8: Exploratory Efforts During FY-25

S.No.	Subject	Parameter	ONGC (Nomination)	OIL (Nomination)	Contract Regime (PSC+RSC)	Mission Anveshan & ECS	Grand Total
1	2D seismic data acquired	Onland (GLKM)	191	71	674	25,830	26,766
		Offshore (GLKM)	0	0	0	0	0
	Total 2D Seismic Acquired		191	71	674	25,830	26,766
2	3D seismic data acquired	Onland (SKM)	519	482	1,202	0	2,203
		Offshore (SKM)	1572	0	7,020	0	8,592
	Total 3D Seismic Acquired		2,091	482	8,222	0	10,795

Source: Directorate General of Hydrocarbons

During FY-25, significant exploratory efforts and drilling activities were undertaken across India, reflecting continued focus on strengthening domestic oil and gas production. A total of 26,766 GLKM of 2D seismic data was acquired, with the majority (25,830 GLKM) coming under Mission Anveshan & ECS, indicating large-scale national efforts to enhance subsurface understanding. On the 3D seismic front, 10,795 SKM of data was acquired, with ONGC

contributing the largest share (2,091 SKM) followed by the contract regime (PSC+RSC) contributing 8,222 SKM, highlighting robust private and public participation in offshore and onshore surveys.

Table 9: Drilling Activities During FY-25

S.No.	Subject	Parameter	ONGC (Nomination)	OIL (Nomination)	Contract Regime (PSC+RSC)	Grand Total
1	Exploratory Wells	Onland	52	15	35	102
		Offshore	19	0	20	39
	Total Exploratory wells			71	15	55
2	Development Wells	Onland	371	32	103	506
		Offshore	92	0	0	92
	Total Development wells			463	32	103

Source: Directorate General of Hydrocarbons

In drilling activities, 141 exploratory wells were drilled during FY-25, led by ONGC with 71 wells, OIL with 15 wells, and 55 wells under contract regime. Offshore exploratory drilling accounted for 39 wells, underscoring the importance of deepwater exploration in meeting future energy needs. Development drilling also remained strong with 598 development wells drilled, of which ONGC accounted for 463 wells and the contract regime 103 wells, demonstrating ongoing efforts to enhance production from existing fields. The data reflects a healthy pace of exploration and development activity, which is crucial for augmenting domestic hydrocarbon production and reducing import dependency.

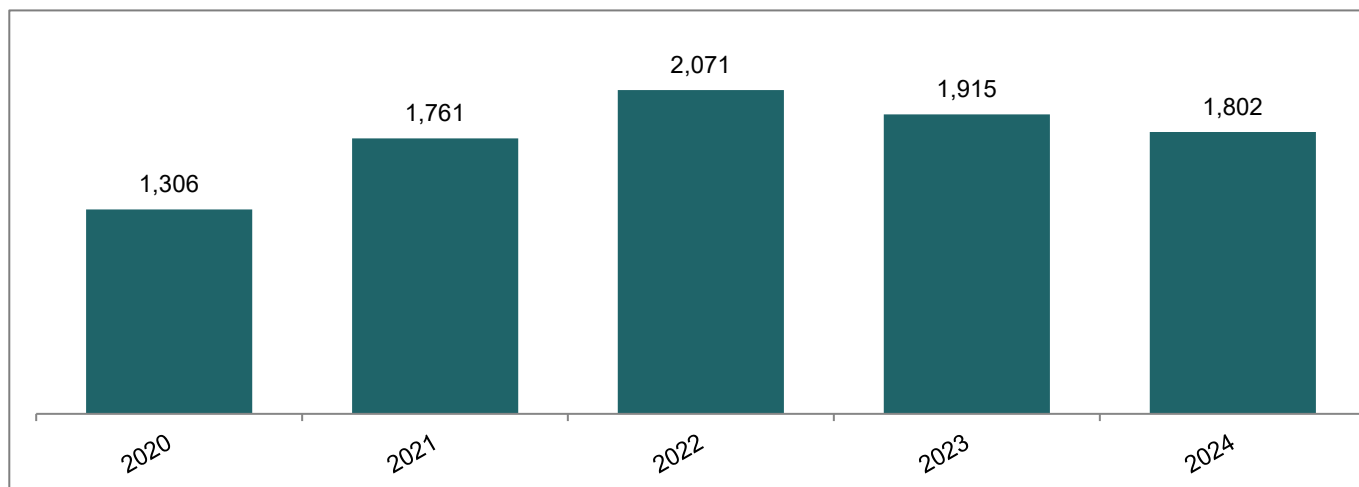
5.3 Rigs & Utilization Rates

Rigs are the primary equipment used for drilling oil and gas wells, broadly categorized into onshore (land) and offshore types. They come with different classifications based on their capabilities, such as shallow water, deepwater, and ultra-deepwater capabilities. Rigs vary in their levels of technological sophistication and drilling capabilities, with key components including the derrick, drill floor, power systems, and safety equipment.

Rig count serves as an important indicator of oil and gas industry activity and functions as a leading indicator of demand for products and services in the sector. It effectively reflects industry confidence and investment levels, showing strong correlation with oil prices and market conditions. The count typically shows regional variations that reflect local market dynamics and can be influenced by seasonal factors.

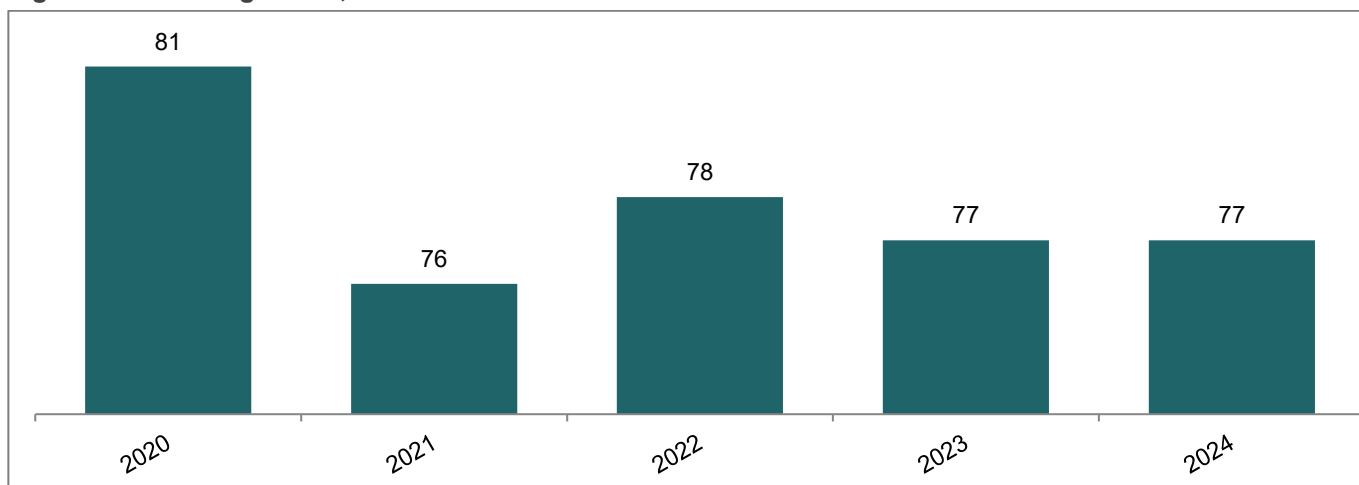
Utilization rate measures the percentage of available rigs that are actively working and serves as a key performance indicator for drilling contractors. This metric reflects the market's supply-demand balance, with higher rates generally indicating stronger market conditions. Utilization rates significantly influence day rates and contractor profitability and can vary between different segments (offshore/onshore). The rates are affected by multiple factors including oil and gas prices, exploration budgets, regulatory environment, regional demand, and technological requirements. These factors collectively provide insight into the overall health and activity level of the drilling industry.

Figure 30: Global Rig Count, 2020 to 2024



Source: OPEC, Crisil Intelligence

Figure 31: India Rig Count, 2020 to 2024



Source: OPEC, Crisil Intelligence

5.4 Unconventional Resources Development

Unconventional resources development represents a significant shift in how the energy industry approaches oil and gas extraction. This specialized sector focuses on recovering hydrocarbons from geological formations that were traditionally considered too challenging or economically unfeasible to exploit using conventional methods. These resources primarily include shale oil and gas, tight oil and gas, coal bed methane, oil sands, heavy oil deposits, and gas hydrates.

The technological backbone of unconventional resource development centres around two primary innovations: hydraulic fracturing (fracking) and horizontal drilling.

- Hydraulic fracturing involves injecting high-pressure fluid mixtures into deep rock formations to create artificial fractures, which are then held open by proppants, allowing oil and gas to flow more freely.
- Horizontal drilling complements this process by enabling wells to extend laterally through resource-rich formations, significantly increasing contact with the reservoir and improving recovery rates.

These technologies, combined with advanced well completion techniques such as multi-stage completions and smart completions, have revolutionized the industry's ability to access previously unrecoverable resources.

5.5 Advancement in Technology

The future of oilfield services is being revolutionized by significant technological advancements across multiple domains. Key developments include digital technologies and automation featuring AI and machine learning, sophisticated data analytics for real-time processing, advanced drilling technologies, and environmental solutions focusing on sustainability. Other crucial areas of progress include subsea technologies, enhanced oil recovery methods, robotics, and improved imaging systems. The industry is also seeing innovations in materials technology, safety monitoring systems, alternative energy integration, and communication systems. These technological advancements are primarily aimed at improving operational efficiency, reducing costs, enhancing safety measures, minimizing environmental impact, increasing production capabilities, and optimizing resource utilization. As the industry evolves, these innovations will play a crucial role in addressing challenges while meeting growing energy demands in a more sustainable and efficient manner.

Table 10: Key areas of development and future trends

Importance	Description
Digital Technologies and Automation	<ul style="list-style-type: none"> - Advanced AI and Machine Learning applications - Digital twins for equipment and operations - Remote monitoring and operations - Automated drilling systems - Smart sensors and IoT integration
Data Analytics	<ul style="list-style-type: none"> - Real-time data processing and analysis - Predictive maintenance - Performance optimization - Better reservoir characterization - Enhanced production forecasting
Drilling Technologies	<ul style="list-style-type: none"> - Automated drilling rigs - Advanced directional drilling - Smart drill bits with sensors - Improved well placement technology - Enhanced drilling fluid systems
Environmental Solutions	<ul style="list-style-type: none"> - Carbon capture and storage technologies - Methane emission reduction systems - Water management solutions - Sustainable drilling practices - Green completion technologies
Subsea Technologies	<ul style="list-style-type: none"> - Advanced subsea processing systems - Underwater drone inspection - Autonomous underwater vehicles (AUVs) - Smart well completion systems - Improved subsea separation technology
Robotics and Automation	<ul style="list-style-type: none"> - Robotic pipe handling - Automated well servicing - Inspection robots - Maintenance robots - Autonomous surface vehicles
Materials Technology	<ul style="list-style-type: none"> - Advanced composites - Smart materials - Corrosion-resistant alloys - Self-healing materials - Nano-enhanced materials

Safety and Monitoring	<ul style="list-style-type: none"> - Advanced safety systems - Real-time monitoring solutions - Wearable technology - Emergency response systems - Environmental monitoring
Alternative Energy Integration	<ul style="list-style-type: none"> - Hybrid power systems - Renewable energy solutions - Energy storage systems - Power optimization - Electrification of operations
Communication Systems	<ul style="list-style-type: none"> - Enhanced connectivity - Satellite communications - 5G network integration - Edge computing - Improved data transmission

5.6 Adoption of Digital Oilfield Technologies

The oil and gas industry has undergone a remarkable transformation in recent decades, primarily driven by the integration of digital technologies and advanced drilling techniques. This digital revolution, commonly known as the "Digital Oilfield," has fundamentally reshaped exploration and production operations worldwide. The transformation encompasses everything from basic data collection to sophisticated artificial intelligence applications, creating a more efficient and interconnected industry.

The global adoption of digital oilfield technologies has been spearheaded by major international oil companies. Major players such as Shell, BP, and ExxonMobil have made substantial investments in cutting-edge technologies, setting new standards for the industry. These investments have focused on several key areas:

Internet of Things (IoT) Integration: The deployment of IoT sensors throughout oilfield operations has created an unprecedented level of operational visibility. These sensors continuously monitor various parameters such as pressure, temperature, flow rates, and equipment health. This real-time data collection has transformed decision-making processes, allowing operators to respond quickly to changing conditions and optimize production parameters instantaneously.

Artificial Intelligence and Machine Learning: The integration of artificial intelligence and machine learning has revolutionized data analysis in the oil and gas sector. These technologies can process vast amounts of data to identify patterns, predict equipment failures, and optimize production processes. For instance, machine learning algorithms can analyze seismic data more efficiently than traditional methods, improving the success rate of exploration activities.

Digital Twins and Virtual Reality: The implementation of digital twin technology has created virtual replicas of physical assets, enabling operators to simulate different scenarios and optimize operations without risking actual equipment. This technology has proven particularly valuable in training personnel and planning maintenance activities. Virtual reality applications have enhanced training programs and improved safety protocols by allowing workers to practice procedures in a risk-free environment.

5.7 Advanced Drilling Technologies

Advanced drilling techniques have evolved considerably, with directional drilling becoming increasingly sophisticated. Horizontal drilling and extended reach drilling have opened up previously inaccessible reserves, while measurement while drilling (MWD) technology has enhanced precision and reduced drilling risks. The integration of automation in

drilling operations has not only improved efficiency but also significantly reduced human exposure to hazardous environments.

Directional Drilling Advancements: Modern directional drilling capabilities have revolutionized well construction. Horizontal drilling techniques now allow operators to access reservoirs that were previously unreachable, while extended reach drilling has made it possible to access offshore reserves from onshore locations. These advancements have not only improved recovery rates but also reduced environmental impact by requiring fewer well sites.

Measurement While Drilling (MWD): MWD technology has transformed the accuracy and efficiency of drilling operations. Real-time data transmission from downhole sensors provides immediate feedback about formation characteristics, wellbore positioning, and drilling parameters. This information allows operators to make instant adjustments, reducing drilling risks and improving overall efficiency.

Automated Drilling Systems: The introduction of automated drilling systems has significantly improved operational safety and efficiency. These systems can maintain optimal drilling parameters automatically, reducing human error and improving consistency in well construction.

5.8 Enhanced Oil Recovery (EOR)

Enhanced Oil Recovery (EOR) represents a critical technological advancement in the upstream sector of oil and gas industry, serving as a tertiary recovery method to extract additional oil from reservoirs after primary and secondary recovery methods have been exhausted. The significance of EOR has grown substantially in recent decades, particularly as conventional oil fields mature and the demand for energy continues to rise globally.

EOR encompasses various sophisticated techniques designed to increase oil recovery from reservoirs by altering the physical and chemical properties of reservoir fluids and rocks. The primary objective is to improve oil displacement efficiency and volumetric sweep efficiency, ultimately leading to increased oil production. Technology has evolved significantly since its inception, incorporating advanced methodologies such as thermal recovery, chemical injection, gas injection, and microbial techniques.

Table 11: Key Techniques for Enhanced Oil Recovery (EOR)

Techniques	Description
Thermal EOR	<ul style="list-style-type: none"> - Uses heat to reduce crude oil viscosity and improve flow - Common techniques include steam injection, cyclic steam stimulation (CSS), and steam-assisted gravity drainage (SAGD) - Particularly effective for heavy oil and bitumen reservoirs - Heat lowers oil viscosity, enabling easier production
Gas Injection (Miscible/Immiscible)	<ul style="list-style-type: none"> - Injects gases such as CO₂, nitrogen, or natural gas into the reservoir - Gas mixes with oil (miscible) or pushes oil toward production wells (immiscible) - Helps maintain reservoir pressure and improve displacement efficiency- Widely used in mature conventional oil reservoirs
Chemical EOR	<ul style="list-style-type: none"> - Injects chemicals such as polymers, surfactants, or alkali solutions into the reservoir - Polymers increase water viscosity to improve sweep efficiency - Surfactants reduce interfacial tension between oil and water - Enhances mobilization of trapped oil in porous rock
Microbial EOR (MEOR)	<ul style="list-style-type: none"> - Utilizes microorganisms or nutrients injected into the reservoir - Microbes produce gases, acids, or biosurfactants that improve oil mobility - Helps reduce oil viscosity and improve displacement - Considered a relatively low-cost and environmentally friendly EOR option

Source: Crisil Intelligence

Some Investments & Developments in EOR

- CO₂-EOR Pilot – Gandhar Oilfield (ONGC): In January 2026, ONGC launched a carbon capture and storage (CCS) pilot at the Gandhar oilfield in Gujarat, involving the injection of captured CO₂ into depleted reservoirs. The initiative aims to capture ~100 tons of CO₂ per day and evaluate the feasibility of CO₂-based EOR to enhance recovery from mature fields while supporting carbon management objectives.
- ONGC invested INR 57,825 crore on 28 EOR projects to tap an additional 194 Million Tonnes of Oil Equivalent (Mtoe)
- Saudi Aramco launched a USD 500 million Chemical Enhanced Oil Recovery (CEOR) project in the Ghawar oilfield, incorporating alkaline-surfactant-polymer (ASP) flooding to maximize extraction
- BASF SE announced the expansion of its chemical manufacturing plant in Germany, increasing the production of high-efficiency EOR surfactants
- Halliburton introduced a smart CEOR system integrating real-time reservoir monitoring with optimized chemical injection, enhancing performance and cost efficiency
- Cairn India has announced plans to invest INR 5,220 crore in shale and oil recoveries

5.8.1 Different Kinds of EOR Processes

Polymer Flooding

Polymer flooding involves the injection of water mixed with polymers, typically partially hydrolyzed polyacrylamide, to increase the viscosity of the injected fluid and improve mobility control within the reservoir. This enables a more uniform sweep of the reservoir by reducing water channeling and fingering, thereby enhancing displacement efficiency and improving oil recovery. The technique is particularly effective in heterogeneous reservoirs where conventional water flooding may be inefficient. Polymer flooding is widely regarded as one of the simplest and most commercially successful chemical EOR methods due to its relatively lower cost, operational ease, and established track record across mature oilfields.

Surfactant-Polymer (SP) Flooding

Surfactant-polymer flooding involves the injection of a combination of surfactants and polymers to improve both microscopic and macroscopic displacement efficiency. The surfactant component reduces the interfacial tension between oil and water, thereby mobilizing residual oil trapped within the pore spaces, while the polymer component enhances sweep efficiency by improving mobility control. This combined mechanism enables more effective recovery compared to standalone polymer flooding. SP flooding is considered a more advanced technique relative to polymer flooding, involving higher chemical costs and formulation complexity, but offering improved recovery potential in reservoirs with significant residual oil saturation.

Alkaline-Surfactant-Polymer (ASP) Flooding:

Alkaline-surfactant-polymer flooding represents a further advancement in chemical EOR techniques, wherein alkaline chemicals are injected along with surfactants and polymers. The alkaline component reacts with naturally occurring acidic components in crude oil to generate in-situ surfactants, further reducing interfacial tension and enhancing oil

mobilization. In combination with the mobility control provided by polymers, this results in improved displacement efficiency and higher recovery rates. ASP flooding is considered a more advanced and chemically intensive technique, offering higher recovery potential; however, it involves greater operational complexity, sensitivity to reservoir conditions, and higher costs, necessitating careful design and reservoir screening.

5.9 Well Intervention Services

Well intervention, fundamentally, represents a set of crucial operations performed on oil and gas wells throughout their lifecycle and forms an integral part of upstream oil and gas activities. These operations are essential for maintaining well productivity, ensuring safety, and optimizing reservoir performance.

Types of Well Intervention

- **Light Well Intervention:** This category involves minimal equipment and typically doesn't require a rig. Wireline operations are the most common form, where tools are lowered into the well using a cable. These operations include:
 - **Slickline Operations:** Using basic mechanical tools for tasks like setting plugs or gauges
 - **Electric Line Operations:** More sophisticated operations involving electronic tools for logging or perforating
 - **Diagnostic Runs:** Gathering data about well conditions using various sensors
 - **Minor Repairs:** Simple fixes that don't require major equipment
- **Medium Well Intervention:** These operations require more substantial equipment but not a full workover rig. Coiled tubing operations are the primary example:
 - **Well Stimulation:** Improving flow through chemical or mechanical means
 - **Scale Removal:** Clearing mineral deposits that restrict flow
 - **Sand Cleanouts:** Removing accumulated sand that impedes production
 - **Chemical Treatments:** Applying various chemicals to improve well performance
- **Heavy Well Intervention:** These are major operations requiring significant equipment and resources:
 - **Complete Workover Operations:** Major well repairs or modifications
 - **Completion Replacement:** Changing the entire production system
 - **Side-tracking:** Drilling a new wellbore from an existing well
 - **Well Conversion:** Changing the well's purpose (e.g., from producer to injector)

Table 12: Importance of Well Intervention

Importance	Description
Production Enhancement	<ul style="list-style-type: none"> - Restoring or increasing production rates - Accessing new production zones - Optimizing flow conditions - Removing flow restrictions - Improving reservoir contact
Well Integrity	<ul style="list-style-type: none"> - Ensuring safe operations - Preventing leaks - Maintaining pressure control - Protecting the environment - Complying with regulations
Economic Benefits	<ul style="list-style-type: none"> - Extending well life - Reducing operating costs - Maximizing recovery - Improving efficiency - Enhancing asset value

Some Investments & Developments in Well Intervention Services

- In 2025, ONGC appointed BP as a technical services provider to enhance production from the mature Mumbai High field. The 10-year program involves advanced well intervention, reservoir optimization, and production enhancement techniques aimed at increasing crude output by ~44% and gas production by ~89%
- In 2025, ONGC carried out a complex well intervention and control operation at the Rudrasagar field in Assam following a gas blowout. The operation involved removal of damaged well equipment and installation of a capping stack with support from international well-control specialists to safely restore well integrity.
- In March 2024, Wellvene Limited announced a partnership with Marwell AS to enhance its market presence and increase its earnings. This strategic move seeks to fulfill the region's well intervention needs and improve the efficiency of plug and abandonment tasks.
- In January 2024, Coretrax (Expro Group) acquired Wireline Drilling Technologies to strengthen well intervention capabilities and expand its presence in the Middle East.
- Cairn Oil & Gas's USD 3-4 billion investment to triple production will create strong demand for well intervention services.

5.10 Well Stimulation Services

Well stimulation refers to upstream oil and gas techniques used to improve or restore the flow of hydrocarbons from reservoir rocks to the wellbore by overcoming near-wellbore damage or improving the rock's natural permeability.

Table 13: Key Techniques for Well Stimulation

Techniques	Description
Hydraulic Fracturing (Fracking)	<ul style="list-style-type: none"> - Creates fractures in reservoir rock using high-pressure fluid injection - Proppants keep fractures open for hydrocarbon flow - Common in shale and tight formations - Components include water, sand, and chemical additives
Matrix Acidizing	<ul style="list-style-type: none"> - Involves pumping acid below fracture pressure - Dissolves sediments and mud solids - Commonly uses hydrochloric acid for carbonates - Hydrofluoric acid for sandstone formations
Acid Fracturing	<ul style="list-style-type: none"> - Combines hydraulic fracturing with acid injection - Creates lasting conductivity in carbonate formations - Doesn't require proppants - More common in limestone reservoirs

The importance of well stimulation services extends far beyond simple production enhancement. It represents a confluence of technical innovation, environmental responsibility, economic necessity, and human expertise. As the industry continues to evolve, the services will remain crucial in meeting global energy needs while adapting to changing environmental and social expectations.

Table 14: Importance of Well Stimulation

Importance	Description
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Production Enhancement	<ul style="list-style-type: none"> - Increases well productivity - Improves recovery rates - Extends well life - Enhances reservoir contact
Economic Benefits	<ul style="list-style-type: none"> - Makes marginal fields profitable - Reduces operating costs - Improves return on investment - Maximizes asset value
Resource Recovery	<ul style="list-style-type: none"> - Enables access to tight formations - Improves ultimate recovery - Unlocks unconventional resources - Optimizes reservoir drainage
Field Development	<ul style="list-style-type: none"> - Essential for shale development - Enables multi-stage completions - Supports horizontal well productivity - Facilitates field optimization

Some Investments & Developments in Well Stimulation Services

- In January 2024, Trendsetter Engineering, Inc. completed the deepwater stimulation of two wells with water depths ranging between 6,500’-7,200’ for the major operators. This campaign was conducted in the Gulf of Mexico and assisted in completing the acid treatment of a combined 6 wells.
- In June 2023, Halliburton Company and Nabors Industries Ltd. announced an agreement on well-construction automation solutions. The collaboration aimed to automate the drilling process and other well construction services with the help of technology.
- Halliburton's launch of its "Frac of the Future" initiative, which aims to reduce the environmental impact of hydraulic fracturing operations
- In 2024, ONGC collaborated with Halliburton for well stimulation vessels.

5.11 Surface Production Facilities

Surface production facilities are integrated infrastructure systems used to receive, process, treat, store, and transport hydrocarbons extracted from reservoirs. These facilities handle the fluids produced from wells—typically a mixture of crude oil, natural gas, water, and impurities—and process them to meet pipeline, storage, or export specifications. By separating and stabilizing these hydrocarbon streams, surface facilities ensure that production from wells can be safely transported and commercialized.

Surface production infrastructure primarily forms part of the upstream segment of the oil and gas value chain, as it directly supports hydrocarbon production and initial processing at or near the wellhead. Surface production facilities often act as a critical bridge between upstream production operations and midstream transportation networks.

Types of Facilities

- **Onshore Facilities:** These facilities are built on land and typically include multiple interconnected systems. Well pad facilities serve as the initial collection point, where individual wells converge. The produced fluids then flow to gathering stations, which consolidate production from multiple well pads. Central processing facilities handle the main separation and treatment processes, while tank batteries store the processed hydrocarbons. Gas processing plants specifically handle natural gas treatment, and storage terminals prepare products for export.

- **Offshore Facilities:** These sophisticated installations operate in marine environments. Fixed platforms, anchored to the seabed, are common in shallow waters. FPSOs (Floating Production Storage and Offloading vessels) offer flexibility in deeper waters and can store large volumes of oil. Tension Leg Platforms provide stability in deeper waters through tensioned cables, while semi-submersible platforms use ballast systems for stability. Subsea systems operate on the seafloor, connecting to surface facilities through risers.

Key Functions

Surface production facilities serve multiple critical functions in hydrocarbon processing. The primary function involves separation, where produced fluids are divided into their constituent components - oil, gas, and water. This separation process typically occurs in multiple stages, beginning with primary separation where the bulk of gas is removed from the liquid stream, followed by secondary separation where oil and water are separated. The separation process utilizes various physical principles including gravity settling, centrifugal force, and coalescence to achieve the desired separation efficiency.

Following separation, each stream undergoes specific treatment processes. Gas treatment involves removing contaminants such as hydrogen sulfide (H₂S), carbon dioxide (CO₂), and water vapor to meet pipeline specifications and prevent corrosion. Oil treatment focuses on stabilization by removing light hydrocarbons, reducing water content, and controlling salt concentration through desalting processes. Produced water treatment involves removing suspended oil droplets, dissolved hydrocarbons, and managing dissolved solids before disposal or reinjection.

Storage and export systems form another crucial function, providing buffer capacity between production and transportation. These systems include storage tanks for oil and produced water, gas compression systems for maintaining pressure, and export pipelines or loading facilities for product transportation. The entire operation is monitored and controlled through sophisticated instrumentation and control systems, ensuring safe and efficient operation.

Components

Surface production facilities comprise numerous specialized components working together. Separation equipment includes test separators for individual well testing, production separators for continuous operation, and free water knockout vessels for bulk water removal. Electrostatic treaters and desalters remove remaining water and salt from the oil stream. Heat exchangers manage process temperatures, while pumps and compressors provide the necessary fluid movement and pressure maintenance.

Gas processing equipment includes compression systems, gas sweetening units for acid gas removal, and molecular sieve units for dehydration. Liquid processing equipment encompasses heater treaters for oil treatment, storage tanks with floating or fixed roofs, and various pumping systems for fluid transfer. Supporting utilities include power generation systems, instrument air systems, cooling water systems, and chemical injection packages.

GAS DEHYDRATION UNIT (GDU)

The Gas Dehydration Unit plays a vital role in natural gas processing by removing water vapor from the gas stream. The most common method employs glycol dehydration, typically using triethylene glycol (TEG). In this process, wet gas enters the absorber tower where it contacts counter-currently with lean glycol. The glycol absorbs water from the gas stream, becoming rich glycol. This rich glycol then flows to a regeneration system where heat is applied to drive off the absorbed water, regenerating the glycol for reuse. The system includes several key components: the absorber tower where dehydration occurs, a flash tank for removing absorbed hydrocarbons, a regeneration system (including reboiler and stripping column), and various heat exchangers and pumps for process optimization.

Dew Point Depression represents a critical parameter in gas processing, defined as the difference between the actual gas temperature and its hydrocarbon dew point temperature. This parameter is crucial for preventing liquid dropout in gas pipelines and ensuring consistent gas quality. DPD control employs various methods including mechanical

refrigeration, turbo-expansion, and the Joule-Thomson effect. Mechanical refrigeration uses compression and expansion cycles to cool the gas, while turbo-expansion harnesses the gas pressure drop for cooling. The Joule-Thomson effect utilizes pressure reduction to achieve temperature control. The system requires careful monitoring through temperature and pressure sensors, online analyzers, and control systems to maintain the desired dew point depression.

The effectiveness of DPD control depends on several factors including gas composition, pressure conditions, temperature requirements, and process conditions. Modern facilities often employ integrated control systems that continuously monitor and adjust process parameters to maintain optimal DPD values. This control is essential for meeting gas sales specifications and ensuring efficient pipeline operation. The system typically includes refrigeration units, heat exchangers, pressure control valves, and associated instrumentation for monitoring and control.

Some Investments & Developments in Surface Production

- Schlumberger has led initiatives in developing integrated digital platforms (for example, its DELFI® digital environment) that combine data from surface production facilities with reservoir management.
- Halliburton, through its digital integrated completions and production technologies, has been investing in IoT-enabled surface systems. For example, it employs a network of IoT sensors installed on wellheads and within surface processing equipment to collect key metrics such as pressure, temperature, flow rates, and vibration data.
- Baker Hughes has focused on the development and deployment of modular surface production systems. By using modular designs, the company and its customers can more rapidly deploy processing facilities—especially in challenging environments—and adjust capacities as field production evolves.
- OIL awarded INR 53.5 crore contract to BGR Tech, in partnership with Collabrah India, for the deployment of surface production facilities.

5.12 Production Enhancements

Marginal fields are oil and gas reservoirs with declining production, limited reserves, or challenging economic viability. Enhancing production from these fields is critical to maximizing hydrocarbon recovery and extending asset life. Production enhancement operations involve advanced techniques and innovative strategies to improve reservoir performance, optimize recovery, and ensure sustainable operations.

Production enhancement primarily falls within the upstream segment of the oil and gas value chain, as it focuses on improving hydrocarbon extraction from reservoirs through advanced subsurface and well engineering techniques. These techniques are particularly relevant for mature and marginal fields, where natural reservoir pressure declines and conventional production methods become less effective over time. Production enhancement strategies typically involve a combination of Enhanced Oil Recovery (EOR), improved recovery methods, artificial lift optimization, reservoir modelling, well intervention, and infrastructure upgrades, enabling operators to extend field life and maximize recoverable reserves. However, these initiatives also have important implications for the midstream segment, particularly where enhanced production necessitates the expansion or optimization of gathering systems, surface processing facilities, pipelines, and storage infrastructure. As a result, production enhancement programs often require integrated investments across both upstream and midstream assets to accommodate incremental production volumes and ensure efficient transportation and processing of hydrocarbons.

In India, production enhancement has gained increasing importance due to the maturity of several legacy oil and gas fields, particularly those operated by national oil companies in basins such as Assam, Gujarat, Mumbai Offshore,

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and Rajasthan. Many of these fields were discovered decades ago and have experienced declining production profiles, making the deployment of advanced recovery techniques critical to sustaining domestic output. According to government data, India's crude oil production declined from 38.1 million tonnes in FY2012 to approximately 28.7 million tonnes in FY2025, highlighting the need to improve recovery factors from existing reservoirs. Enhanced recovery technologies such as thermal recovery, chemical flooding, and gas injection are increasingly being deployed in mature reservoirs to mobilize residual hydrocarbons that cannot be extracted through primary or secondary recovery techniques. These technologies improve reservoir pressure maintenance, reduce oil viscosity, and enhance sweep efficiency, enabling operators to recover a greater proportion of in-place hydrocarbons.

Table 15: Enhanced Oil Recovery Techniques

EOR Technique	Examples	Importance / Benefits	Key Principle
Thermal EOR	<ul style="list-style-type: none"> - Steam Flooding (continuous steam injection) - Cyclic Steam Stimulation (CSS) or "Huff-and-Puff"- In-Situ Combustion (fire flooding) 	<ul style="list-style-type: none"> - Ideal for heavy oil reservoirs where oil is too viscous to flow naturally. - Extends field life significantly. 	Heat is introduced into the reservoir (via steam or combustion), which reduces oil viscosity, allowing it to flow more easily toward production wells.
Gas Injection EOR	<ul style="list-style-type: none"> - CO₂ Injection (most common) - Hydrocarbon Gas Injection (methane, ethane, LPG) - Nitrogen Injection 	<ul style="list-style-type: none"> - Maintains reservoir pressure and can achieve miscible displacement. - Especially important for light to medium oil reservoirs. - CO₂ EOR has the additional benefit of carbon capture and storage (CCS). 	Gas is injected to either mix with oil (miscible displacement) or push it toward production wells (immiscible displacement). This reduces interfacial tension and increases sweep efficiency.
Chemical EOR	<ul style="list-style-type: none"> - Polymer Flooding (increases water viscosity) - Surfactant Flooding (reduces interfacial tension) - Alkaline Flooding (reacts with acidic crude components to form natural soaps) 	<ul style="list-style-type: none"> - Helps when waterflooding becomes inefficient due to high water cut. - Can mobilize residual oil trapped in rock pores. - Improves overall sweep efficiency and oil recovery factor. 	Chemicals are injected into the reservoir to alter fluid properties (viscosity, wettability, interfacial tension) to displace oil more efficiently.

Another crucial approach is Artificial Lift Optimization, which enhances well productivity by improving fluid flow from the reservoir to the surface. Common artificial lift methods include Electrical Submersible Pumps (ESPs), Gas Lift, and Progressive Cavity Pumps (PCPs). Selecting the appropriate artificial lift system based on reservoir conditions significantly impacts production rates and operational efficiency. Proper monitoring and regular maintenance of these systems are vital to sustaining long-term production from marginal fields. Reservoir Stimulation is also a key aspect of production enhancement, focusing on increasing permeability and improving hydrocarbon flow. Techniques such as hydraulic fracturing and acidizing help in breaking down reservoir rock or dissolving formations that restrict flow.

Table 16: Artificial Lift Optimization Techniques

Artificial Lift Technique	Examples / Variants	Importance / Benefits	Key Principle
Rod Pumping (Beam Pumping)	<ul style="list-style-type: none"> - Conventional beam pump-Hydraulic rod pump 	<ul style="list-style-type: none"> - Most common lift method worldwide (especially onshore). - Reliable, low-cost solution for low to medium rate wells. - Easy to maintain and adjust stroke length/speed for optimization. 	Uses a surface beam unit and downhole pump connected by rods to mechanically lift fluids from the wellbore.
Electric Submersible Pump (ESP)	<ul style="list-style-type: none"> - Standard ESP systems-Variable speed drive ESPs- Gas-handling ESPs 	<ul style="list-style-type: none"> - Suitable for high production wells and deeper reservoirs. - Can produce thousands of barrels per day. - Optimization through speed control helps match inflow 	A multistage centrifugal pump is submerged in the well and electrically driven to lift large volumes of fluid.

		performance and avoid pump-off or gas lock.	
Gas Lift	- Continuous gas lift- Intermittent gas lift	- Ideal for deviated/horizontal wells where rod pumps or ESPs are challenging. - Optimization by adjusting gas injection rate maximizes production while minimizing gas usage.	Injects high-pressure gas into the tubing to lighten the fluid column, allowing reservoir pressure to push fluids to surface more easily.
Progressive Cavity Pump (PCP)	- Conventional PCP- PCP with variable speed drive	- Effective for viscous crude or wells with high sand production. - Low shear pumping, protects oil quality. - Optimization by adjusting rotational speed to avoid excessive wear.	Uses a helical rotor turning inside a stator to progressively lift fluids from the well.
Plunger Lift	- Conventional plunger lift- Smart plunger lift systems	- Common in gas wells with liquid loading issues. - Low operating cost and energy requirement. - Optimization involves cycle timing and plunger velocity control.	Uses a plunger traveling up the tubing to carry accumulated liquids to the surface, allowing gas to flow freely.

Hydraulic fracturing is particularly beneficial for tight formations, while matrix acidizing is effective in carbonate reservoirs. These methods rejuvenate old wells and enhance production, ensuring economic feasibility in marginal fields. The importance of Digitalization and Data Analytics in production enhancement cannot be overlooked. Real-time monitoring, predictive analytics, and reservoir modelling enable better decision-making and proactive field management. Technologies such as IoT sensors, AI-driven analytics, and cloud-based platforms help operators optimize production, reduce downtime, and cut operational costs. By leveraging digital solutions, the company can maximize output from marginal fields and ensure sustainable, profitable operations

5.12.1 Government Policies Supporting Production Enhancements

Recognizing the strategic importance of maximizing domestic hydrocarbon production, the Government of India has introduced several policy initiatives aimed at encouraging investment in mature fields and improving recovery from existing reservoirs.

Discovered Small Field (DSF) Policy

The Discovered Small Field (DSF) Policy, initially introduced as the Marginal Field Policy in 2015, was designed to monetize hydrocarbon discoveries that were previously considered uneconomical by national oil companies. The policy enables private and foreign operators to bid for marginal fields through a revenue-sharing contractual framework, allowing contractors to undertake development and production activities with greater operational flexibility. The DSF policy is estimated to unlock over 85 million metric tonnes of oil and oil equivalent gas reserves from such fields. These marginal field developments typically involve significant production enhancement and redevelopment activities, including drilling of additional wells, implementation of EOR techniques, and upgrading surface infrastructure to improve recovery rates.

Hydrocarbon Exploration and Licensing Policy (HELP)

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In 2016, the Government introduced the Hydrocarbon Exploration and Licensing Policy (HELP) to replace the earlier New Exploration Licensing Policy (NELP). HELP provides a uniform licensing regime for exploration and production of all hydrocarbons, including conventional and unconventional resources such as shale oil, shale gas, coal bed methane, and tight hydrocarbons. Under the HELP framework, the Open Acreage Licensing Policy (OALP) allows companies to identify and bid for exploration blocks throughout the year, improving investment flexibility and encouraging increased exploration and production activities. As of recent government disclosures, 172 exploration blocks covering approximately 378,652 sq. km have been awarded across nine OALP bidding rounds. Further, OALP bid Round X offering 25 explorations blocks covering 1,91,986.21 sq. km has been launched on 15.04.2025.

Enhanced Recovery Policy Framework

To further promote improved recovery from mature reservoirs, the Government introduced a policy framework in 2018 to incentivize enhanced recovery (ER) and improved recovery (IR) projects, including the adoption of EOR technologies. The policy aims to provide fiscal incentives and regulatory clarity to operators undertaking production enhancement initiatives in ageing fields.

The ER includes Enhanced Oil Recovery (EOR) and Enhanced Gas Recovery (EGR), Unconventional Hydrocarbon (UHC) production methods include Shale oil and gas production, tight oil and gas production, production from oil shale, gas hydrates and heavy oil. Enhanced Recovery, Improved Recovery and exploration and exploitation of unconventional hydrocarbons are capital intensive, technologically complex and challenging in nature. It calls for supporting infrastructure, logistic support, fiscal incentives and enabling environment.

The strategic objective of the Policy is to build a supportive ecosystem through academic and research institutes, industry- academia collaboration and to support and encourage Exploration and Production (E&P) Contractors to deploy ER/IR/UHC Methods/ techniques. The Policy will be applicable to all contractual regimes and Nomination fields.

Some Investments & Developments in Production Enhancements

- In 2024, Deep Industries secures largest project worth INR 1,042 crore from ONGC for production enhancements. The project will span 15 years.
- ONGC and BP signed a contract to enhance production from Mumbai High field.
- Condor Energies initiates gas field production enhancements operations of an integrated cluster of eight conventional natural gas-condensate fields in Uzbekistan.
- ONGC has invited global oil and gas companies to participate in production enhancement programs for its mature onshore fields, particularly in Assam and Gujarat basins

5.13 Key Competitors in Oilfield Services

Table 17: Key Competitors

Competitors	Headquarter	Establishment	Business Segments / Offerings
BVishal Oil & Energy Ltd	Mehsana, India	1999	Well Intervention & Well stimulation, Surface Production Testing & Gas Processing, Production Enhancement, Enhance Oil Recovery (EOR)

			through subsidiaries, Operation & Maintenance (O & M) Services (Holding & Subsidiary companies)
Akash Exploration Services	Ahmedabad, India	2007	Well Head Maintenance, Well Head Greasing, Hot Oil Circulation Unit, Drilling Rig
Assam Air Products	Dibrugarh, Assam, India	1985	Industrial Gas Products & Units, Oilfield Services, EPC Contracts, Oilfield Accessories
Deep Industries Ltd	Ahmedabad, India	1991	Drilling & Workover Services, Integrated Project Management Services, Air & Gas Compression, Gas Dehydration, Conditioning and Processing
Weafri Well Services Pvt Ltd	Nigeria	1988	Well Cementing, Well Intervention, High Pressure Pumping, Filtration Services, Downhole Service Tools, Slickline Services, Pipeline Services, Casing Hardware
Seros Energy	Mumbai, India	2022	Directional Drilling, Workover Services, Coring Rigs, Geothermal, Hydraulic Fracking, Cementing
Halliburton India Operations Pvt Ltd	Mumbai, India	2016	Offshore Drilling, Oil & Gas Exploration, Development & Production Activities
Hindustan Oil Exploration Company Limited	Chennai, India	1983	Oil & Gas Exploration and Production, Development of Onshore and Offshore Hydrocarbon Blocks, Field Development and Production Operations
Antelopus Selan Energy Limited (formerly Selan Exploration Technology Limited)	Gujarat, India	1985	Integrated Oilfield Services including Drilling and Workover Services, Well Testing, Production Facilities, Field Operations and Asset Management
Asian Energy Services	Mumbai, India	1992	Seismic Data Acquisition, Production facility EPC, Oilfield Operations & Maintenance, Production Enhancement Services, Integrated Energy Services for Upstream Oil & Gas

Source: Company Website, Crisil Intelligence

5.14 Opportunities in Exploratory Fields

India's oil and gas sector is witnessing renewed focus on exploration to enhance domestic production and reduce import dependence. The government has launched multiple initiatives, including the Hydrocarbon Exploration & Licensing Policy (HELP) and Open Acreage Licensing Policy (OALP), unlocking large offshore and onshore areas for bidding – many in previously restricted “no-go” zones. With improved data availability, streamlined regulations, and a strong policy push, opportunities are opening up across frontier basins, deepwater regions, and discovered small fields, attracting both national oil companies and private players.

Key Policy & Regulatory Enablers

1. HELP / Open Acreage Licensing Policy (OALP)

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- Since 2016, the Hydrocarbon Exploration & Licensing Policy (HELP) has replaced older licensing models (like NELP). Under HELP, OALP lets companies pick blocks, submit expressions of interest, etc., with more transparency.
- The OALP rounds offer varied blocks: onshore, shallow water, deepwater, ultra-deepwater.

2. OALP Round-X (the 10th round of bidding)

- Launched in February 2025 during India Energy Week.
- Offers 25 blocks across 13 sedimentary basins, covering about 191,986.21 sq km.
- Most blocks are offshore: 19 out of 25. And many in deep or ultra-deep water.
- A significant portion of area is in previously restricted “No-Go” zones (areas formerly off-limits due to environmental, regulatory, or other reasons).

3. Discovered Small Fields (DSF) Rounds

- These are smaller fields already discovered but undeveloped. They often have lower risk than completely new exploration, and quicker turnaround.

4. Modernized Regulatory Framework

- Amendments to the Oilfields (Regulation & Development) Act, to streamline approvals and bring regulatory norms more in line with international best practices.
- The National Data Repository (NDR) has been upgraded, data (seismic, well, etc.) is more accessible / transparent. Helps in evaluation of blocks.

5. Seismic / Data Investment

- The government is investing in seismic surveys, aerial surveys, stratigraphic wells to reduce geological risk and improve discovery potential.

5.15 Opportunities, Challenges and Risks

Opportunities

Digital Transformation: Digital Transformation is revolutionizing the oilfield services sector by enabling companies to leverage advanced technologies for improved operations. The integration of AI, IoT, and automation is creating more efficient workflows and better decision-making capabilities. Companies can now monitor and control operations remotely, analyze vast amounts of data in real-time, and optimize their processes for maximum efficiency and cost reduction. This digital evolution is transforming traditional operating models and creating new revenue streams.

Energy Transition: Energy Transition presents a significant opportunity as the industry adapts to changing energy landscapes. Oilfield service companies are increasingly diversifying their portfolios to include renewable energy services, carbon capture and storage solutions, and geothermal energy development. This shift allows companies to maintain relevance while contributing to global sustainability goals. Companies that successfully pivot to include these new energy solutions alongside traditional services will be well-positioned for future growth.

Technology Innovation: Technology Innovation drives competitive advantage in the sector. Advanced drilling technologies, smart well completion systems, and improved fracking techniques are enabling access to previously uneconomical resources. Subsea technology advancements are opening new frontiers in deepwater exploration and production. Companies that invest in research and development can differentiate themselves through superior technical solutions.

Challenges

Market Volatility: Market Volatility remains a persistent challenge in the oilfield services sector. Oil price fluctuations directly impact service companies' revenues and profitability, making long-term planning difficult. The cyclical nature

of the industry creates uncertainty in investment decisions and requires companies to maintain flexible business models. This volatility affects everything from project scheduling to workforce management and capital allocation.

Environmental Regulations: Environmental Regulations pose increasing challenges as governments worldwide implement stricter standards. Companies must invest significantly in compliance measures, upgrade equipment to meet emission standards, and develop comprehensive waste management solutions. Carbon pricing policies add another layer of complexity to operational costs. Adapting to these regulations while maintaining profitability requires careful balance and strategic planning.

Cost Pressure: Cost Pressures continue to intensify as operators demand more efficient and cost-effective solutions. Companies must optimize operating costs while maintaining service quality, manage capital expenditure carefully, and compete with low-cost providers. This challenge requires innovative approaches to cost management and service delivery while preserving margins and market share.

Workforce: Workforce Issues present ongoing challenges as the industry faces an aging workforce and skills gap. Companies must invest heavily in training programs, attract new talent to the industry, and maintain knowledge transfer from experienced workers. The technical complexity of modern oilfield operations requires a highly skilled workforce, making recruitment and retention crucial for success.

Risks

Operational Risks: Operational Risks are inherent in the oilfield services sector. Safety incidents, equipment failures, and environmental accidents can result in significant financial and reputational damage. Project delays can impact revenue and client relationships. Managing these risks requires robust safety protocols, regular maintenance programs, and comprehensive risk management systems.

Financial Risks: Financial Risks affect companies throughout the sector. Credit risks from customers, particularly in challenging market conditions, can impact cash flow. Currency fluctuations in international operations can affect profitability. The capital-intensive nature of the business requires careful debt management and financial planning to maintain stability.

Geopolitical Risks: Geopolitical Risks can significantly impact operations and market access. Political instability in key markets, trade restrictions, and sanctions can disrupt business activities. Local content requirements can complicate operations and increase costs. Companies must navigate these complex international relationships while maintaining operational efficiency.

Strategic Risks: Strategic Risks arise from rapid industry changes. Technology obsolescence can quickly erode competitive advantages. New market entrants and changing business models can disrupt established players. Companies must continuously adapt their strategies to maintain market position and relevance.

Electric Vehicles (EV Risk): The increasing adoption of electric vehicles represents a structural shift in global energy consumption patterns and may impact long-term demand for crude oil and related services. Accelerated electrification of transportation, supported by government policies, incentives and technological advancements in battery storage, could reduce demand for petroleum products, particularly in the mobility segment. This may, in turn, affect capital expenditure by oil and gas companies, thereby impacting demand for oilfield services. Additionally, evolving regulatory frameworks and decarbonization targets across key markets may further influence investment priorities within the energy sector. Companies operating in the oilfield services industry may need to adapt to these transitions by diversifying service offerings and aligning with evolving energy requirements.

Climate Change: Climate Change Risks represent a growing concern for the industry. The transition to renewable energy could impact traditional service demand. Stranded assets and regulatory changes could affect long-term

viability. Companies must manage their reputation while adapting to changing energy landscapes and environmental expectations.

6 Strategic Positioning of BVishal Oil & Energy

6.1 Company Overview

BVishal Oil & Energy Ltd. (BVOEL) is a prominent oilfield service provider in India, established in 1999. With the experience over 2 decades, the company specializes in customized oilfield solutions for optimal performance. The company offers a comprehensive suite of services - Well Intervention & Well stimulation, Surface Production Testing & Gas Processing, Production Enhancement, Enhance Oil Recovery (EOR) through subsidiaries, Operation & Maintenance O & M Services (Holding & Subsidiary companies). The company provides specialized expertise, equipment, tools, and support for oil and gas wells, covering exploration, drilling, production, and maintenance activities. The company is focused on delivering innovative solutions to drive efficiency and excellence in upstream and midstream segment oil & gas sector not only in India but also in Kuwait. The company is the only Indian company to pre-qualify as a participant for strategic Enhanced Oil Recovery (EOR) projects and Surface Well testing facilities to operate for Oil and Gas company at the Kuwait Oil Company and one of the companies among 3 Indian companies to pre-qualify as a participant for Drilling of Shallow Oil/Water Wells, Workover and Ancillary Services.

BVishal Oil & Energy Ltd. (BVOEL) is a technology-driven onshore oilfield services provider offering comprehensive services related to the exploration, production and maintenance of Oil & Well Intervention & Well Stimulation, Surface Production Testing & Gas Processing, Operations & Maintenance (O & M) services and Production Enhancement Services provided by the holding company and Enhanced Oil Recovery (EOR) and Operations & Maintenance (O & M) services provided by the subsidiary companies, each designed to enhance reservoir productivity, optimize hydrocarbon recovery, and improve field economics. With a technical foundation built over years, advanced equipment base, and highly skilled manpower, the company delivers customized solutions that address complex reservoir challenges while adhering to safety and environmental standards as stipulated under the project contract awarded by the contractor.

BVOEL possesses a team of skilled professionals and a dedicated workforce with experience in the Oil & Gas industry, enabling the company to execute projects efficiently adhering to safety and environmental standards as stipulated under the project contract awarded by the contractor. The team majorly comprises engineers and other qualified personnel who generally possess the qualification related to petroleum industry and other engineering industries. The seasoned professionals are united by a common goal: to empower the clients with cutting-edge services that optimize operations, maximize output along with ensuring environmental compliance as prescribed in the contract. The field workforce undergoes training tailored to the specific procedures and protocols of the project operations. The company ensures the availability of adequately qualified personnel and deploys manpower in strict compliance with the staffing norms prescribed under the Service Level Agreements (SLAs) of the contracting Maharatna and private companies, with such norms varying across projects. The company provides specialized upstream services in the following areas.

Well Intervention Services: The company stands in the market as a complete oil-field package player, where the company offers Coiled Tubing Units (CTU) and workover rigs for intervention activities. These include rig-based services, Artificial lift services, sand control and much more. The company also provides services and expertise on matters related to drilling muds.

Well Stimulation Services: The company provides customizable, well stimulation services based on specific field and application requirements, potentially offered on a hiring basis. The company's well stimulation services have significantly impacted clients by completing 2 to 3 operations in a single day and reducing the time required for subsequent operations from 7 days to 3 days by boosting production and saving time.

Enhanced Oil Recovery (EOR) Services: The company offers EOR applications, including polymer-based

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operations to reduce water mobility and alter reservoir flow parameters, increasing oil and gas production. The company has secured LSTK projects for designing, fabricating, constructing, installing, and commissioning polymer-based plants in Mehsana and Ahmedabad for ONGC, with the capability to prepare polymer-based fluids using treated effluent water and conduct QA/QC testing at in-plant laboratories.

Surface Production Facilities & Gas Processing: The company operates a surface production facility that will separate gases from oil and further treat the resulting fluids. This surface production operation (SPO) encompasses the processing of all three streams from the wellhead, including gas, crude oil, and water. Recently, the company was awarded a tender for Gas Dehydration Unit (GDU) and Dew Point Depression (DPD) projects, which involve treating gas to remove hydrates and light oil, a key process in the upstream segment of the oil and gas industry.

Operations & Maintenance (O&M) Services: The company offers a comprehensive range of O&M services in the oil and gas sector, specializing in gas compressors, drilling rigs, and workover rigs. Its gas compressors are designed to operate efficiently under demanding conditions and comply with international standards, ensuring performance and safety. The company also provides O&M services for drilling rigs, having started with electric drilling rigs of 100 HP and Electrical AC/VFD 1400 HP rigs in 2006, and for workover rigs, with experience operating over 10 rigs of varying capacities.

Production Enhancement Services: The company has been awarded to operate and facilitate by augmenting the production of oil and gas from marginal fields. Production Enhancement Services from the company include field expertise, reservoir and field management, Integrated Asset Management, production optimization and innovative techniques to increase hydrocarbon production. The company undertake the services such as the storage and transportation of crude oil and natural gas to the contractor's designated facilities. Accordingly, such services interface with midstream operations, thereby establishing a linkage between the upstream and midstream segments of the Indian Oil and Gas sector

Table 18: BVishal Oil & Energy Business Segment Revenues, INR Millions, FY-23 to H1-FY26

Particulars	H1-FY2026		FY-2025		FY-2024		FY-2023	
	Revenue	Share %	Revenue	Share %	Revenue	Share %	Revenue	Share %
Well Intervention & Well Stimulation	313.05	34.39%	596.05	34.29%	671.53	37.13%	498.23	39.93%
EOR (Enhanced Oil Recovery)	213.30	23.43%	502.69	28.92%	570.72	31.55%	310.94	24.92%
Operation & Maintenance (O&M)	183.64	20.18%	378.61	21.78%	371.86	20.56%	238.79	19.14%
Surface Production Testing & Gas Processing	193.07	21.21%	260.80	15.00%	194.69	10.76%	199.91	16.02%
Production Enhancement	7.138	0.78%	0	0.00%	0	0.00%	0	0.00%
Total Revenue from Operations	910.19	100.00%	1,738.15	100.00%	1,808.80	100.00%	1,247.86	100.00%

Source: Company Filings, Crisil Intelligence

The revenue indicates a fluctuating trend across business segments between FY-23 and H1-FY26. Revenue from operations is primarily driven by the Well Intervention & Stimulation segment, which has consistently remained the largest contributor, accounting for 39.93% (INR 498.23 million) in FY2023, 37.13% (INR 671.53 million) in FY2024, 34.29% (INR 596.05 million) in FY2025, and 34.39% (INR 313.05 million) for the six months ended September 2025.

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The EOR (Enhanced Oil Recovery) segment constituted the second-largest contributor, contributing 24.92% (INR 310.94 million) in FY2023, increasing to 31.55% (INR 570.72 million) in FY2024 and 28.92% (INR 502.69 million) in FY2025, before moderating to 23.43% (INR 213.30 million) in the six months ended September 2025. The Operation & Maintenance (O&M) segment has demonstrated relative stability, contributing 19.14% (INR 238.79 million) in FY2023, 20.56% (INR 371.86 million) in FY2024, 21.78% (INR 378.61 million) in FY2025 and 20.18% (INR 183.64 million) in the six months ended September 2025.

The Surface Production Testing & Gas Processing segment accounted for 16.02% (INR 199.91 million) in FY2023, declined to 10.76% (INR 194.69 million) in FY2024, and subsequently increased to 15.00% (INR 260.80 million) in FY2025 and 21.21% (INR 193.07 million) in the six months ended September 2025, indicating increased traction in the latest period. The Production Enhancement segment contributed 0.78% (INR 7.14 million) in the six months ended September 2025, with no contribution in earlier periods, indicating a nascent stage of operations. Total revenue from operations increased from INR 1,247.86 million in FY2023 to INR 1,808.80 million in FY2024, before marginally declining to INR 1,738.15 million in FY2025, while revenue for the six months ended September 2025 stood at INR 910.19 million, reflecting variations attributable to project execution timelines and order inflows.

Table 19: BVishal Oil & Energy State-wise Revenues, INR Millions, FY-23 to H1-FY26

State	H1-FY2026		FY-2025		FY-2024		FY-2023	
	Revenue	Share %	Revenue	Share %	Revenue	Share %	Revenue	Share %
Gujarat	537.15	59.02	1,177.70	67.76	1,272.52	70.35	869.68	69.69
Assam	293.62	32.26	505.30	29.07	433.97	23.99	353.12	28.30
Rajasthan	16.62	1.83	37.07	2.13	42.79	2.37	21.89	1.75
Andhra Pradesh	62.80	6.90	16	0.92	0.00	0.00	0.00	0.00
Odisha	0.00	0.00	2.09	0.12	45.55	2.52	0.00	0.00
Maharashtra	0	0.00	0	0.00	13.98	0.77	3.165	0.25
Total	910.19	100.00	1,738.15	100.00	1,808.80	100.00	1,247.86	100.00

Source: Company Filings, Crisil Intelligence

Revenue from operations is geographically concentrated, with Gujarat consistently contributing the majority share across the periods under review. Revenue from Gujarat accounted for 69.69% (INR 869.68 million) in FY2023, increasing to 70.35% (INR 1,272.52 million) in FY2024, and moderating to 67.76% (INR 1,170.70 million) in FY2025 and 59.02% (INR 537.15 million) for the six months ended September 2025. Assam represents the second-largest market, contributing 28.30% (INR 353.12 million) in FY2023, 23.99% (INR 433.97 million) in FY2024 and 29.07% (INR 505.30 million) in FY2025, and 32.26% (INR 293.62 million) in the six months ended September 2025, indicating an increasing contribution in recent periods.

Other states contribute a relatively smaller share to overall revenue. Rajasthan contributed 1.75% (INR 21.89 million) in FY2023, 2.37% (INR 42.79 million) in FY2024, 2.13% (INR 37.07 million) in FY2025 and 1.83% (INR 16.62 million) in the six months ended September 2025. Andhra Pradesh has seen an increase in contribution in the latest period, accounting for 6.90% (INR 62.80 million) in the six months ended September 2025 as compared to 0.92% (INR 16.00 million) in FY2025 and no contribution in earlier periods. Odisha and Maharashtra have contributed intermittently, with Odisha contributing 2.52% (INR 45.55 million) in FY2024 and 0.12% (INR 2.09 million) in FY2025, while Maharashtra contributed 0.77% (INR 13.98 million) in FY2024 and 0.25% (INR 3.17 million) in FY2023, with no contribution in the latest period. In essence, the revenue profile indicates a high geographic concentration in Gujarat and Assam, with gradual diversification into other states.

The BVOEL group has expanded operations across Gujarat, Assam, Rajasthan, Andhra Pradesh, Odisha and has benefitted of the strategic presence in the locations which are rich in oil production nationally. During the financial year 2024-25, the BVOEL group earned its 96.83 % of total revenue from the state of Gujarat and Assam.

6.2 Awards & Recognition

- BVOEL has been lauded and awarded for safety practices in FY 21-22 and FY 22-23 by Oil India Ltd.
- BVOEL was recognized as one of the top 10 contenders in oil and gas service industry in the year 2024 by Industry Outlook.
- BVOEL has been prequalified as a participant for Strategic Enhanced Oil Recovery projects to operate for Kuwait Oil Company in Kuwait oil fields.
- BVOEL has been prequalified as a participant for Surface Well Testing Facilities to operate for Kuwait Oil Company in Kuwait oil fields.
- BVOEL has been prequalified as a participant for Drilling Of Shallow Oil/Water Wells, Workover And Ancillary Services by Kuwait Oil Company in Kuwait oil fields.

7 Competition Landscape & Benchmarking

7.1 Operational Benchmarking

Table 20: Competitors Operational Benchmarking (Domestic)

Competitors	Business Segments / Offerings
BVishal Oil & Energy Ltd	Well Intervention & Well stimulation, Surface Production Testing & Gas Processing, Production Enhancement, Enhance Oil Recovery (EOR) through subsidiaries, Operation & Maintenance (O & M) Services (Holding & Subsidiary companies)
Akash Exploration Services	Well Head Maintenance, Well Head Greasing, Hot Oil Circulation Unit, Drilling Rig
Assam Air Products	Industrial Gas Products & Units, Oilfield Services, EPC Contracts, Oilfield Accessories
Deep Industries Ltd	Drilling & Workover Services, Integrated Project Management Services, Air & Gas Compression, Gas Dehydration, Conditioning and Processing
Weafri Well Services Pvt Ltd	Well Cementing, Well Intervention, High Pressure Pumping, Filtration Services, Downhole Service Tools, Slickline Services, Pipeline Services, Casing Hardware
Seros Energy	Directional Drilling, Well Stimulation, Well Intervention, Hydraulic Fracturing, Coiled Tubing & Nitrogen Services, Cementing
Halliburton India Operations Pvt Ltd	Offshore Drilling, Oil & Gas Exploration, Development & Production Activities
Hindustan Oil Exploration Company Limited	Oil & Gas Exploration and Production, Development of Onshore and Offshore Hydrocarbon Blocks, Field Development and Production Operations
Antelopus Selan Energy Limited	Integrated Oilfield Services including Drilling and Workover Services, Well Testing, Production Facilities, Field Operations and Asset Management
Asian Energy Services Limited	Seismic Data Acquisition, Oilfield Operations & Maintenance, Production Enhancement Services, Integrated Energy Services for Upstream Oil & Gas

Source: Company Website

Global Competitors

Competitors	Business Segments / Offerings
Halliburton	Drilling & Evaluation Services, Well Construction, Formation Evaluation, Completion & Production Services (cementing, stimulation, artificial lift), Production Optimization, Digital & Consulting Solutions for Upstream Oil & Gas Operations
Schlumberger	Reservoir Characterization, Subsurface & Geological Analysis, Drilling Services, Well Construction & Completion, Production & Intervention Services, Digital Solutions, Integrated Project Management and Field Development Services

7.2 Financial Performance Benchmarking with Peers

7.2.1 Revenue & Growth

Table 21: Revenue Benchmarking

Domestic Competitors	Revenue (INR Millions)				
	FY-23	FY-24	FY-25	H1-FY26	Growth (FY23-25)
BVishal Oil & Energy Ltd	1,247.86	1,808.80	1,738.15	910.19	18%
Akash Exploration Services	925.77	922.33	981.89	486.62	3%
Assam Air Products*	1,067.84	787.91	-		-26%
Deep Industries Ltd	3,413.36	4,269.93	5,761.30	4,205.08	30%
Weafri Well Services Pvt Ltd	71.49	266.53	236.06		82%

Seros Energy	533.30	2,249.00	2,731.10		126%
Halliburton India Operations	2,807.11	4,414.10	4,711.41	-	30%
Hindustan Oil Exploration Company Limited	5,589.16	7,491.31	4,208.70	3,936.63	-13%
Antelopus Selan Energy Limited	1,179.43	1,656.01	2,580.78	1,057.60	48%
Asian Energy Services Limited	1,099.51	3,050.65	4,650.38	2,173.65	106%

Note: *Financials for FY-25 not available on MCA. Growth is from FY-23 to FY-24

“-“ implies Financials not available

Source: Company Filings, Crisil Intelligence

Global Competitors	Revenue (USD Millions)			
	CY23	CY24	CY25	Growth (CY23-25)
Halliburton	23,018.00	22,944.00	22,184.00	6%
Schlumberger	33,135.00	36,289.00	35,708.00	14%

Source: Company Filings, Crisil Intelligence

7.2.2 EBITDA & Margins

Table 22: EBITDA Benchmarking

Domestic Competitors	EBITDA (INR Millions)				
	FY-23	FY-24	FY-25	H1-FY26	Growth (FY23-25)
BVishal Oil & Energy Ltd	341.03	520.87	496.88	302.87	21%
Akash Exploration Services	133.46	171.20	101.09	57.92	-13%
Assam Air Products*	334.29	307.82	-	-	-8%
Deep Industries Ltd^	1,752.35	1,609.81	-195.89	1,731.89	-8%
Weafri Well Services Pvt Ltd	17.17	28.88	19.69	-	7%
Seros Energy	45.60	441.50	419.00	-	203%
Halliburton India Operations	393.50	441.38	842.57	-	46%
Hindustan Oil Exploration Company Limited	3,000.78	3,407.66	1,728.77	874.36	-24%
Antelopus Selan Energy Limited	315.10	386.48	913.60	562.50	70%
Asian Energy Services Limited#	-242.27	415.37	722.95	145.67	74%

Note: *Financials for FY-25 not available on MCA. Growth is from FY-23 to FY-24.

^EBITDA growth is from FY23 to FY24

#EBITDA growth is calculated from FY24 to FY25

“-“ implies Financials not available

Formula used for EBITDA is as follows:

EBITDA: EBIT + Depreciation & Amortization

EBIT: PBT+ Interest/ Finance Cost

Source: Company Filings, CRISIL Intelligence

Global Competitors	EBITDA (USD Millions)			
	CY23	CY24	CY25	Growth (CY23-24)
Halliburton	4,083.00	3,822.00	2,260.00	-26%
Schlumberger	8,097.00	8,703.00	8,428.00	2%

Formula used for EBITDA is as follows:

EBITDA: EBIT + Depreciation & Amortization

EBIT: PBT+ Interest/ Finance Cost

Source: Company Filings, CRISIL Intelligence

Table 23: EBITDA Margins Benchmarking

Domestic Competitors	EBITDA Margin (%)			
	FY-23	FY-24	FY-25	H1-FY26
BVishal Oil & Energy Ltd	27.33%	28.80%	28.59%	33.28%
Akash Exploration Services	14.42%	18.56%	10.30%	11.90%
Assam Air Products*	31.30%	39.07%	-	-
Deep Industries Ltd	51.34%	37.70%	-3.40%	41.19%
Weafri Well Services Pvt Ltd	24.01%	10.84%	8.34%	-
Seros Energy	8.55%	19.63%	15.34%	-
Halliburton India Operations	14.02%	10.00%	17.88%	-
Hindustan Oil Exploration Company Limited	53.69%	45.49%	41.08%	22.21%
Antelopus Selan Energy Limited	26.72%	23.34%	35.40%	53.19%
Asian Energy Services Limited [#]	-22.03%	13.62%	15.55%	6.70%

Note: *Financials for FY-25 and H1-FY26 not available on MCA

“-“ implies Financials not available

Formula used for EBITDA Margin is as follows:

EBITDA Margin: EBITDA / Revenue from Operations

Source: Company Filings, CRISIL Intelligence

Global Competitors	EBITDA Margin, %		
	CY23	CY24	CY25
Halliburton	13.34%	17.74%	16.66%
Schlumberger	24.59%	24.44%	23.98%

Formula used for EBITDA Margin is as follows:

EBITDA Margin: EBITDA / Revenue from Operations

Source: Company Filings, CRISIL Intelligence

7.2.3 PAT & Margins

Table 24: PAT Benchmarking

Domestic Competitors	PAT (INR Millions)				
	FY-23	FY-24	FY-25	H1-FY26	Growth (FY23-25)
BVishal Oil & Energy Ltd	195.71	284.02	295.09	172.60	23%
Akash Exploration Services	45.36	62.06	18.41	8.15	-36%
Assam Air Products*	101.79	71.53	-	-	-30%
Deep Industries Ltd [^]	1,233.97	1,238.53	-901.03	1,262.39	0.37%
Weafri Well Services Pvt Ltd	6.44	12.84	0.56	-	-70.39%
Seros Energy	16.40	186.90	183.00	-	234.04%
Halliburton India Operations	23.31	178.53	677.73	-	439.27%
Hindustan Oil Exploration Company Limited	1,940.48	2,264.30	1,472.08	467.02	-12.90%
Antelopus Selan Energy Limited	308.48	327.41	705.70	230.30	51.25%
Asian Energy Services Limited [#]	-443.57	254.67	421.23	17.52	65.40%

Note: *Financials for FY-25 and H1-FY26 not available on MCA. Growth is from FY-23 to FY-24

“-“ implies Financials not available

[^]PAT growth is from FY23 to FY24

[#]PAT growth is calculated from FY24 to FY25

PAT is calculated after excluding Non-Controlling Interest wherever applicable

Consulting

Source: Company Filings, CRISIL Intelligence

Global Competitors	PAT (USD Millions)			
	CY23	CY24	CY25	Growth (CY23-24)
Halliburton	2,638.00	2,501.00	1,283.00	-30.26%
Schlumberger	4,203.00	4,461.00	3,374.00	-10.40%

Source: Company Filings, CRISIL Intelligence

Table 25: PAT Margin Benchmarking

Domestic Competitors	PAT Margin, %			
	FY-23	FY-24	FY-25	H1-FY26
BVishal Oil & Energy Ltd	15.68%	15.70%	16.98%	18.96%
Akash Exploration Services	4.90%	6.73%	1.87%	-
Assam Air Products*	9.53%	9.08%	-	-
Deep Industries Ltd	36.15%	29.01%	-15.64%	30.02%
Weafri Well Services Pvt Ltd	9.01%	4.82%	0.24%	-
Seros Energy	3.08%	8.00%	6.44%	-
Halliburton India Operations	0.83%	4.04%	14.38%	-
Hindustan Oil Exploration Company Limited	34.72%	30.23%	34.98%	11.86%
Antelopus Selan Energy Limited	26.16%	19.77%	27.34%	21.78%
Asian Energy Services Limited	-40.34%	8.35%	9.06%	0.81%

Note: *Financials for FY-25 & H1-FY26 not available on MCA

“-“ implies Financials not available

Formula used for PAT Margin is as follows:

PAT Margin: PAT / Revenue from Operations

Source: Company Filings, CRISIL Intelligence

Global Competitors	PAT Margin, %		
	CY23	CY24	CY25
Halliburton	11.46%	10.90%	5.78%
Schlumberger	12.47%	11.97%	9.23%

Formula used for PAT Margin is as follows:

PAT Margin: PAT / Revenue from Operations

Source: Company Filings, CRISIL Intelligence

7.2.4 RONW & ROCE

Table 26: RONW Benchmarking

Domestic Competitors	RONW, %			
	FY-23	FY-24	FY-25	H1-FY26
BVishal Oil & Energy Ltd	21.84%	20.40%	14.50%	7.29%
Akash Exploration Services	9.07%	11.20%	3.10%	1.34%
Assam Air Products*	12.37%	7.86%	-	-
Deep Industries Ltd	10.03%	8.80%	-5.52%	6.73%
Weafri Well Services Pvt Ltd	40.24%	24.31%	0.66%	-
Seros Energy	1.11%	9.13%	6.10%	-
Halliburton India Operations	-3.88%	-35.75%	-950.65%	-

Consulting

Hindustan Oil Exploration Company Limited	22.82%	21.35%	11.80%	3.47%
Antelopus Selan Energy Limited	8.96%	8.69%	14.75%	4.00%
Asian Energy Services Limited	-20.11%	10.67%	12.45%	0.42%

Note: *Financials for FY-25 & H1-FY26 not available on MCA

“-“ implies Financials not available

Formula used for RONW is as follows:

$\text{RONW} = \text{PAT (excluding Non-Controlling Interest)} / \text{Average Shareholder's Equity (excluding Non-Controlling Interest)}$

Source: Company Filings, CRISIL Intelligence

Global Competitors	RONW, %		
	CY22	CY23	CY24
Halliburton	30.43%	25.14%	12.24%
Schlumberger	21.81%	21.02%	13.96%

Formula used for RONW is as follows:

$\text{RONW} = \text{PAT (excluding Non-Controlling Interest)} / \text{Average Shareholder's Equity (excluding Non-Controlling Interest)}$

Source: Company Filings, CRISIL Intelligence

Table 27: ROCE Benchmarking

Domestic Competitors	ROCE, %			
	FY-23	FY-24	FY-25	H1-FY26
BVishal Oil & Energy Ltd	18.76%	20.80%	14.52%	7.61%
Akash Exploration Services	9.76%	12.76%	3.71%	2.00%
Assam Air Products*	12.97%	9.34%	-	-
Deep Industries Ltd	15.30%	10.56%	-4.06%	8.21%
Weafri Well Services Pvt Ltd	29.94%	20.41%	0.55%	-
Seros Energy	0.95%	11.57%	5.86%	-
Halliburton India Operations	2.87%	3.39%	8.97%	-
Hindustan Oil Exploration Company Limited	18.83%	19.66%	6.82%	3.61%
Antelopus Selan Energy Limited	7.55%	8.30%	16.36%	4.19%
Asian Energy Services Limited	-19.78%	9.43%	15.03%	1.06%

Note: *Financials for FY-25 & H1-FY26 not available on MCA

“-“ implies Financials not available

Formula used for ROCE is as follows:

$\text{ROCE} = \text{EBIT} / \text{Average Capital Employed}$

Capital Employed: Net Tangible Assets + Total Borrowings + Deferred Tax Liabilities

Net Tangible Assets: Net Worth (excluding NCI) – Intangible Assets

Total Borrowings: Short Term Borrowings + Long Term Borrowings

Average Capital Employed: (Capital Employed for current fiscal + Capital Employed for previous fiscal)/2

Source: Company Filings, CRISIL Intelligence

Global Competitors	ROCE, %		
	CY23	CY24	CY25
Halliburton	19.74%	16.54%	6.64%
Schlumberger	20.65%	20.85%	18.17%

Note: *Financials for FY-25 not available on MCA

Formula used for ROCE is as follows:

$\text{ROCE} = \text{EBIT} / \text{Average Capital Employed}$

Capital Employed: Net Tangible Assets + Total Borrowings + Deferred Tax Liabilities

Net Tangible Assets: Net Worth (excluding NCI) – Intangible Assets

Consulting

Total Borrowings: Short Term Borrowings + Long Term Borrowings

Average Capital Employed: (Capital Employed for current fiscal + Capital Employed for previous fiscal)/2

Source: Company Filings, CRISIL Intelligence

7.2.5 Working Capital Cycle Benchmarking

Table 28: Working Capital Cycle Benchmarking

Domestic Competitors	Working Capital Days, days			
	FY-23	FY-24	FY-25	H1-FY26
BVishal Oil & Energy Ltd	192	205	228	163
Akash Exploration Services	-32	-44	-51	-96
Assam Air Products*	142	165	-	-
Deep Industries Ltd	197	225	271	261
Weafri Well Services Pvt Ltd	-4,993	-512	-69	-
Seros Energy	58	80	50	-
Halliburton India Operations	-1,277	-1,186	-715	-
Hindustan Oil Exploration Company Limited	-40	28	134	107
Antelopus Selan Energy Limited	349	212	234	401
Asian Energy Services Limited^	103	49	28	67

Note: *Financials for FY-25 & H1-FY26 not available on MCA

^For Inventory and Payable Days Calculation feeding into Working Capital Cycle, the COGS is taken as Project Related Expense from the Consolidated Statement of Profit and Loss

“-“ implies Financials not available

Inventory Days & Payable Day for Seros Energy & HLS Asia are calculated on Cost of Sales

Formula for Working Capital Cycle is as follows:

Working Capital Cycle: Inventory Days + Receivable Days – Payable Days

Source: Company Filings, CRISIL Intelligence

Global Competitors	Working Capital Cycle (days)		
	CY23	CY24	CY25
Halliburton	74	79	80
Schlumberger	0	0	7

Formula for Working Capital Cycle is as follows:

Working Capital Cycle: Inventory Days + Receivable Days – Payable Days

Source: Company Filings, CRISIL Intelligence

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