Indian Oil & Gas Exploration and Production: Catalyzing Growth through Business Model Innovation

EXECUTIVE SUMMARY

India's E&P sector has a long history, but one that has been challenged on many fronts. However, new policy changes bring the promise of more openness and progression to a market based economy. With India looking to reduce its growing dependence on oil imports, increasing domestic production is a top government priority. To spur growth of domestic production and attract new entrants, the government has initiated new policies: the Hydrocarbon Exploratory Licensing Policy (HELP) and Discovered Small Fields (DSF). These policies signal the most significant transition in the E&P sector in India, from one of government control to that of government support, and their key tenets are outlined below.

Hydrocarbon Exploratory Licensing Policy (HELP)	Discovered Small Fields (DSF)
• Unifies the authority to grant licenses across hydrocarbon types, including oil and gas, both conventional and unconventional such as shale oil/ gas, and coal bed methane • Moves to a market oriented approach with companies given marketing and pricing freedom • Introduces an Open Acreage Licensing Policy (OALP) to allow companies to seek permission to explore any block • Moves from the much criticized cost-recovery based production sharing to revenue-sharing	• Designed to attract new entrants, bring innovation into the E&P sector, and attempt to recreate the entrepreneurial US unconventional oil & gas ecosystem • Comprises auctions of discovered small fields that were not being developed by NOCs as a way to spur new entrants into the oil and gas industry • Prior technical experience was not mandated in order to attract newcomers to the industry • Includes the market oriented and revenue sharing aspects of HELP

While these policy changes have brought optimism and initial success, significant challenges remain in its long term ability to attract investment and resources to this sector, and it is far from clear if they will have the desired impact.

The E&P industry ecosystem, comprising operators (NOCs, domestic oil companies, IOCs, and new entrants), technology and service providers, regulators, and extending to midstream and infrastructure sectors, needs to collectively evaluate the potential for business model innovation to address some of these challenges. There are significant challenges of doing business in India, in areas from dispute resolution to unclear and uncertain policy and tax regimes. Many foreign firms view these challenges as insurmountable, while a few have been able to thrive and compete successfully by committing for the long term and creating appropriate solutions for the Indian market. While there are no clear answers on the future of E&P in India, we provide a deeper look into the business challenges and innovation imperatives that will determine its ultimate long term success.

Indian E&P Sector Snapshot

India is the **world's 4th largest energy consumer** but imports 79% of its oil demand (876,000 bopd production vs 4.159M bopd consumption)

It has approx. **40M tons of excess refining capacity that is exported**; this may change as domestic energy use grows

2016 gas production: 32BCM (approx. 564,110 boepd)

India is the **4th largest LNG importer** after Japan, South Korea and China, and accounts for 5.8% of the total global trade

10 major O&G companies: NOCs (8)–IOCL, ONGC, OIC, GAIL, Hindustan Pertoleum, BPRL, GSPC, NTPC; IOCs (2)–Shell, BP; Domestic oil companies (2)–Cairn, Reliance

Oil reserves amounted to 763.5MMT in FY15

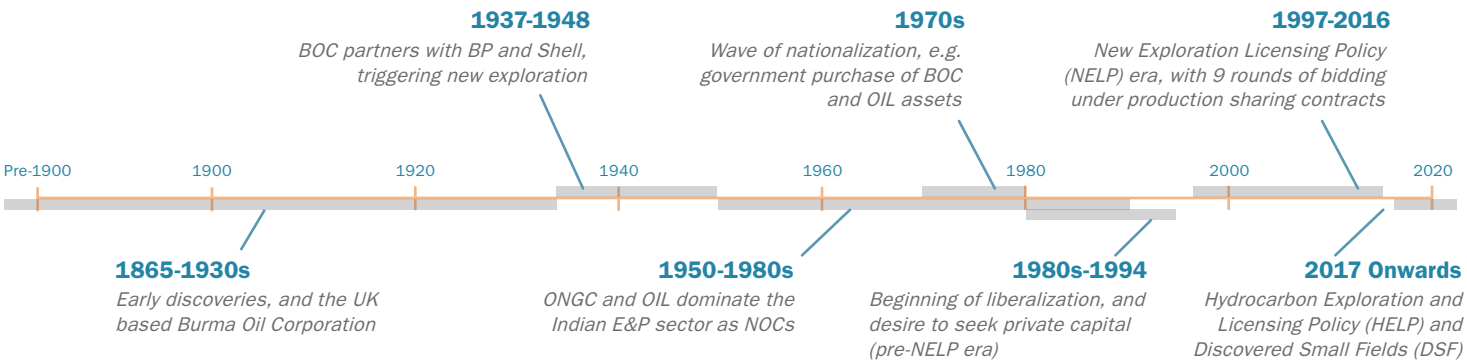
EVOLUTION OF THE E&P SECTOR IN INDIA

India has a long history with oil exploration and production. The world's first oil well was drilled using modern techniques in 1859 in Pennsylvania in the US. Asia's first mechanically drilled well[1] struck oil less than 10 years later, in 1867 in Assam, India. This was followed by a brief period of systematic drilling. However, misguided investments and mismanagement led to the eventual acquisition of these assets by the UK-based Burma Oil Company (BOC), who along with BP and Shell started carrying out geophysical surveys in pre-independence India. With the emergence of the global oil economy, post-independence India gave the development of the petroleum industry top priority, and the Oil and Natural Gas Commission (ONGC) was set up in 1956, with subsequent discoveries of oil and gas in the states of Gujarat and Rajasthan, as well as the Western offshore fields. Oil India Private Limited (OIL) was incorporated to take over BOC, and saw successful discoveries in the state of Assam. ONGC and OIL continued to dominate the Indian E&P sector until the early 1980s.

Early attempts at inviting foreign companies to participate in the Indian E&P sector were met with limited success. The sector was further liberalized in 1994 through the use of production sharing contracts, and the Directorate General of Hydrocarbons (DGH) was setup. The New Exploration Licensing Policy (NELP) was set up in 1997 to attract risk capital from the private sector and bring new technologies. Under NELP, a competitive bidding system was required, along with the use of production sharing contracts. Nine rounds of bids have been conducted to date.

The following summarizes the evolution of the E&P sector in India from its origins to 2017.

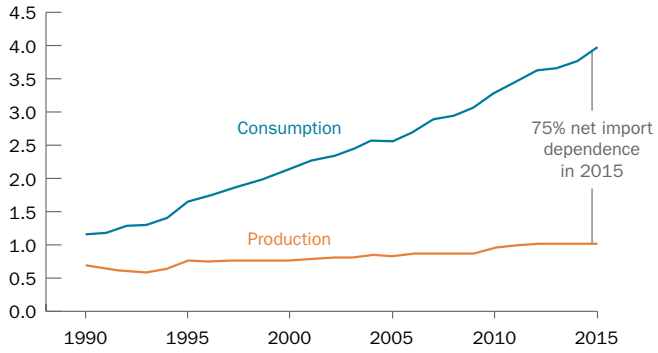
Evolution of E&P Sector in India



ENERGY CONSUMPTION DRIVES THE ECONOMIC IMPERATIVE AND NEW POLICIES

Economic liberalization and growth of the past two decades has resulted in a sharp increase in the demand for energy, which has far outgrown domestic production. India imports more than 75% of its petroleum demand today. The IEA estimates that India will be the fastest-growing oil consumer through 2040, and that imports may rise to 90% by the year 2040.[3] Under pressure to reduce its growing dependence on imports, the Indian government has announced that it is targeting a 10% cut in imports by 2022 through increased domestic production, improved energy efficiency, and demand reduction.[4] India is also seeking to extend exploration to cover its entire sedimentary area of 3.14 million square km, less than half of which has been appraised so far.

India Petroleum and Other Liquids Production and Consumption (1990-2015), million barrels per day



Source: The US Energy Information Administration, International Energy Statistics and Short-Term Energy Outlook[2]

Two initiatives are looking to create a new era for the Indian E&P sector: **Discovered Small Fields (DSF)** and the **Hydrocarbon Exploration and Licensing Policy (HELP)**.

Discovered Small Fields (DSF)

The DSF auction is widely considered an experiment to boost E&P activities in India, bring innovation into the sector, and attempt to recreate the entrepreneurial US unconventional oil & gas ecosystem. Under the DSF policy, the government directed the NOCs to relinquish discovered small fields that were not being developed as a way to spur new entrants into the oil and gas industry. The first set of DSF blocks encompassed 46 contract areas with 67 oil and gas fields, and an estimated 625M boe of oil and gas were auctioned in 2016.

Key aspects of the DSF policy also include revenue sharing with the government (instead of cost-recovery based production sharing), marketing and pricing freedom, and a unified policy for all types of hydrocarbons, including unconventional oil and gas and coal bed methane. Prior technical experience was not mandated in order to attract newcomers to the industry.

The government has seen early success in the first round of DSF auctions, highlighted by the emergence of 15 new entrants with no prior oil and gas experience. These companies have six months to submit their Field Development Plans after being awarded the Petroleum Mining Lease. It is widely expected that the government will increase the acreage for the second round of DSF.

Hydrocarbon Exploratory Licensing Policy (HELP)

HELP brings together several key policy aspects for improving the E&P sector in India.[5]

- It unifies the authority to grant licenses across hydrocarbon types, including oil and gas, both conventional and unconventional such as shale oil / gas, and coal bed methane
- HELP introduces an Open Acreage Licensing Policy (OALP) to allow companies to seek permission to explore any block; under earlier regimes, exploration was restricted to specific blocks identified by the government
- The government has developed and made accessible a National Data Repository (NDR) that contains maps and geological data to help companies identify areas to bid; the NDR is expected to be a key enabler for the OALP
- HELP also does away with the much criticized cost-recovery based production sharing, and instead implements a revenue-sharing model under which revenue will be shared in a ratio submitted by bidders; the earlier cost-recovery regime resulted in conflicts over which costs were deemed to be necessary vs. “gold plating”
- HELP provides companies the freedom to market and price their production without government intervention

Collectively, the DSF and HELP signal the most significant transition in India’s E&P sector, from one of government control to that of government support.

The government is looking to remove the protectionism and bureaucracy that has held back domestic oil and gas exploration and production. It has designed these new policies to encourage private investment, and open up and liberalize opportunities in India.

The key question is what impact will these new policies have on the E&P landscape in India? Will they attract new investments and new entrants, and succeed in moving the needle on domestic production? Are they sufficient to counter the systemic challenges that have impeded the sector for many decades? The global landscape for oil & gas is expected to be challenging, with prices expected to stay low compared to the highs from 2014, and experience increased volatility.[6] It is driving a relentless focus to drive down costs by many companies to achieve and maintain profitability at $50 levels. Will these reforms change the outlook in the face of such fierce competition for capital and production?

CHALLENGES OF DOING BUSINESS IN INDIA AND THE E&P SECTOR

A key aspect of the new E&P policies in India is to attract increased foreign capital and technology, from service providers to oil and gas operating companies. However, despite moving into the top 100 in the World Bank's Ease of Doing Business global rankings[7], India still lags in areas such as Starting a Business, Enforcing Contracts, and Dealing with Construction Permits. India was ranked 100th in global rankings, and many of these issues highlighted below also negatively impact the E&P sector:

- The legacy command and control policy and economic model continues to dominate many sectors
- This often leads to an attitude where "government knows best", with bureaucracy, patronage, and favor to Public Sector Units
- A poor dispute resolution process causes the cases challenged to get stuck in the judicial system for years, often decades
- Large, family-controlled industrial groups look to dominate the industry
- Nationalism, which is on the rise, favors Indian companies with policy initiatives such as Make in India and Startup India

E&P Sector Specific Challenges

In addition to the challenges of doing business in India, the E&P sector also continues to face its own inherent set of challenges:

- Lack of market scale: poor economic underpinnings vs. energy security as a strategic driver for expanding production
- At low oil and gas prices compared to the highs from 2014, imports are likely to remain the more economically attractive option
- Protectionism of NOCs, where historically the government has not relinquished NOC assets due to poor production and performance
- Uncertainty in policy, implementation timelines, and tax regimes
- With the exception of a few massive offshore projects, most large IOCs and most western E&P companies continue to be hesitant about participating in India, and have a somewhat pessimistic view
- Relatively poor midstream infrastructure controlled by NOCs, with resistance to opening up
- Mature fields in decline
- Lack of adequate local technical talent in key areas such as geotechnical
- Lack of confidence in existing data: geological and operational, sector is dependent on NOCs for data

THE IMPERATIVE FOR BUSINESS MODEL INNOVATION IN THE INDIAN E&P SECTOR

DSF: Addressing Scale, Operational, and Technical Challenges

The DSF auction, focused on small fields, has brought new entrants into the E&P sector, and some existing companies have sought to grow their footprint. The DSF awardees can be characterized by the following:

- **Lack of prior operating experience –** some of the awardees have no prior experience in operating an E&P company, and may have likely viewed the DSF as a relatively small stakes experiment in entering a new sector
- **Varied degrees of business experience –** some of these new entrants are subsidiaries of larger diversified, industrial companies, eager to become leaders of the new era in the oil and gas sector, while others are smaller startups founded by entrepreneurial individuals, many with prior success in other sectors
- **Lack of scale –** given the small scale of the DSF auctions, many of these companies will look to viable low-cost small field solutions to address their lack of operational and market scale
- **Mixed technology expertise –** while some of the DSF awardees have built technical and operational teams, others are utilizing industry consultants to get through the early phases of the DSF process

The following are critical innovation levers for the DSF ecosystem and span across operating companies, technology and service providers, capital, and regulatory authorities:

- **Fit for Purpose Technology:** Culture and field size drive heightened cost consciousness; this necessitates a new approach, where technology needs to be fit for purpose, not over-engineered, and adapted into a compelling "good enough" offering. An example of this from another industry is GE's ECG machine, the Mac 400 ultra-portable electrocardiogram (ECG) machine.[8] This machine was

GE Mac 400 ultra-portable ECG.

developed in India in 2009 for the Indian market, and is priced at a third that of imported systems of similar quality. GE continues to innovate, recently with the "Mac i", with the i for India, driving down the price by a staggering 50 percent

- **Creating Scale:** A significant challenge is the lack of operational and market scale for the DSF awardees. Studying business models from other industries is key. For example, in food and agriculture, small operators can group together in cooperatives to benefit from scale in various aspects of procurement and operations
- **Shared Risk-Reward Mechanism:** E&P activities are complex, with many players typically involved in the planning, construction, and production phases of operations; a shared risk-reward mechanism can align the interest of all players in seeking optimal outcomes.
- **Local Relationships:** Foreign companies operating in India need to tap into the web of existing relationships that drives business, as local partners are often key, and strong local brands and "boots on the ground" are required.
- **Long Term Engagement:** Foreign companies operating in India should learn and pivot as the Indian E&P sector evolves, while also signaling long term commitment; this also requires a robust government engagement strategy.
- **One Size Does Not Fit All:** Market participants have different challenges regarding technical expertise, business management, and operational experience, and the service sector should identify these and adapt their strategies.

HELP and Beyond

Through HELP policy changes, the government wishes to propel investment in the energy and petroleum sector and increase domestic production. Along with the creation of a strategic petroleum reserve, acquiring overseas assets, and promoting energy sustainability, it views HELP as critical in reducing India's dependence on energy imports. However, the ability of the E&P sector to attract capital and resources over the long term is based on its risk-adjusted returns on the capital employed. While HELP streamlines operations, opens up acreage, and begins to transition the Indian E&P sector to becoming more market-driven, investors will continue to view the Indian E&P sector risks and returns through a critical lens.

Therefore, the following are key levers for business model innovation:

- **Vibrant Service Sector:** The technology and service sector is critical to addressing technical and operational risk in the E&P sector. Much of the recent global technological developments have been in the shale oil and gas sector in the US, with waves of innovation that have unleashed staggering productivity improvements. Many of these innovations have been from smaller companies, with more nimble regional service providers, outside of the traditional big three incumbent global leaders. The services sector could be encouraged in India to bring these innovations through business model innovation such as shared risk-reward mechanisms and joint ventures.
- **A New Cooperative Framework for the Ecosystem:** The lack of market scale puts the Indian E&P sector at a distinct disadvantage. The move to increase private sector participation doesn't address the economic fundamentals for the cost for drilling each well, which remain high in India relative to the major oil producing nations. While the Indian sector has benefitted tremendously from falling rig prices in the past few years, coordination of activities among

US Unconventional Oil & Gas Drilling

operators has the potential to benefit everyone involved, as it could allow more meaningful contracts to service companies at lower costs. This could greatly benefit DSF awardees and smaller operators, but likely necessitates a tradeoff with operational flexibility for larger operators, which is not a small task by any means.

- **Infrastructure:** Massive pipeline networks have been one of the key factors in the success of US unconventional oil and gas. However, India ranks 66th in the world in infrastructure according to the World Economic Forum's Global Competitiveness Index[9], while being 40th overall, indicating room for substantial improvement. The business model for infrastructure, especially midstream, should be a focus as it plays a key role connecting production to the end markets. Transparency, access, and availability of reliable data in the midstream sector will be key to new market participants, and attempts to create scale could also be extended to E&P and midstream infrastructure.

- **A Level Playing Field:** Continued expansion of market reform and policy that creates a level playing field for IOCs and new entrants with the NOCs. This aspect is critical to attracting new investment.

Business model innovation could therefore play a key role in enhancing the Indian E&P sector's competitiveness, and its ability to attract capital. However, the challenges of doing business in India remain a barrier for many foreign firms. In fact, they may be considered more critical than the E&P sector specific challenges, which can be addressed in the variety of ways discussed above.

For the E&P sector to thrive, India must evolve to a business environment where policy, tax regimes, and the judicial systems are viewed as stable and performing in a neutral and just manner, and further loosen the grip of government entities on the sector.

A CALL TO ACTION

The Indian E&P sector is on the cusp of one of its most profound transitions, driven by a more open and progressive policy, and the desire for reducing its dependence on energy imports. While these policies set a good direction, they are not sufficient to overcome significant challenges. It is far from clear if these policies will have the desired effect of attracting new capital and altering the E&P landscape in any significant manner. The E&P industry ecosystem, comprising operators (NOCs, domestic oil companies, IOCs, and new entrants), technology and service providers, regulators, and extending to midstream and infrastructure sectors, need to collectively evaluate the potential for business model innovation to address its challenges. While there are no clear answers on the future of E&P in India, our goal is to provide a deeper look into the business challenges and innovation imperatives that will determine its ultimate long term outcome.

The path ahead is to build on the initial optimism generated through the new policies, identify and address the challenges that remain through business innovation and a new cooperative framework for the E&P ecosystem.

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