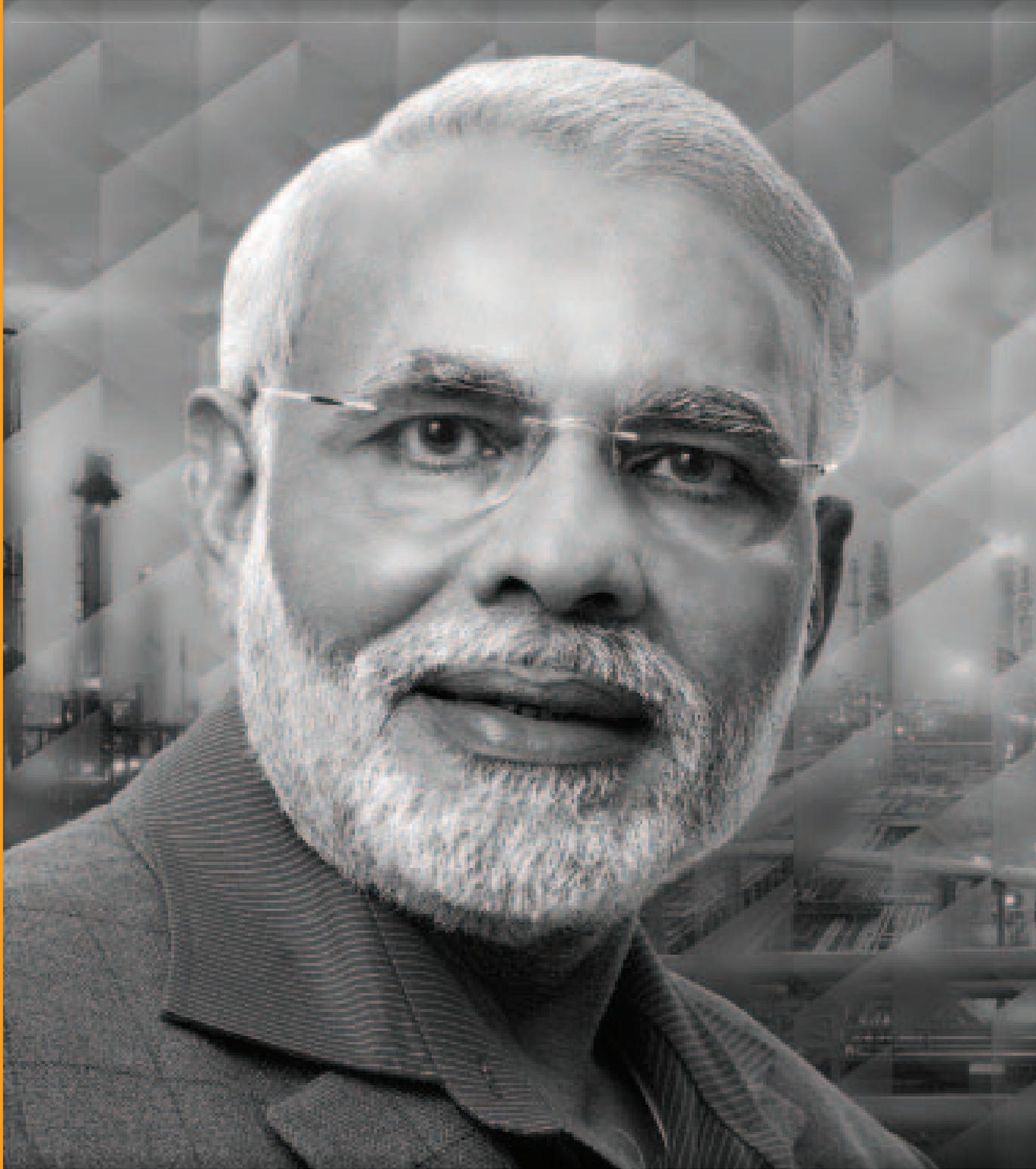


EYE ON

INDIA 2016

ENERGY



Energy for India
Shri Dharmendra PRADHAN
Hon'ble Minister (I/C)
**MINISTRY OF PETROLEUM
& NATURAL GAS**

Transformational Strategy
Ashvini KUMAR
Managing Director
**SOLAR ENERGY
CORPORATION OF INDIA**

Pull Out Map
India Renewable Energy
2016
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Chairman & Managing Director
OIL INDIA

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North by North East
Ajay RAY
CEO
GEOENPRO PETROLEUM



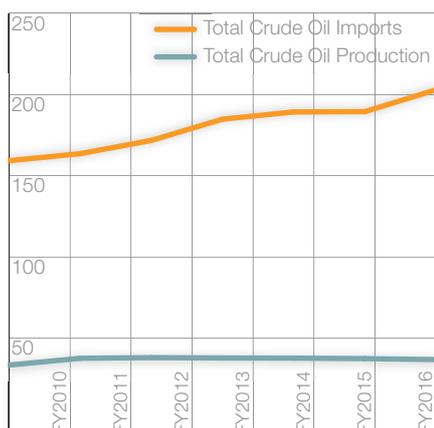
Photo courtesy of: ONGC

Pushing Production, Curbing Decline

150 years after oil first sputtered out of a hand-dug well in Assam, only 48% of India's 26 sedimentary basins and deep-water areas have been geologically studied, and only seven are still producing oil. With high oil and gas import dependence, the government is working to boost exploration and output at maturing fields and incentivise investment in greenfield assets.

India holds 0.3% of the world's proven crude oil reserves (763.48 million tonnes) and 0.8% of the world's proven natural gas reserves (1,488.49 billion cubic metres). While crude oil production has been steadily reducing in ageing fields, demand is expanding and India is now the world's third largest energy consumer. In FY2016, the country produced just 36.9 million metric tonnes (MMT) of crude oil while importing a massive 202.9 MMT. With current oil import dependency hovering at over 80%, in March 2015 Prime Minister Narendra Modi set the ambitious target of cutting crude oil imports by 10% by 2022, i.e. decreasing the country's 83% import dependence in FY2015 to 73% by FY2022. But this ambition has to be fuelled by a rapid rise in exploration and production at home and increased supply from assets acquired in other countries.

India's Crude Oil Production & Imports in Million Metric Tonnes (FY2009-FY2016)



Meeting Rising Demand Upstream

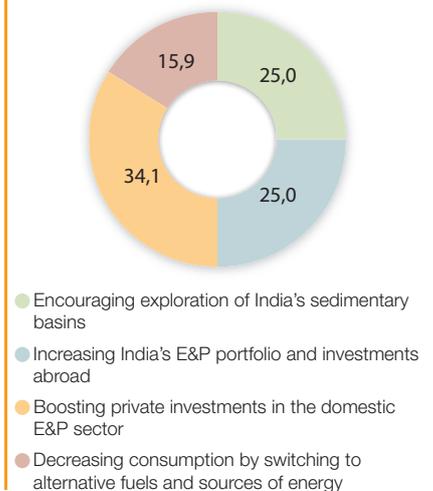
In a one-month market survey conducted in India by EYE ON and the Petroleum Federation (PetroFed) between June and July 2016, over a third of the 214 industry executives and experts surveyed stated that private investment in the domestic upstream industry should be the key focus in decreasing oil import dependence.

While the Indian government has continuously tried to increase upstream investments through policy tweaks and auctions over the last two decades, policy paralysis and uncertainty had left India's hydrocarbon sector starving for reforms until 2014. Following the election of Prime Minister Narendra Modi, the focus was on the ease of doing business in the sector, cutting red tape on new contracts and clearing as many as 30 projects for development within less than a year. In May 2014, the Ministry of Petroleum and Natural Gas (MoPNG) also released the highly-anticipated model revenue-sharing contract, which is now to be found in landmark policies announced in 2016, the Hydrocarbon Exploration Licensing Policy (HELP) and the Discovered Small Fields Policy targeted at the auction of 67 small discovered fields in India.

Sector-reviving Reforms

HELP is India's major effort to ramp up E&P activities and boost private investment. This new contractual and fiscal model for awarding hydrocarbon acreages is a major departure from the previous New Exploration Licensing Policy (NELP). Under this revamped regime, companies

What do you think should be the primary focus of the government and the industry to reduce India's hydrocarbons import dependency by 10%?



benefit from a single license to explore and produce all forms of hydrocarbons. The open acreage licensing policy allows firms to select exploration blocks without waiting for bidding rounds and includes revenue-sharing, gas pricing and marketing freedom from deep-water, ultra-deep-water, and high-pressure, high-temperature areas. Exploration is also allowed throughout the contract period.

HELP has been introduced at the right time because the prospect for exploration and production in India is massive. The IEA, in its India Outlook Report 2015, noted that areas of exploration extend over some 1.1 million sq. km. of the almost 1.8 million sq. km. of the country's onshore and shal-

low water sedimentary basins. Since the last major assessment of India's reserves was conducted nearly two decades ago, the government has initiated a re-assessment of India's resource potential to be completed by December 2017. In October 2016, it launched the \$750 million (Rs. 5,000 crore) National Seismic Program, by which state-owned ONGC and Oil India will acquire, process and interpret over 48,000 line kilometres of 2D seismic data by March 2019.

Find and Seek

There is plenty of room for further investment in hydrocarbons exploration. Success rates for new discoveries have been high in India, with hydrocarbons being discovered in one out of five allotted blocks under the NELP regime, under which nine rounds of bidding have been held since 1999. Under NELP, the country has totalled 116 oil discoveries and 109 gas discoveries as of January 2016. In 2016 for instance, ONGC made a significant discovery in GSS-041NAA-2 exploration well in the GS-OSN-2204/1 Block in Kutch offshore, bringing hope that this basin can finally be brought into production in the near future.

Enhancing Energy Security

Despite encouraging exploration efforts,

India's energy security remains threatened due to declining domestic production. Efforts are thus underway to arrest falling production from existing onshore and offshore fields through re-development projects and various enhanced or improved oil recovery (IOR/EOR) techniques.

Since April 2014, ONGC has approved over \$2 billion (about Rs. 15,000 crore) worth of re-development projects, especially for its Mumbai High field, India's largest producing asset. Since October 2014, in Rajasthan, Cairn India has started one of the world's largest EOR polymer injection projects at its onshore Mangala field. The field is located in the RJ-ON-90/1 block, which has seen \$5 billion (Rs. 34,105 crore) of development capex so far from India's leading private operator. As of September 2016, 400,000 bbl/d of polymer solution was being injected and production had been raised to about 42,000 boepd.

The Promise of the Future

In the meantime, to ensure energy security amid fluctuating oil prices and rising domestic demand, India's state-owned oil companies are making aggressive equity investments in foreign oilfields. India has been looking for hydrocarbons assets abroad since the formation of ONGC's sub-

Domestic crude oil production (FY2016):
36.9MMT

Domestic natural gas production (FY2016):
31,138.48mmscm

Crude oil imports (FY2016):
202.9MMT

Natural gas imports (FY2016):
21,309mmscm

Crude oil import dependence in FY2016:
84%

sidiary, ONGC Videsh in 1965, which has been joined more recently by other state-owned companies in its quest for overseas acquisitions.

2016 has been marked by massive deals with Russia's state-owned Rosneft, for instance, of which ONGC Videsh acquired 26%. Oil India's consortium with Indian Oil Corporation and Bharat PetroResources acquired 23.9% in JSC Vankorneft, Russia's second largest producing asset. The value of these acquisitions in JSC Vankorneft is estimated to be well over \$3 billion (Rs. 20,463 crore). An Oil India-led consortium also struck a deal to acquire a 29.9% stake in Rosneft's LLC Taas-Yuryakh Neftegazodobycha.

With economic growth steady at well over 7% and an ever-growing population, India's energy demand will continue to climb. The growth of the country's demand for petroleum products has averaged about 6% a year since 2010, and in its 2015 India Energy Outlook, the IEA predicted that the country's oil and gas import dependence would be 91% and 49%, respectively, by 2040. Within this scenario, India will be working to bolster its position as a hot spot for upstream investment, and in turn, ensure its future energy security. ■



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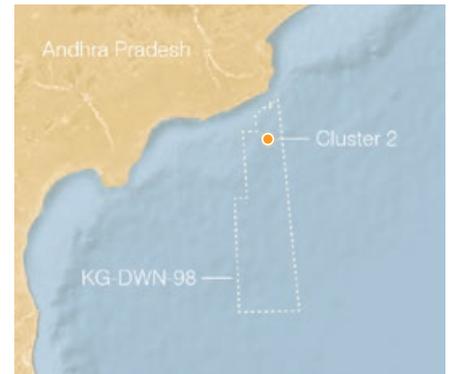
**BIG
CHALLENGES
WITHOUT
SMALL EXPECTATION**



Major Upstream Hydrocarbons Projects

Eye On: KG-DWN-98/2 Deep-Water Development Project

Operator:
ONGC
Board approval:
March 2016
Completion:
June 2020
Cost:
\$5.076 billion (Rs. 34,012 crore)
Scope:
Development of cluster 2 fields. The field development comprises of drilling and completing 35 wells including 15 oil producing wells, 12 water injection wells, and eight gas producing wells
Target:
Targeted peak production of 17mmscmd and 77,000 bopd



National Seismic Programme

Launch:
October 2016
Completion:
March 2019
Cost:
About \$750 million (Rs. 5,000 crore)
Scope:
Undertaken on behalf of the Government by state-owned ONGC and Oil India, the program will cover 52% of unsurveyed sedimentary basins area in India.
Target:
Acquire, process and interpret over 48,000 line kilometres of 2D seismic

Mumbai High North Redevelopment Project Phase III

Operator:
ONGC
Board approval:
June 2014
Completion:
May 2017
Cost:
About \$890 million (Rs. 5,813 crore)
Scope:
Five wellhead platforms, one clamp-on facility for wells at an existing platform, associated pipelines and modifications at 13 platforms, the drilling of 52 new wells and 24 sidetrack wells
Target:
Incremental production of 50 million barrels of oil and 2.2 bcm of gas by 2030.

Mumbai High South Redevelopment Project Phase III

Operator:
ONGC
Board approval:
November 2014
Completion:
March 2019
Cost:
About \$950 million (Rs. 6,069 crore)
Scope:
Drilling of 36 wells and 34 sidetrack wells, installation of three wellhead platforms with pipelines and modifications at 18 platforms.
Target:
Incremental gain of 55.3 million barrels of oil and 3.86bcm of gas from by 2030

RJ-ON-90/2 (Mangala, Bhagyam and Aishwariya Fields)

Operator:
Cairn India
Current production:
About 170,000 boepd
Cost:
\$5 billion development capex already invested in past 11 years
Scope:
At Mangala, the focus is on EOR via alkaline surfactant polymer flooding since October 2014, which has brought current production at about 42,000boepd, with an injection rate of 400,000bb/d of polymer solution. Similar EOR schemes are being prepared for the Bhagyam and Aishwariya fields

Daman Field Development Project

Operator:
ONGC
Board approval:
August 2014
Completion:
Pre-monsoon 2019
Cost:
About \$910 million (Rs. 6,086 crore)
Scope:
seven well head platforms, one riser platform with pipelines and drilling of 28 wells to develop C-24 field and monetize the B-12 marginal fields
Target:
Peak production rate of 8.35mmscmd and 9,286bb/d of condensate; cumulative production 26.67bcm and 5.01 million m3 by FY2035. Production started in August 2016

RG(E)-CBM-2001/1 (Coal bed and Methane)

Operator:
Essar Oil
Current production:
Mining Lease granted on October 26th, 2009
Cost:
Cumulative investment of about \$500 million (Rs. 3,300 crores) as of October 2016
Scope:
As of October 2016, 300 wells have been drilled, out of which 265 have been fracked and 190 are producing. Essar has approval to drill up to 363 wells from the block
Target:
2mmscmd by March 2017 and 3mmscmd by March 2018

Private Sector Voices Forum

What is your reaction to the 2016 Hydrocarbon Exploration Licensing Policy (HELP) and the Discovered Small Fields (DSF) auction?



Manish MAHESHWARI
CEO, Exploration & Production
ESSAR OIL

The discovered small fields (DSF) being offered by the government, bidding for which closes in November 2016, present a unique opportunity to the industry players to hunt for exploration upside whilst monetising the existing discoveries. Similarly, the Hydrocarbon Exploration Licensing Policy (HELP) announced by the government on March 10, 2016, is expected to be a game changer for the exploration & production business in India. Indeed, the acronym 'HELP' is very apt: it signals the government's readiness to redefine the contractual, fiscal and operating framework in these challenging times, which the E&P industry is going through, so as to give an impetus to domestic exploration and production activities. HELP is expected to usher in a fresh outlook, be it in addressing sub-surface synergies across the conventional and unconventional plays or ease of doing business. HELP is, thus, apposite and progressive. 'Unconventional' holds the potential to be the 'new conventional'. India has untapped potential in unconventional plays: CBM, shale, tight reservoirs. HELP is expected to help unlock this potential. Several studies have been undertaken to assess this potential. As an order of magnitude, the CBM resources in India are estimated to be 40 to 50Tcf. EIA reports indicate shale gas resources in India to be in the range of 60 to 100Tcf.

Prashant MODI
Managing Director & CEO
**GREAT EASTERN
ENERGY CORPORATION**



Encouraging the usage of gas requires investor-friendly policies, which is what India currently has under its CBM regime and the new proposed Hydrocarbon Exploration Licensing Policy (HELP). Clearances and approvals will be easier to get, which positively impacts growth prospects for gas projects. Free market pricing, which is applied to CBM, was also required for developing any gas assets and is now given for challenging gas reservoirs. Operators by nature are always ready to take risks as long as their pricing remains free. This model has worked to make the US a net energy exporter from an importer.

An Indian CBM contract allows free-market pricing of the gas produced, which remains the main incentive for CBM investors in this market. This is now also applied to Discovered Small Fields (DSF) and also proposed under the new Hydrocarbon Exploration Licensing Policy (HELP). In addition, CBM in India does not have any cost recovery, and is regulated by a very simple royalty contract. Concretely, the operator bears all the risk of its investments and pays the royalty on the wellhead price to the government regardless of its capital spending.

GEECL is now looking at expanding its unconventional portfolio in India, especially under the open acreage licensing policy to be announced under the proposed HELP policy. As a company, we are keen to expand into new acreages whose geology and reserves offer attractive economic prospects.