

Are we leveraging our resources advantage?



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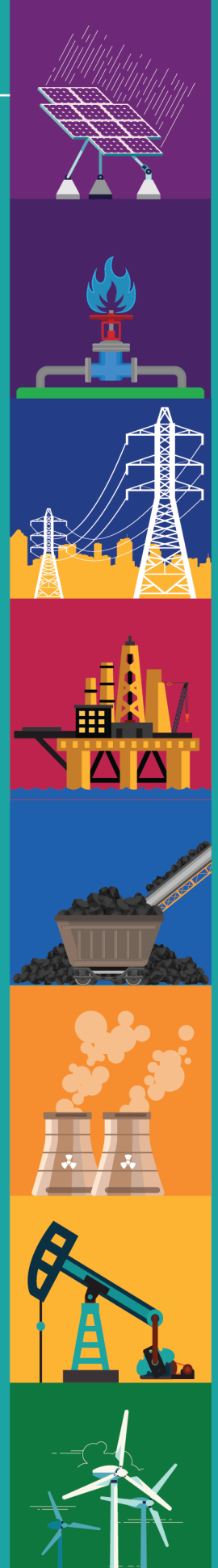
ENRich 2017

Changing Indian energy landscape

- Adapting to a new normal and reality

November 2017

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Global trends and challenges

Globally, oil and gas together are the dominant fuels accounting for over half of the world's consumption of primary energy. Coal is a distant second with a contribution half of that of oil and gas¹. Geopolitical changes are impacting global energy markets, specifically oil and gas.

Further, the technological transformation of the transport and energy markets are of a scale that has not been witnessed before. The advent of distributed generation, increase in e-mobility combined with the threat of climate change is taking its toll on the outlook of fossil fuels. Coal, and oil and gas together account for more than 90 per cent of India's Total Primary Commercial Energy Supply (TPCES)¹. While their displacement by clean energy in India is still distant, the world-wide thrust towards renewables has impacted the prices of these fuels in the global energy markets.

Due to the substantial decrease in commodity prices that began in 2014, the oil and gas sector has been forced to engage in serious restructuring of its operations. Oil & gas companies are reducing the scope of their activities and freezing a number of planned projects, optimising resources and are deferring capital investment projects indefinitely.

Rising technical complexity, strong competition and high development costs have reduced the average exploration industry Internal Rate of Return (IRR) over the past few years. Despite the healthy volumes, exploration returns sank to unacceptable lows, even while oil prices were high. In addition, strategic challenges for the industry include uncertainty about future of the internal combustion engine, which today accounts for 60 percent of global hydrocarbon consumption, and the growing emphasis on alternative energy sources¹.

Oil and coal have been traditional competitors for the energy demand in India over the last century. As the world moves towards electric vehicles, it is believed that the demand for electricity from renewable and other conventional sources is likely to increase. In India, due to the legacy energy mix and the easy availability of coal, in the short term, the space left open by oil is expected to be filled up by coal-based thermal power. Annual global seaborne supply of thermal coal has reduced by over 100 Million Tonnes over the last three years¹. However, in the short term, the yawning gap between demand and supply of coal in China and India in particular, has led to an arrest in the general declining trend of seaborne coal prices. In the long run however, it is clear that the concern over climate change and the development of renewable technology will ease out all the fossil fuels from the market, including coal. This dichotomy in the current and future outlook for fossil

fuels is reflected in the divergent pricing of coal in the global markets. While the current price of 6300 Gross Calorific Value (GCV) coal is in the USD95 – 100/ tonne range, most analysts expect that by 2020, the prices will cool down below USD70/ tonne².

With respect to the Indian market, we see the following opportunities and threats at play for coal, oil and gas:

1. E-mobility to be a key demand driver of electricity; likely to be positive for coal-based generation but negative for oil and gas sector
2. India's oil and gas potential has still not been sufficiently explored and much headroom exists for new discoveries
3. Increased thrust on rural electrification may lead to higher demand for power
4. Various initiatives aimed at growth of infrastructure and manufacturing sector will continue to spur the development of steel, cement and other energy intensive industries
5. Renewables and storage likely to emerge as key substitutes for fossil fuels
6. Energy efficiency to be another key substitute (of energy demand)
7. Regulatory environment to continue to get stricter, increasing the compliance cost
8. Change in the energy market structure will necessitate changes in the coal and oil sector.

1. KPMG experience in the Oil & Gas Sector; KPMG Russia & CIS; 31st October 2017

2. Valedictory Address of Saurabh Chandra; 4th Oil & Gas National Convention, Mumbai, August 2015; 1st November 2017

As a combined result of these expected changes, our point of view is that

1. Coal is likely to be the dominant primary energy source in India accounting for over 50 per cent of the primary energy supply; oil could contribute about 25 per cent of the primary energy mix with gas being in the range of 10 per cent
2. Oil and gas marketing companies might have to transform to keep up their market share in a scenario where the government has pledged to push for electric vehicles in a big way; coal Public Sector Units (PSU) are also expected to prepare for a post-fossil fuel world
3. R&D investment by the oil and gas sector is likely to continue to suffer due to low prices and the sector may not spend enough to sustain the growth in production
4. Demand for coal in India will continue to expand to about 1450 Million Tons Per Annum(MTPA) by 2030, lower than the past growth rate
5. The current set of coal mines allocated to the coal PSUs, State Mineral Development Corporations (SMDC) and captive segment at full capacity of 1500 MTPA are sufficient to address envisaged demand; new capacity, if allocated (like commercial coal blocks to private sector) shall only displace costly and risky capacity at present
6. Due to developmental risks and delays of currently allocated coal blocks, the supply shortfall in coal may continue to plague India in the foreseeable future (up to 2022)

7. Cost competitiveness of Indian coal might continue to be challenged due to worsening geology, increased wages and general inflation
8. Logistics infrastructure will continue to be a key bottleneck and coal imports will continue to come into India.

Key enablers

Automation, digitalisation and robotics

At a time of weak commodity prices, spending on research and development by oil & gas companies is under pressure. There is a possibility that the sector will not spend enough to sustain growth in oil production or to explore options for alternative energy sources.

We believe cutting-edge technologies, including digital technologies, can help to substantially reduce operational costs and increase oilfield productivity (E.g. digital oilfields). Robotics are also finding broader applications. Experts from Merrill Lynch believe that by 2020 the global robotics market and artificial intelligence will reach USD 152.7 billion, which may result in 30 per cent productivity growth³.

A higher degree of mechanisation in coal is a must. About 80 per cent of India's coal production comes from 10 per cent of mines⁴ – and these are highly mechanised. It is imperative that the thrust on mechanisation and automation is pursued relentlessly in the coal sector, if it has to stay competitive.

Data and analytics

Oil & gas companies are developing their in-house capabilities to collect and analyse huge quantities of data in order to optimise extraction and manage well operations in real time, such as optimising the efficiency of their global supply chains and enhancing compliance while at the same time controlling costs.

Companies have already improved reservoir performance by analysing seismic studies and production systems, and are avoiding disruptions and reducing production losses caused by equipment breakdowns. The risks involved in oil and gas prospecting have been lowered, which has made unconventional reserves cheaper and easier to exploit.

Need for self-dependence

India has a huge potential for oil & gas production, with 3.14 million square kilometres of the country's potential reserves lying unexplored until 2016. The government has set a target to cut oil import dependence by 10 per cent by 2022 from 77 per cent dependence in 2014-15. The dependence has only increased and is now over 80 per cent⁵.

Despite having the largest bauxite deposits in the world, only 3.5 per cent of India's deposits have been explored while the western world has explored 73 per cent. India imports a majority of its copper and gold requirements despite having its own resources. According to a study, India has better geology than China but produces only 6 per cent of what China produces. India has spent about USD 400 billion on imports of resources, which can be substantially reduced by active resource exploration and utilisation⁶.

3. KPMG experience in the Oil & Gas Sector; KPMG Russia & CIS; 31st October 2017

4. The Hindu's Interview with Anil Agrawal, Vedanta Plc Chairman, November 2016; <http://www.thehindu.com/business/We-want-to-produce-half-of-India%E2%80%99s-oil-Anil-Agrawal/article16668261.ace>; 1st November 2017

5. Valedictory Address of Saurabh Chandra; 4th Oil & Gas National Convention, Mumbai, August 2015; 1st November 2017

6. KPMG in India's analysis and estimates 2017 based on information on coal projects provided in Annual Reports of SECL, MCL, CCL, NCL, ECL

Enhanced Oil Recovery (EOR)

The global average recovery factor for a typical oilfield is approximately 40 percent⁹. This results in a large amount of identified oil left behind despite an existing production infrastructure. There is a great need to enhance the recovery factor from oilfields through EOR. The government has EOR's importance to further reduce dependence on imports.

Rationalisation of costly coal sources and customer-focussed planning

We estimate the cost of production of about 200 - 300 MTPA of the projected supply of 1500 MTPA by 2030, is expected to be higher than the prevailing price of coal. The current price of coal-based thermal power is already at a disadvantage to the recently discovered solar prices. With the market-driven approach to allocation of coal linkages, the landed cost of coal has further increased

in recent times. It is therefore imperative for the sustainability of coal that it pursues policy that supports minimising the landed cost of coal. This would include the closure of costly coal mines supplying coal to distant consumers. It is high time that 'Landed Cost' be made a key decision criteria in the medium and long term planning of coal blocks/ mines in the country instead of piece-meal allocations and auctions.

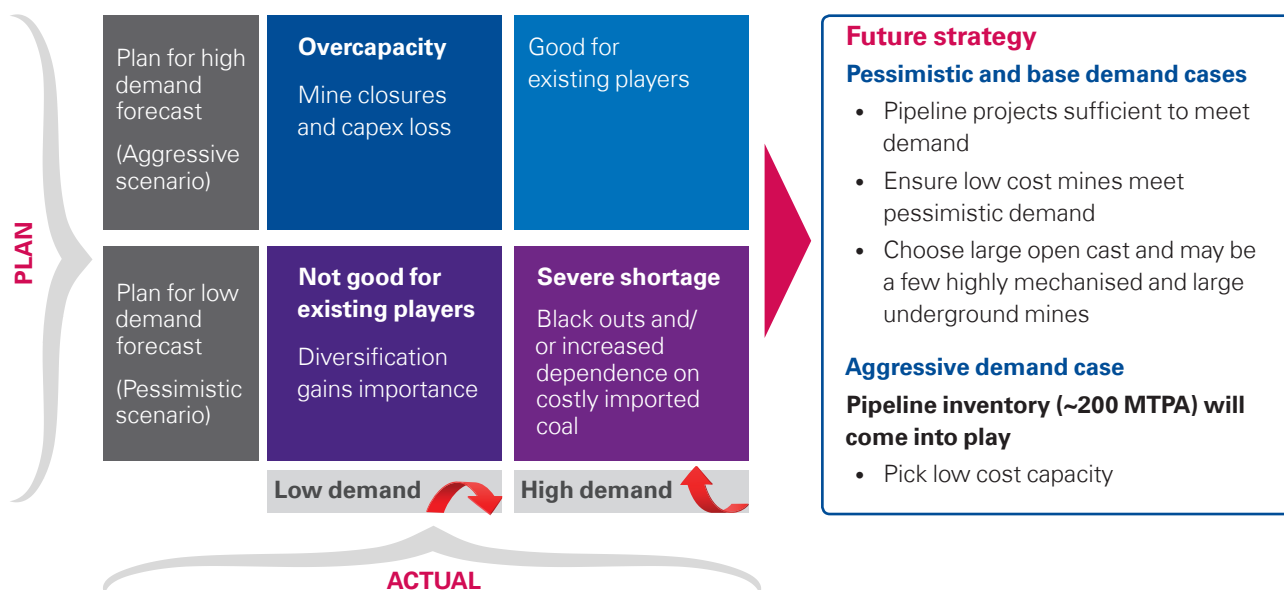
Balanced development and close monitoring needed in the Coal Sector

The coal mining and coal-fired thermal power generation sector are two of the core industries and together contribute ~12 per cent to India's Index of Industrial Production (IIP)⁷, which shows their importance to the economy. Further, India's logistics industry, sponge iron industry, aluminium industry among several others, as on date depend on India's

domestic coal industry. Economic activities in the eastern states are significantly dependent on coal. The sector employs about 400,000 people directly⁸ and possibly, the same number indirectly. The importance of the coal sector to India, not just in terms of an energy source but also its socio-economic role cannot be denied.

With the uncertainty in the demand projections, it is important to have a balanced strategy towards capacity augmentation in the coal sector. If aggressive capacity augmentation is pursued and demand does to fructify, again a situation of stranded capacities, banking NPAs etc. will be created, not to mention the politically sensitive issue of unemployment. On the other hand, if a defensive strategy is adopted towards capacity expansion and demand picks up, there will be a power crisis that has to be dealt with. The illustration below captures the challenge of planning in the coal sector:

Figure 1. Strategy for the coal sector in India



7. Index of Eight Core Industries (Base: 2011-12=100) April, 2017 published by Press Information Bureau, Government of India, Ministry of Commerce & Industry; <http://pib.nic.in/newsite/PrintRelease.aspx?relid=163282> accessed on 17th November, 2017

8. KPMG in India's analysis and estimates 2017 based on CIL and SCCL physical performance reports for September 2017; <https://www.coalindia.in/en-us/performance/physical.aspx> and https://scclmines.com/scclnew/performance_production.asp accessed on 17th November, 2017

9. Schlumberger's EOR Webpage; http://www.slb.com/services/technical_challenges/enhanced_oil_recovery.aspx; 1st November 2017

Therefore it is suggested that in the next three years the thrust of planning in the sector should consider the following:

1. Project planning and clearances for a target of 1,500 MTPA and prioritise re-rating of ongoing/ brown-field projects instead of green-field
2. Phasing out costly capacities above 1,300 MTPA continuously and replacing them with less costly capacities
3. Conceptualising and executing logistic evacuation projects to move ~1,500 MTPA (interim target of at least 1,300 MTPA)
4. Exploring capacity expansion model based on ownership by public sector and MDO operations by private players to enable sharing of stranded capex risk
5. Pushing towards establishing pit-head thermal power capacities with carbon sequestration technologies instead of load-centre power stations
6. Augmenting supply immediately with flexibility in logistics to ensure quantity as per FSA reaches consumers.

Downstream oil

India's fuel demand is projected to increase at a 4 per cent CAGR to reach 248 MT by 2030 from current demand levels of 194 MT in 2016-17. Given India's current refining capacity of 232.06 MT in 2017, Indian Oil Marketing Companies (OMC) are looking to expand capacities to meet the increasing demand¹⁰. One of the notable projects include a 60 MT integrated refinery-cum- petrochemical project on the west coast that OMCs plan to implement¹¹.

Focus on operations improvement

Oil downstream players need to keep pace with the evolving market dynamics (increasing demand, possible competition from new entrants etc.). Some of the key areas to focus in the mid to long term will include enhancing overall operational efficiency of plants, flexibility in refinery configurations, improving energy efficiency, upgrading quality of fuel along with upgrading facilities to produce BS-IV and BS-VI compliant fuels. In the long term, integration with bio-refining may be critical to serve the objective of reduction of Green House Gas (GHG) emissions and reduce dependence on crude oil imports.

Foray into value-added products market

The petrochemical market in India is expected to grow at a CAGR of 10 per cent over the next five years to reach USD100 billion by 2022. The petrochemical industry can also support

growth based on the development of niche products for exports and advanced integrated complexes for polymer production.

Several ambitious petrochemical manufacturers have already taken dramatic steps to change the competitive landscape. The sector has long been dominated by a handful of players. Private as well as public sector players are already looking to expand further into the petrochemical space with aggressive expansion plans being announced.

Focus on sales and distribution

Players may also need to strengthen their sales and distribution network especially with respect to petrochemicals. At present, the domestic distribution network is concentrated around a few producers. As a result, distributors face margin pressures and small-to mid-sized distributors are hindered by unreliability in supply. Petrochemical companies should develop strong sales and distribution networks and set up production plants to minimise landed costs.

In addition, these companies might consider the development of models similar to Petroleum, Chemicals and Petrochemical Investment Regions (PCPIRs) and work with major end-product consumer firms to gain priority access to business customers.

10. KPMG experience in the Oil & Gas Sector; KPMG Russia & CIS; 31st October 2017

11. OMCs formalise plans for West Coast Refinery Project, Business Standard, accessed on 1 November 2017



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