PetroFed

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इंजन की लंबी उम्र के लिए

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From the Director General

Growth in India is on course, spurred by a Union Budget aimed towards fiscal consolidation without compromising on the development agenda, by boosting employment generation, incentivizing 'Make in India', and promoting measures towards a pensioned society with promotion of affordable housing. The total allocation for agriculture, farmers' welfare and irrigation is set to be nearly doubled as compared to the previous year. A tax friendly regime is to be promoted minimizing hassles due to litigation through a New Dispute Resolution Scheme (NDRS) with low or zero penalties. Public spending on infrastructure will witness an increase of 22.5% over the previous year. Free LPG connections will be provided in the name of woman member of a family to 1.5 crore BPL households in 2016-17 and to continue for two more years to cover 5 crore households in total.

It is with some measure of satisfaction that the hydrocarbon industry in India received the Union Budget and the policy reforms in the oil & gas sector announced shortly thereafter. Several recommendations sent by PetroFed to Government on behalf of the industry were accepted, either partially or in full measure.

The OID cess on crude oil was brought to an ad valorem rate of 20% from a fixed rate as compared to the PetroFed recommendation of 8%. This, however, does provide temporary relief to some extent until the crude prices go up again. Similarly, the PetroFed made representation for not introducing customs duty on crude oil and refineries heaved a sigh of relief after budget. While presenting the Union Budget 2016-17 Hon'ble Finance Minister had shown Government's strong commitment to incentivize gas production for new oil & gas discoveries from deep water, ultra-deep water and high pressure-high temperature areas by providing calibrated marketing freedom with a ceiling price on the basis of landed price of alternate fuel.

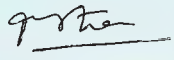
The recommendations of your Federation pertaining to diesel and gasoline specifications have been accepted in the draft notification issued by the Ministry of Road, Transport & Highways. However, the auto industry seems to be opposed to such changes. In a surprising move, the Bureau of Energy Efficiency has issued a notification on March 31, 2016 stipulating the energy consumption norms and standards for target year 2018-19 in relation to base line energy consumption for the year 2014-15. Each refinery in the country has been given the targets which are quite stringent by any standards and complying with same will be a great challenge for the refineries. Particularly the refineries which are already performing optimally in terms of energy consumption will find it more difficult to achieve targets.

PetroFed recommendations on suggested measures to ramp up CBM production in the country, submitted after an intense interactive workshop with industry members, have been partially addressed in the new Hydrocarbon Exploration Licensing Policy (HELP). The new Policy hopefully will enhance domestic oil & gas production, bring substantial investment in the sector and generate sizable employment. The uniform license will enable the contractor to explore conventional as well as unconventional oil and gas resources including CBM, shale gas/oil, tight gas and gas hydrates under a single license. The concept of Open Acreage

Policy will enable E&P companies choose the blocks from the designated area. Present fiscal system of production sharing based on Investment Multiple and cost recovery/production linked payment is being replaced by revenue sharing model. Under the profit sharing methodology, it became necessary for the Government to scrutinize cost details of private participants and this led to many delays and disputes. Under the new regime, the Government will not be concerned with the cost incurred and will receive a share of the gross revenue from the sale of oil, gas etc.

PetroFed welcome the new Policy which recognises the higher risks and costs involved in exploration and production from offshore areas and has provided for lower royalty rates for such areas compared to NELP royalty rates. The graded system of royalty rates in which royalty rates decreases from shallow water to deepwater and ultra-deep water is a positive move. The new policy regime marks a generational shift and modernization of the oil & gas exploration policy. It will certainly stimulate new exploration & production activity for oil, gas and other hydrocarbons and eventually help reduce import dependence.

As an inveterate optimist I believe that the new policy directions of government portend well for the industry.



Dr. R. K. Malhotra
Director General

"Determination gives you the resolve to keep going in spite of the roadblocks that lay before you."

~ Denis Waitley

"Man becomes great exactly in the degree in which he works for the welfare of his fellow-men."

~ Mahatma Gandhi

"You change your life by changing your heart."

~ Max Lucado

Changing Energy Dynamics

Dr. Atul Arya
Senior Vice President for the
Energy Insight Business
IHS

(In a free-flowing interview with PetroFed, Dr. Atul Arya, Senior Vice President for the Energy Insight Business at IHS, spoke his mind on the changing global dynamics in energy during a short visit to Delhi. He has international leadership experience in a diverse array of Energy fields besides two decades with BP. He holds the Global Agenda Council on the Future of Oil & Gas with the World Economic Forum.)

Q. How is this commodity price cycle different from the ones before?

Ans. Over the last fifteen years, the world has experienced a commodity "super-cycle". This super-cycle was driven by industrialization of China. Chinese economic growth was led by manufacturing which is resource intensive. As an example, China absorbed 45% of global growth in oil demand over last fifteen years. During the last eighteen months, we have seen slowdown in Chinese economy as well as beginning of a shift from manufacturing to domestic consumption. One of the most significant impacts of this transition is a marked drop in energy consumption. In 2015, Chinese GDP growth was 6.9%; however, energy demand grew by just 0.9%.

During this period, we have also seen an unprecedented boom in oil supplies, led by unconventional oil revolution in the US. Oil production in US peaked at 9.6 million/bbls in May 2016. When OPEC decided not to cut production in November 2014 to balance the market, it became clear that there was a classic supply/demand imbalance. According to IHS estimates, it will take at least through end of 2016, for the market to balance.

A major difference between this and prior cycles is the role played by US unconventional "swing" supply to balance the market. At the moment, OPEC is dormant and has given power to financial markets. This is creating very significant volatility in the system which will continue until supply and demand are balanced.

Q. How do you see the supply/demand balance evolving to balance the market?

Ans. During CERAWeek 2016 in February, Saudi Oil Minister Ali Naimi spelled out Saudi/OPEC policy and how market is going to work. He said "we (OPEC) are going to stop subsidizing high-cost production. Companies are going to have to cut costs, borrow or liquidate". US industry is adapting through lower cost and higher productivity to this new world. Resilience of industry is being tested and it will be a painful transition.

In last 12-18 months we have seen very little M&A and bankruptcies, everything seems to be frozen. We are not likely to see much M&A because no one is willing to adopt debt of other companies. The US bankruptcy system will help and at the end of the day we will end up with industry which is stronger to grow in low oil price environment

We will see similar readjustment globally. According to IHS estimates, capex spend over next five years has been cut by some $1.8 trillion and this will have a very significant impact on supply. More expensive oil

developments including deepwater and oil sands will see a very significant slowdown.

This rebalancing will present new opportunities for companies including those in India on at least two fronts: over $200 billion of oil and gas assets are on sale at present - this is an unprecedented opportunity to acquire assets; we are also seeing significant cost deflation which will make future projects more attractive.

Q. Are we really in a "new world", post COP 21 and what do you think are its implications across the energy spectrum?

Ans. During CERAWeek, COP21 and climate change were front and center throughout the week. It is too early to say how companies across the energy value chain will respond to the commitments made by governments in Paris. However, we are clearly in a new world where climate change is part of the strategic thinking of companies not just in the Energy sector but across all sectors from Automobiles to Utilities.

In order to reduce carbon intensity of economy, we can reduce energy intensity per unit of GDP growth (i.e., energy efficiency) and reduce carbon intensity of energy (i.e. decarbonisation). We will see a diversity of approaches including lower carbon power generation (gas, nuclear, wind and solar) and alternatives to oil such as gas, biofuels and electricity for transportation. Although the energy mix changes slowly, technological breakthroughs in solar PV and batteries could enable us make a step change in the path to decarbonisation.

We will also see gas playing a major role in integration of renewables into the grid. During CERAWeek, Alexander Medvedev, the Deputy Chairman of the world's largest gas producing company, Gazprom, talked about gas and renewables in partnership for meeting COP21 agenda. Gas industry sees great opportunity and sees itself as part of the solution. In India, gas is still a very small part of energy mix. The reforms announced in early March are a very important step to enable gas resources in India to be developed and contribute to the path to a the lower-carbon future.

Q. What does India's rise and growth mean for the global energy system?

Ans. India has very significant potential to power its economic growth by developing a robust energy system. Today, India with 18% share of world population, consumes only about 5.7% of world's energy. Around one-sixth of the world's population in India consumes about one-twentieth of global power output. I think of India as a child in the mithai shop asking the halwai - please give me one of every mithai! India will need a mix of solutions depending on geography, economic attractiveness and supporting infrastructure.

As the Chinese economy slows down and shifts from manufacturing to consumption, the global energy sector is looking at India to be the engine of growth. This will require India to engage globally on multiple fronts - policy, technology, finance. It will also require pace of decision making to accelerate so that the international energy sector accelerates d energy investments in India.

India has the potential to become a major "energy hub" - not just a major consumer and importer of energy but also lead in energy innovation and technology development. There are many energy challenges in India which require a local solution. As an example, biomass is still a primary fuel for many Indians living in villages - this is a source of air pollution as well as health problems. We need Indian ingenuity to find low cost scalable solutions to address this and similar challenges.

Q. How do you is IHS addressing the challenges it clients are facing being faced in the investment choices that a new energy world leads to?

Ans. IHS has been working with companies, governments and financial institutions around the world to help navigate through these uncertain and turbulent times. As an example, our scenario based approach has enabled companies to examine alternate futures and ensure that they are making sound investment decisions which are robust through the price cycles.

We have undertaken major policy studies such as the impact of lifting ban on export of US crude oil. IHS work on this was cited by US Congressional leaders as a key factor in lifting this ban. We have advised a number of governments around the world on issues ranging from hydrocarbon sector reforms, policies to eliminate subsidies and liberalization of domestic power sector.

Since November 2014 when OPEC made the momentous policy change which led to sharp decline in oil price, we have been very proactive in helping our clients understand the market dynamics. Our analysis has shown how the US oil production has remained resilient through productivity gains and technological innovation while oil price dropped in 2015. In Asia, we predicted slowdown in Chinese coal demand long before it was the accepted norm. In February this year, we completed a major new study on the US unconventional gas supply which is going to have far reaching implications for years to come.

Q. How can IHS help India achieve a more energy secure future?

Ans. Heat, light and mobility are essential ingredients to meet the economic growth aspirations every Indian holds. IHS has been working in India for many years. Over the last five years, we have made significant investments in India to build a world-class team to support our local clients. IHS has unrivalled depth and breadth of data, insight and analysis across the entire energy value chain. As an example, IHS has provided in-depth analysis on competitiveness of Indian oil and gas industry to both the government and local companies. This analysis has contributed to the recent hydrocarbon sector policy changes announced by the government.

As you can see, the world of energy is undergoing very significant transition - in oil and gas sector it is driven by low prices and abundance of supply; in power sector it is driven by new policies to combat climate change. We are also seeing major technological shifts such as digitization of energy sector, rapid decline in price of solar PV and emergence of electric cars. Indian companies and government are making monumental decisions which will shape the energy future for India. IHS has a strong track record of guiding its customers to understand these rapidly changing forces that are shaping the energy sector and make sound policy and investment decisions.

As someone who grew up living next to power stations rising in the middle of nowhere in central India in the 60s and 70s, it gives me enormous pride to be able to make a small contribution to the success of India at this important time in the country's journey.

Thank you.

Asian Premium or Discount?

Johannes Benigni
Founder
JBC Asia Pte. Limited

- OPEC's drive for market share erased the so-called Asian premium over much of 2015
- Crude balances suggest widening imbalances in Asia and the US, but not Europe
- Asian premium to resurface versus Europe; to US expected around parity

The oil market has changed in many ways since the fateful November 2014 OPEC meeting. All major benchmarks are mired in contango and global oil stocks have built for nine consecutive quarters. With Saudi Arabia and Russia producing well over 10 million b/d each and continued strong growth coming from Iraq and now also a post-sanctions Iran, many forecasters are even expecting further builds throughout 2016, particularly as demand growth is expected to be some 500,000 b/d below last year's level.

An environment characterised by high crude availability, steady contango, and low outright prices is of course optimal for refiners, particularly those in Asia and Europe. US refiners are also profiting from these factors but overall acquisition costs have nonetheless increased as changes in infrastructure over recent years have realigned WTI with the global market, narrowing the WTI/Brent spread and putting an end to cost-advantaged crude. As a result, the playing field has levelled between the key refining regions, and Asia may in fact be benefiting the most, as the so-called "Asian premium" has not only disappeared but actually flipped into an Asian discount over the November to January period.

The "Asian premium" refers to the historical tendency for Asian refiners to pay more for their crude than their counterparts in Europe and the United States that are in the market for the same barrels. This means that a barrel of the same crude from Saudi Arabia, Iran or Iraq would on average be sold to an Asian refiner at a higher price than to a refiner West of Suez. However, a direct comparison of pricing is not at all straightforward due to different regional pricing mechanisms: Asian pricing of Middle Eastern barrels is done predominantly on a loading-month average basis, while US and European pricing is typically done on a shorter 5-10 day strip basis (usually on arrival). The difference in when the price is triggered results in different outright prices being used to calculate the price, thereby making a fair comparison extremely difficult. For the sake of comparison, we calculated official selling prices for all regions on the same time basis, namely the loading month average (see chart).

Using this methodology one can clearly see that the Asian premium has been reduced significantly since the November 2014 OPEC meeting. The key question is: Can we expect crude acquisition costs to remain more attractive to Asian buyers for the rest of the year or not? In order to answer this question we will first analyse global benchmarks and then look into the crude balances of each region.

The Dubai benchmark is coming under pressure from higher availability of medium and heavy sour OPEC crude. Changes to the Platts assessment have also played a (smaller) role in weakening the Asian benchmark as Al Shaheen has now been added to the Dubai assessment process and is nominated frequently via the partials mechanism. Al Shaheen is qualitatively inferior to all other deliverable grades in the Dubai basket. The weaker Dubai market is reflected clearly in the wider Brent/

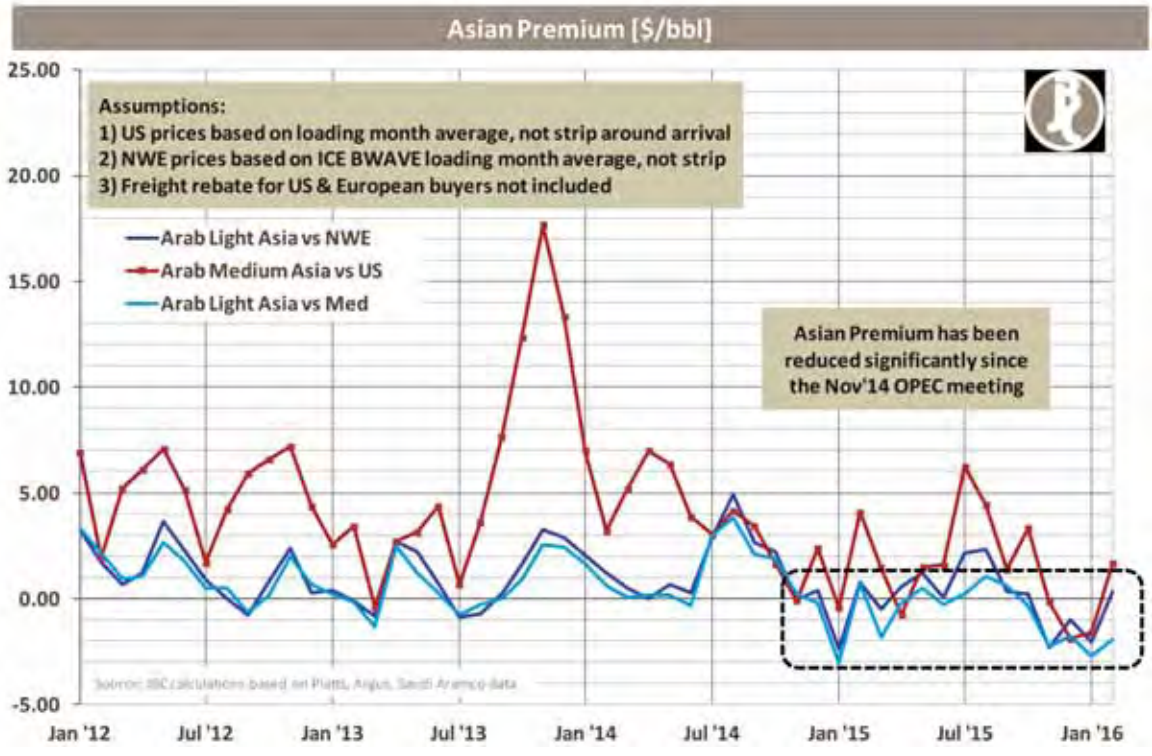
Dubai EFS levels seen this year with 2016 averaging around $3.20 per barrel compared to $1.80 per barrel in 2015. Developments on the product market are also helping Brent widen its premium against Dubai with naphtha and gasoline set to receive strong support from demand growth while middle distillates come under pressure from slowing demand growth and excessive stocks. Marketing strategies aside, a strong Brent benchmark combined with a weaker Dubai benchmark would in tendency speak in favour of a continued discount of Asian term crude to European term crude.

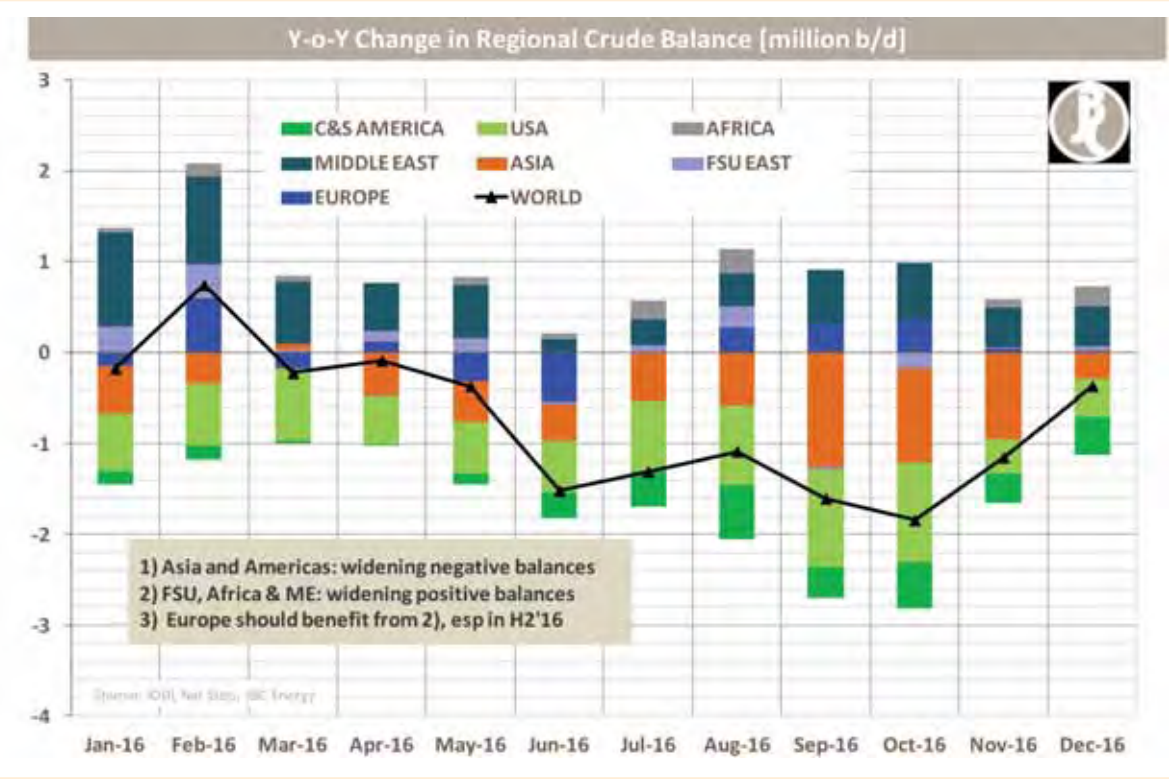
What about the US? From a benchmark perspective the US market has realigned itself with the global market as major investments into infrastructure have successfully overcome the Midcontinent's bottleneck. In fact, the new pipelines connecting the Cushing hub to the Texan coast are currently underutilised. Moreover, the US crude export ban has been lifted, thereby ensuring that US crude differentials cannot fall far below international levels for a sustained period. In fact, this rebalancing can already be seen in action with reports of several US crude cargoes being sent to Europe on the back of the wider premium of Brent over WTI (in conjunction with a wider inter-month contango). Going forward we do not expect to see any major blowouts to the Brent/WTI and Dubai/WTI spreads; in fact we expect WTI to remain around parity to Brent (and therefore at a steady quality-based premium to Dubai) as any strong variations would prompt market corrections by either keeping more crude in the Midcontinent (something that would weaken WTI) or by exporting more crude (something that would strengthen WTI). US crude exports either to Europe or Asia would also tend to weaken the benchmarks in the target region (i.e. Brent or Dubai) even as they strengthen WTI.

Therefore from a benchmark-related perspective, it would appear as if Middle Eastern crude marketed in Asia will keep its discount to term crude marketed West of Suez. But is such a view also in line with our projected monthly crude balances?

In the current oversupplied crude market it is often overlooked that Asian crude supply is shrinking while crude intake is increasing. As our balance chart shows, the Asian (negative) balance is set to widen in every month this year save March. In a y-o-y comparison, Asian crude requirements will grow by an average 560,000 b/d, skewed heavily towards H2. Asian refiners will therefore require more crude and with the Brent/Dubai EFS spread expected to remain wider y-o-y, the call on Middle Eastern crude will be stronger. We may even see a backwardated market environment in early H2, something that would send a strong signal to Middle Eastern term suppliers to hike prices.

This contrasts starkly with Europe where the negative balance will actually shrink by around 50,000 b/d this year on account of lower crude intake amid increased maintenance and potentially some margin pressure due to the growing middle distillate overhang. The easing European balance would in turn suggest that crude competition in Europe will pick up, perhaps necessitating wider discounts to remain competitive. After all the return of Iranian crude to the EU crude slate will pile pressure on spot Urals, which in turn will send a signal to Middle Eastern marketers to ease OSPs. With balances moving in opposite directions in Europe and Asia, the upside to the Brent/Dubai spread is capped, although we still expect to see a wider spread than last year on account of the reasoning above. Diverging regional balances will therefore take some of the strength out of the Brent market while at the same time underpinning Dubai. This reduces the prospect of a benchmark-related discount mentioned earlier. As a result, we would expect Middle Eastern term crudes to be priced at slightly lower levels to Europe than for Asian buyers, thereby reversing the spread seen in recent months and re-introducing an Asian premium that will likely be narrower in H1 and wider over H2.


Asian Premium [$/bbl]
Assumptions:
1) US prices based on loading month average, not strip around arrival
2) NWE prices based on ICE BWAVE loading month average, not strip
3) Freight rebate for US & European buyers not included
Arab Light Asia vs NWE
Arab Medium Asia vs US
Arab Light Asia vs Med
Asian Premium has been reduced significantly since the Nov'14 OPEC meeting
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Jan '12
Jul '12
Jan '13
Jul '13
Jan '14
Jul '14
Jan '15
Jul '15
Jan '16


Y-o-Y Change in Regional Crude Balance [million b/d]
C&S AMERICA
USA
AFRICA
MIDDLE EAST
ASIA
FSU EAST
EUROPE
WORLD
1) Asia and Americas: widening negative balances
2) FSU, Africa & ME: widening positive balances
3) Europe should benefit from 2), esp in H2'16
3
2
1
0
-1
-2
-3
-4
Jan-16
Feb-16
Mar-16
Apr-16
May-16
Jun-16
Jul-16
Aug-16
Sep-16
Oct-16
Nov-16
Dec-16

Place of Effective Management ('POEM') - Concept and Impact

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Place of Effective Management ('POEM') is an internationally recognized concept to determine the tax residency of a company. Generally, a company is treated as a tax resident of a country in which its POEM is situated i.e. place from which the key managerial and commercial decisions of a company are taken. To give an example, if a company is incorporated in Netherlands but if key decisions relating to the operations of the company are taken in Brazil, then POEM of the company is considered to be situated in Brazil and the company will be taken as a tax resident of Brazil under Netherlands - Brazil tax treaty.

In the Indian context, hitherto, a company was treated as resident of India, if it was an Indian company or during the year, control and management of the affairs of that company was wholly situated in India. The Finance Act 2015 amended[1] the provisions of the Income Tax Act, 1961 ('the Act') to provide that a foreign company, for tax purposes, will be considered to be resident of India in any previous year, if its POEM, in that year, is in India. POEM is defined as a place from where key management and commercial decisions that are necessary for the conduct of the business of an entity as a whole, are in substance made.

The major consequence, if a company is considered to be resident in India, is that its world-wide income will be taxable in India at 40%[2]. Further, the provisions of Transfer pricing and withholding tax provisions, as applicable to a resident, will become applicable to the foreign company. To give an example, if POEM of a Malaysian subsidiary company, which holds Participating Interest in Oil and Gas blocks in Malaysia, of an Indian company is considered to be in India, then the income earned by the Malaysian company from the Participating Interest will be taxable in India at 40%[3]. This taxability arises irrespective of the fact that the Malaysian subsidiary company has not declared any dividends to its Indian parent company.

From the upstream Oil and Gas perspective, the analysis of POEM becomes important since, as a business model, interests in Oil and Gas blocks acquired abroad are generally held through overseas subsidiary companies. The parent company in India is normally actively involved in the affairs of the subsidiary companies and thus the exposure to POEM, in this case, is comparatively high.

In view of the above, it becomes important to analyse and evaluate whether POEM of a foreign company is in India.

[1] Finance bill, 2016 has proposed to defer the applicability of the provisions to 1st day of April 2017 with a view to reduce ambiguity around the concept of POEM

[2] plus surcharge and cess, as applicable

[3] plus surcharge and cess, as applicable

The Central Board of Direct Taxes ('CBDT') has recently issued draft guiding principles for the determination of POEM. The tests laid down for foreign companies in the draft guidelines are discussed in brief as under:

• Tests for companies engaged in 'active business outside India':

A company is considered as doing 'active business outside India' if the following conditions are satisfied

- Passive income[4] of such company does not exceed 50% of its total income; and
- Assets situated in India are not more than 50% of its total assets; and
- Employees situated/resident in India are not more than 50% of its total employees; and
- Payroll expenses on such employees are not more than 50% of total payroll expenses.

The company having active business outside India would be deemed to have a POEM outside India if majority of board meetings are held outside India. However, if the management powers are exercised by holding company or other person(s) resident in India, then POEM of such company will be deemed to be in India.

• Tests for companies not engaged in active business outside India

In case a company is not engaged in doing 'active business outside India', the POEM would be determined as per a two stage process i.e.

- Ascertaining the person(s) who actually make the key management and commercial decisions; and
- Determining the place where these decisions are in fact made

Some guiding principles discussed in draft guidelines for determination of facts during the aforesaid process are as under:

Location Criteria	Location where company's Board regularly meets and makes decisions, may be considered to be the company's POEM provided the Board: ➢ Retains and exercises its authority to govern the company; and ➢ In substance, makes the key management and commercial decisions necessary for the conduct of company's business as a whole.
Delegation of authority	POEM is determined by the location of the executive committee / senior management in which the Board has vested powers to carry out decisions on its behalf.
Location of the head office	Location of the head office is an important factor in determination of POEM. The following facts needs to be considered for determining the location of head office of the company. ➢ If the company's senior management and their support staff are based in a single location and that location is held out to the public as the company's principal place of business or headquarters, then that location is the place where head office is located. ➢ If the company is more decentralised, then the location where senior managers are located may be determined as company's head office. ➢ If the meetings are done through video-conferencing, the head office would normally be the location where the highest level of management or their direct support staff are located.

[4] Passive income" defined to mean - Income from transactions where, both, the purchase and sale of goods is from / to Associated Enterprises and Royalty, dividend, capital gains, interest or rental income

In this connection it has also been clarified that the place where decisions are taken are more important than its place of execution. Further, it is stated that substance would be more conclusive than form for determination of POEM.

The aforesaid draft guidelines are not finalized as yet. However, it brings out important points which need to be considered while determining POEM of a foreign company in India.

Apart from the aforesaid guidance given in the draft guidelines, following are the important points which are to be considered while determining POEM:

- POEM rules do not stipulate a definitive point in time when the residential status test has to be examined and for what period. From the deliberations held in the Finance Bill 2015 it can be inferred that the intention is to verify the residency for a substantial part of the year.
- The test of POEM is to be applied to each previous year independently. Thus, the fact pattern of each previous year is required to be analysed.
- It may be arguable that "parental control" or in other cases shareholders control to protect its interest / carry on operations of the subsidiary company may or may not have any influence on determination of POEM. Generally, it can be inferred that if the parental control or the shareholders' control is only in the capacity as owners of the company, it may not have any significant effect on determination of POEM.

  Thus, if the overseas subsidiary has independent decision making authority and is functioning independently and the role of the shareholder is only to the extent of parenting or guiding then it cannot be said that the overseas subsidiary has a POEM in India. Some of the examples of the parental control by holding company are as under:

- Review of the operations of the overseas subsidiary company and providing guidance in the annual general meetings.
- Review of reports from the directors of the overseas subsidiary company and discussion on the future business plans and business prospects.
- Setting up of the group vision and group policy and procedures and communicating to the subsidiary companies to adhere to the same.

However, where key management and commercial decisions of overseas subsidiary, in substance, are made by ultimate holding company being Indian resident company and not by foreign intermediary holding company, analysis of parental control will be ineffective.

- If a company is a resident of more than one country as per the domestic tax law of each country, then its residency shall have to be analysed as per the tie-breaker rule in the respective Tax Treaty. Most of the Tax Treaties recognise the concept of POEM for determination of residence of a company as a tie-breaker rule for avoidance of double taxation. Thus, even under the Tax Treaty, the relevant company is likely to be treated as tax resident of the country where its POEM is situated in that particular year.

While final guidelines from CBDT are awaited, it is important to determine whether provisions of POEM will impact the current business structure and whether there is an exposure that a foreign company may be considered as resident in India. A detailed study needs to be conducted to avoid potential exposure or litigation on account of POEM.

Implications of Union Budget 2016 on Oil and Gas Sector

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The Union Budget 2016 was presented by the government at a time when the Indian economy's domestic parameters like inflation, fiscal and current account deficits were at moderate levels. Moreover, India remained at a relatively bright spot with its growth story continuing to bloom, thanks to the benefit that it derived from a sharp reduction in crude oil prices, of which India is a major importer. Given this backdrop, it was expected that the government would increase the public spending on infrastructure and lay path for fiscal consolidation.

The Hon'ble Finance Minister, Mr. Arun Jaitley presented the Union Budget for 2016-17 before the Parliament on February 29, 2016. In his budget speech he referred to the oil and gas sector on a few occasions and directly linked the importance of the growth of the oil and gas sector with the overall growth of the economy.

While referring to the oil and gas sector, the finance minister in his budget speech said that "India is blessed with rich natural resources including oil and gas. However, their discovery and exploitation has been below our potential".

The finance minister announced that the government is focussed to incentivize gas production from deep water, ultra deep water and high pressure-high temperature areas. He further added that a proposal is under consideration for new discoveries and areas which are yet to commence production, first, to provide calibrated marketing freedom; and second, to do so at a pre-determined ceiling price to be discovered on the principle of landed price of alternative fuels.

The key budget proposals specific to the oil and gas sector are covered hereunder:

Tax exemption to foreign companies on income earned from storage and sale of crude oil

The finance minister has taken a strategic move by exempting the income earned by a foreign company on account of storage and sale of crude oil in India, provided such an arrangement is approved and notified by the central government.

Indian Strategic Petroleum Reserves Limited ('ISPRL') is setting up underground storage facility for storage of crude oil. This storage facility and the proposed exemption shall encourage the participation of private players like foreign oil companies to store and sell crude oil in India.

Phased out deduction - Profits derived from production of mineral oil and natural gas

The Finance Minister proposed to phase out the deduction under section 80-IB (9) and said that deduction shall be available to an undertaking engaged in the production of mineral oil or natural gas who commences the commercial production on or after 1 April 2017.

Excise Duty - Oil Industry Development Cess

The oil producers paid the cess at a flat rate of Rs. 4500/ mt when the crude prices were above $100/ barrel. Currently, the crude oil prices have fallen to $30/barrel, however, the cess remained at the same level. Considering the same, the industry recommended to reduce the cess from INR 4,500 per metric tonne (PMT) to 10 per cent ad valorem.

The finance minister accepted the proposal, though partially and amended the clause of the Oil Industry Development Act where the cess has been reduced to 20 percent ad valorem on the domestically produced crude oil.

Central Sales tax (CST)

The budget proposals explained that where the gas sold is transported through a common carrier pipeline becomes co-mingled and fungible with other gas in the pipeline and such gas is introduced into the pipeline in one state and is taken out from the pipeline in another state, such sale or purchase of gas shall be deemed to be a movement of goods from one state to another.

Customs Duty

Exemption extended on specified goods imported by ONGC or OIL in connection with petroleum operations undertaken under PEL or Mining Leases (ML) issued or renewed before 1 April 1999.

However, the finance minister left many important aspects untouched and many of the sector's concerns remained unanswered. A few of the same are mentioned hereunder:

- Extension of benefits under section 42 of the Income Tax Act, 1961 to (i) Pre-NELP contracts, which have the President's assent; and (ii) for expenses incurred in connection with oil and gas blocks located outside India.
- Clarification on definition of 'mineral oil' under section 80-IB(9) of the Income Tax Act, 1961 and to include natural gas and Coal Bed Methane under the definition retrospectively irrespective of NELP rounds.
- Extending the applicability of the deduction under section 80-IB(9) of the Income Tax Act, 1961 to Refining Business.
- Exemption from book profit tax under section 115JB of the Income Tax Act, 1961 to oil and gas companies availing specific incentives or covered under specific tax regimes (section 42 or section 44BB, etc.).
- Amendment in section 35AD of the Income Tax Act, 1961 to include crude oil pipelines and dedicated pipelines for supply of petroleum products.

The other key proposals of the budget which are relevant for the corporate sector including the oil and gas sector are covered hereunder:

Corporate Tax Rate

- No change in the corporate tax rate except in respect of new eligible manufacturing domestic companies setup and registered after 1st March 2016 and do not claim any tax incentives shall be taxable at the rate of 25 per cent.
- Domestic Companies having a turnover or gross receipts not exceeding INR 50 million during the financial year 2014-15 shall be taxable at rate of 29 per cent.
- There is no change in the tax rates of foreign companies and it continues to apply at 43.26% although MAT is not applicable to a foreign company, if it does not have a PE in India.

Research & Development Expenditure

- The government has proposed to phase out

weighted deduction for expenditure incurred on scientific research and other eligible expenditures under various provisions. The same has been tabulated below:

Section	Existing quantum of incentive	Phase out measure
Payment to an approved scientific research association having object of scientific research.	175 percent	• 150 per cent from 1 April 2017 to 31 March 2020; • 100 per cent from 1 April 2020 onwards.
Contribution to an approved scientific research company, universities for statistical research.	125 percent	• 100 per cent from 1 April 2017 onwards
a. Payment to a National Laboratory or a university or an Indian Institute of Technology for approved scientific research programme; or	200 percent	• 150 per cent from 1 April 2017 to 31 March 2020; • 100 per cent from 1 April 2020 onwards.
b. Expenditure on scientific research in approved in-house research and development facility.		

Considering that the Oil & Gas industry requires huge investment in research and development activities, amendments proposed by the Finance Minister would be harsh on several Oil & Gas companies engaged in research and development activities in relation to their business.

Tax incentive for employee generation

- Currently, deduction under section 80JJAA of the Act is available to an Indian Company engaged in manufacturing of goods. Finance minister in his budget speech has proposed to amend section 80JJAA to extend the deduction to all taxpayers liable to tax audit under section 44AB of the Act.
- Deduction under this section is equal to 30 per cent of additional employee cost incurred in the previous year subject to fulfillment of certain conditions. The minimum number of days for which they should be employed during the year is proposed to be reduced from 300 to 240 days.
- In order to provide incentive to new business, it is further proposed that in the first year thirty percent of all the emoluments paid or payable to the employees shall be allowed as deduction.
- This is a welcome move by the Finance minister which enables the companies to generate new employment and claim deduction for the same.

Tax incentive under Section 32AC

- Currently in order to claim deduction under section 32AC of the Act (i.e. 15% of actual cost of new assets), acquisition and installation of new plant & machinery exceeding twenty five crores should be in the same year.
- The above stipulated conditions create genuine hardship to those assesse who acquired the assets during the year and installed the same in subsequent years.
- The Finance Minister has proposed to allow even if new plant or machinery is acquired and

installed in different previous years provided installation happens before 31 March 2017. In such case, the deduction will be allowed in the year of installation.

- Given the fact that the oil & gas industries require high volume of investment in new assets by way of plant & machinery, this amendment would provide relief to tax payers.

Direct Tax Dispute Resolution

- Litigation has been a major area of concern in the direct taxes and in order to reduce the huge backlog of cases and to enable the government to realize its dues, Finance Minister has proposed to bring the Direct Tax Dispute Resolution Scheme, 2016 in relation to tax arrears and relief to the assesse from various litigations.
- This scheme is applicable to the disputes pending as on 29th Feb 2016 in the following cases stipulated below in the tabular format:-

Particulars	Appeal Against		
	Assessment order	Penalty Order	Retrospective amendment
Pending	Before CIT(A) / CWT(A)	Before CIT(A) /CWT(A)	Before any appellate authority or writ or arbitration
Amount payable	Tax plus interest (up to the date of assessment) - 25% of minimum penalty (if disputed tax exceeds INR 10 lakhs)	25% of minimum penalty	Disputed tax
Immunity	Prosecution	Prosecution	Prosecution, penalty and interest

- This is a welcome move to enable government to expeditiously collect tax arrears and reduce the pending cases before the CIT (A) and ITAT. This would also benefit tax payers as it would help in reducing litigation.

General Anti Avoidance Rule ('GAAR')

In the current budget, it has been clarified that the GAAR provisions are proposed to be implemented and applicable to the investments made on or after 1st April 2017 as there will be no deferment of GAAR provisions.

Conclusion

The budget was presented with a clear road map towards bringing down and eventually abolishing the incentives which reduce the effective corporate tax rate.

The Budget 2016 spells out a positive transformative change by focussing on strengthening the fundamentals of the economy through a sustained and targeted reform process. Be it agriculture, infrastructure, social sector or industrial sector, the Budget aims to create an environment for sustained and inclusive growth. Taking forward the initiatives such as Make in India, Ease of Doing Business (EoDB), Skill India, Financial Sector Reforms, GST, simplification of tax regulations among several others, the Government has clearly shown its intent to pave the way for the development of India.

Key Direct Tax Budget Proposals & Recent Policy Reforms in Oil & Gas

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The Indian Oil and Gas (O&G) industry is heavily dependent upon imports of mineral oil products which constitute approximately 85% of the total mineral oil consumption. With an eye on achieving self-sufficiency in domestic mineral oil production and boosting energy security, the Indian Government has proposed tax and policy reforms in this space. The Government has unveiled these reforms partly through the budget proposals and partly through policy announcements preceding and succeeding the budget presentation. This article focusses on the key direct tax proposals of the budget impacting the O&G industry and also briefly discusses the policy announcements made thereafter.

I. Budget 2016 - Direct Tax Proposals

1. Exemption for income of foreign companies from storage and sale of crude oil in India

With intent to incentivize foreign investment in creation of strategic oil reserves and with the objective of ensuring price stability the Finance Minister of India (FM) has proposed that the income arising to foreign companies from the storage of crude oil in a facility in India and its subsequent sale therefrom to any person resident in India, shall be exempt under the Income-tax Act, 1961 (the Act) if such storage and sale is pursuant to an agreement/ arrangement entered into with/approved by the Central Government and such foreign company as well as the agreement/arrangement are notified by the central Government.

This is a proactive approach adopted by the Government to take advantage of the falling crude oil prices and build up strategic oil reserves.

2. Phasing out of tax holidays

In line with its stated policy of phasing out tax incentives along with parallel reduction in the corporate tax rates, the Finance Minister (FM) has proposed to insert sun-set clause in the profit linked tax holidays provided under the Act. Presently the tax holiday under section 80-IB(9) of the Act is available to income from commercial production of mineral oil and natural gas under specified circumstances. It is proposed to phase out the aforesaid tax holiday by inserting a sun set date of 31 March 2017. Accordingly, tax holiday shall not be available to Exploration and Production (E&P) companies on income arising from commercial production subsequent to 31 March 2017, of:

- mineral oil pursuant to a contract awarded till 31 March 2011;
- natural gas in a block licensed under NELP VIII; and
- natural gas in a block licensed under Coal Bed Methane - round IV.

Given the uncertainty in crude prices and to accelerate the E&P activity in India, the Government may consider extending the sun-set date to provide necessary incentives to such E&P companies.

3. Reduction in depreciation

The FM mentioned in his budget speech that the accelerated depreciation under the Act shall be restricted to maximum 40% from 1 April 2017. Further, the Central Board of Direct Taxes ('CBDT') has recently notified the rate of depreciation on oil wells at 15% on written down value with effect from 1 April 2016. The aforesaid proposals shall have a significant impact on the mineral oil concerns who are presently entitled to higher rates of depreciation in respect of certain equipment such as certain plant used in field operations (above and below ground), air and water pollution equipment etc.

4. Deferral of Place of Effective Management ('POEM') based residency test for foreign companies and introduction of transition provisions

The Government had received consistent representations from various quarters that the POEM provisions ought to be deferred due to lack of clarity as well as absence of transition provisions for foreign companies falling within its net.

The FM has accepted these representations and has proposed to defer the POEM provisions by one year to 1 April 2016. Further, enabling provisions are proposed to be introduced to facilitate notification of transition provisions covering the computation mechanism, set-off of losses, computation of unabsorbed depreciation etc. for foreign companies who become resident in India under the provisions of the Act.

5. Applicability of Minimum Alternate Tax ('MAT') to foreign companies

The CBDT had issued guidance before the budget on this subject which has now been codified into the Act. Accordingly it has been clarified retrospectively from the inception of the MAT provisions (FY 2000-01) that MAT shall not be applicable to foreign companies if:

- they do not have a Permanent Establishment ('PE') in India under the relevant Double Taxation Avoidance Agreement (DTAA); or
- where there is no such DTAA, they are not required to be registered in India under any other law.

The implications, if any, on the above amendment on foreign companies needs to be analysed on a case to case basis.

6. Failure of non-residents to obtain Permanent Account Number (PAN)

Section 206AA of the Act provides for higher withholding tax rate to be applied in cases where the recipient does not furnish PAN. This provision is proposed to be relaxed from 1 June, 2016 in respect of payment of interest on long term loans in foreign currency and certain other payments (these payments and conditions shall be separately notified) being made to the non-residents if certain conditions are met by the non-resident.

7. Introduction of equalization levy

Pursuant to release of BEPS Action Plan in October 2015, a new tax by name of 'equalization levy' is proposed at 6% on payments exceeding Rs. 1 lakh made to a non-resident by (i) a resident in India or (ii) a non-resident having a PE in India in respect of specified services. The services covering online advertisements, provision of digital advertising space or any other related facility or service have been presently specified for this levy and more services may be notified in future.

This levy is separately proposed under the Finance Act, 2016 and guidance shall be issued in due course with respect to the definitions, procedures, administration etc. However, on immediate analysis it is observed that there is no clarity on whether the non-resident service provider can claim DTAA benefit in respect of this levy or credit thereof against the income-tax levied in his home country.

8. Income from patents

It is proposed that the royalty income earned by an Indian resident from a patent developed and

registered in India shall be taxable on a gross basis at the rate of 10% (plus applicable surcharge and education cess). This proposal is aimed at encouraging domestic research and development and should fortify the Government's make in India initiative.

9. Deduction for wages paid to new workers

With a view to encourage fresh employment, it is proposed to provide a deduction of 30% of additional wages paid to new regular workmen for three assessment years subject to certain conditions such as total emoluments of the new worker shall not exceed Rs. 25,000 per month etc.

10. Measures for easing dispute resolution - Key proposals

a. Dispute Resolution Scheme

Appeals pending before the Commissioner (Appeals) as on 29 February, 2016, can be resolved by the taxpayers on:

- payment of tax and interest computed till the date of the assessment Order; and
- payment of penalty up to 25% of minimum penalty leviable in cases where the tax exceeds Rs. 10 lakhs.

A pending penalty appeal can be resolved by the taxpayer on payment of 25% of the minimum penalty leviable provided that tax and interest payable as per the original assessment or reassessment order are paid.

Litigation with respect to retrospective amendments

Litigation arising out of retrospective amendments and pending at any level, can be resolved on payment of only the tax involved.

On payment of aforesaid tax, interest and penalty as may be applicable, the taxpayer may be granted immunity from prosecution proceedings.

b. It is proposed that the revenue shall not have any right of subsequent appeal against the directions of the Dispute Resolution Panel (DRP) on or after 1 June, 2016. This may reduce the litigation significantly especially in cases where DRP were to decide the matters in favour of the taxpayer.

11. Country by Country Reporting ('CbCR')

India has always been an active contributor and is committed to implement the Base Erosion Profit Shifting (BEPS) initiative of the OECD and G-20. To reiterate its commitment, as a first step, the FM proposed to implement the BEPS Action Plan 13 which shall apply to entities whose consolidated revenues of the preceding year exceeds equivalent local currency of EUR 750 million.

12. Revamp of penalty provisions

Existing penalty provisions are proposed to be replaced for assessments for the assessment year commencing after 1 April 2017 by graded penalties (50% on under-reporting of income and 200% on misreporting of income) for reducing uncertainty and bringing objectivity. To provide certainty, the terms under-reporting and misreporting of income have been defined.

Immunity from penalty and prosecution may be granted in specified cases where tax and interest has been paid and no appeal has been filed by the taxpayer. It is further proposed that penalty shall not be levied on the same issue year on year basis.

In case of underreported of income, the tax officer may not levy penalty in case where he is satisfied with the bonafide explanation of the taxpayer and where the taxpayer has disclosed all material facts to substantiate the explanation offered. Interestingly, no such exclusion is provided for misreporting of income and hence, there is no clarity whether application of penalty provisions on misreporting of income (defined under the Act) is automatic.

13. Stay of demand

The FM in his Budget Speech had proposed certain amendments in mechanism for granting stay on recovery of demand. The CBDT on the same day i.e. on 29 February 2016 issued revised guidelines for stay of demand at the first appeal stage in a press release with a view to streamline the process of grant of stay of demand. Under the revised guidelines,

where the outstanding demand is disputed before Commissioner (Appeals), the tax officer shall grant stay of demand till disposal of the said appeal on payment of 15% of the disputed demand subject to certain conditions.

II. Policy initiatives

The FM had mentioned in his budget speech that Government is considering incentivising gas production from deep-water, ultra deep-water and high pressure-high temperature areas, which are presently not exploited on account of higher cost and higher risks, with an aim at self-sufficiency.

Thereafter, the Cabinet Committee on Economic Affairs (CCEA) has approved a proposal to grant marketing, including pricing freedom, for the gas produced from High Pressure High Temperature, Deepwater and Ultra Deepwater areas. It is proposed to calculate ceiling price every six months at the lowest of the imported cost of fuel oil, landed price of liquefied natural gas (LNG), or weighted average of imported price of coal, fuel oil, and naphtha.

The CCEA also unveiled other initiatives such as replacing present NELP regime with Hydrocarbon Exploration Licensing Policy (HELP). HELP aims at providing a uniform licensing system to cover all hydrocarbons such as oil, gas, coal bed methane etc. under a single licensing framework with contracts to be based on 'biddable revenue sharing' (shifting from the profit sharing mechanism under the erstwhile policy), concessional royalty regime for deep water and ultra deep etc.

Further, the CCEA has also decided to grant extension to the Production Sharing Contracts for small, medium sized and discovered fields.

III. Way ahead

The Government has introduced a string of proposals, both in the budget as well as policy, aimed at kick-starting the much needed investment activity in the economy. However it remains to be seen whether these measures will result into acceleration of domestic crude oil and gas production and realise the Government's vision of ensuring energy self-sufficiency and security.

"We all have dreams. But in order to make dreams come into reality, it takes an awful lot of determination, dedication, self-discipline, and effort."

~ Jesse Owens

"Confidence comes from hours and days and weeks and years of constant work and dedication."

~ Roger Staubach

Indian Economic Survey 2015-16

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The Indian Economic Survey for 2015-16 was presented to the Parliament by the Hon'ble Finance Minister Shri Arun Jaitley on February 26, 2016. The Survey reaffirms India's place in the world as a haven of stability and outpost of opportunity amidst the fears of faltering global economy.

India has made striking progress in its contribution to the global growth of Gross Domestic Product (GDP) in Purchasing Power Parity (PPP) terms. PPP represents the number of units of a country's currency required to purchase the same amount of goods and services in the domestic market as the US dollar would purchase in the United States, thus adjusting for purchasing power differentials between currencies in relevant markets. As per the International Monetary Fund (IMF), India's share in world GDP has increased from an average of 4.8 per cent during 2001-07 to 6.1 per cent during 2008-13 and further to an average of 7.0 per cent during 2014 to 2015 in current PPP terms.

The government's emphasis on boosting infrastructure spending, commitment to preserve the fiscal consolidation path to ensure credibility and visible steps on several other economic development initiatives have contributed to this resilience. The Survey also calls for further monetary easing measures given the uncertainty over domestic growth and benign outlook for inflation.

Macro-Economy Outlook

As per the Survey, the real GDP growth for 2016-17 has been pegged at 7-7.75 per cent as compared with a growth of 7.6 per cent (per Advanced Estimates) for 2015-16. As far as the critical issue of deficit is concerned, the Government is expected to meet its 2015-16 fiscal deficit target of 3.9 per cent of GDP and a challenging target of 3.5 per cent has been set by the Government for 2016-17.

During the period April-December 2015, Consumer Price Index (CPI) based inflation declined to 4.8 per cent as compared to 5.9 per cent in 2014-15. Further, the Wholesale Price Index (WPI) based inflation contracted by 3 per cent between April-December 2015 vis-à-vis 2 per cent growth in 2014-15. The moderation in consumer inflation was attributable to drop in inflation of food articles and items under non-food, non-fuel category while in respect of wholesale inflation, the moderation could be attributed to -12.6 per cent growth registered by the fuel and power subgroup.

Further, the Reserve Bank of India (RBI) continued on its path of easing the monetary policy, as it reduced the repo rate by 25 basis points (bps) in June and 50 bps in September 2015, respectively. The key rates - repo, reverse repo and bank, currently stand at 6.75, 5.75 and 7.75 per cent respectively. The continuation of monetary easing, as called for by the Survey, is very critical for the investment cycle to pick up by freeing up the monetary resources and bringing the same into the economy.

As can be inferred from the above, due to moderate levels of inflation, reduced deficit and ongoing fiscal consolidation, the country is currently characterized

to be in a stable macroeconomic situation. This coupled with increased pace of government reforms, can be expected to result in expansion of GDP at a rate of 7-7.5 per cent during 2016-17, making India as one of the fastest growing economies in the world.

Key Highlights

Amidst a slowing global economy with recessionary trends visible in several countries, it becomes all the more imperative for the Government to focus on the key areas which are critical to the country's development but which are lagging due to various reasons. Some of these have been enumerated below -

Exports

India's exports declined by 17.6 per cent during April 2015 to January 2016 due to sluggish global demand, falling commodity prices and stagnation in commercial service exports. In the same period, imports also fell by 15.5 per cent due to sharp decline in international crude oil prices.

To counter declining exports, the government had announced a new Foreign Trade Policy (FTP) in the Union Budget 2015-16 for the period 2015-20 aiming to increase India's exports to USD 900 billion by 2019-20. However, if India is to realize its growth potential, it will have to focus on revival of service exports along with manufacturing and improving 'Ease of Doing Business'. Continued persistence to integrate with the world trade, fortification of domestic economy against external volatilities, providing safety net to farmers from changing trade policies etc. are the necessary steps among others to address these concerns.

Agriculture Sector

Agriculture plays a vital role in employment generation in the Indian economy, with nearly 48.9 per cent (as per the National Sample Survey Office - NSSO) of the population in 2011-12 being dependent on agriculture and allied activities for livelihood. Also, the sector contributes significantly to the nation's GDP and constituted 17.4 per cent of GDP's share during 2015-16.

Despite this, agriculture sector continues to be a victim of administrative neglect. The Survey blatantly terms the urgency to transform agriculture. Increasing productivity through micro-irrigation, prioritizing the cultivation of relatively less water intensive crops and a supportive framework of Minimum Support Price (MSP) to cushion farmers and a solid procurement mechanism are some of the initiatives which can lead transformation in agriculture sector.

Industrial Sector

Industrial sector, which constitutes mining, manufacturing, electricity and construction registered a growth of 5.9 per cent during 2014-15 as compared to 5 per cent during 2013-14. For 2015-16, growth rate of 9.5 per cent is expected to be registered in the manufacturing sector. Growth in the manufacturing sector was led by higher production volumes in the industry segments like, furniture, wearing apparel, motor vehicles, trailers and semitrailers, chemicals and chemical products, refined petroleum products and nuclear fuel.

Further, the Government has initiated various reform measures for simplification and rationalization of procedures and processes to attract more FDI. These reforms include reduction in the list of industries requiring license, amendments in FDI policy including raising FDI limits in defence up to 49 per cent and in railway infrastructure up to 100 per cent. Subsequent to the launch of 'Make in India' initiative in September 2014, there has been an increase of 40 per cent in FDI inflows during the period from October 2014 to June 2015, over the corresponding period of the previous year. Government has also taken various other initiatives like, Invest India, e-biz Mission Mode Project, establishment of 100 Smart Cities, Ease of Doing Business (EoDB), launch of High Speed trains (Bullet Trains) with Japanese assistance, development of Dedicated Freight Corridors, among others, to give

a boost to the Industrial and Infrastructure sector in the country.

Petroleum and Natural Gas Sector

During April-December 2015, domestic production of crude oil was 27.9 Million Metric Tonnes (MMT) which is 0.8 per cent less than the production of 28.2 MMT during the same period of the previous year. Gas production during April-December 2015 was 24.7 Billion Cubic Metres (BCM) against 25.397 BCM during the corresponding period of 2014-15, showing a decline of 2.8 per cent. Currently, commercial production of Coal Bed Methane (CBM) in India is about 1.0 million metric standard cubic metres per day (MMSCMD). In the next three years, CBM production potential is likely to increase to 5.7 MMSCMD.

The estimated CBM resources in the country are about 92 trillion cubic feet (TCF), of which only 9.9 TCF has so far been confirmed. In order to augment CBM gas production, the Government has authorized Coal India Limited and its subsidiaries to undertake CBM operations in coal mining areas held by them.

With a view to increase domestic production of oil & gas, the Government has approved the Marginal Fields Policy (MFP) on 2nd September 2015 for the development of hydrocarbon discoveries made by national oil companies, i.e. ONGC and Oil India Limited (OIL). The Government has also approved a policy on Testing Requirement with/without Drill Stem Test in NELP blocks on 29 April 2015. This policy has paved the way forward for 10 discoveries in the east coast offshore areas by resolving long pending disputes associated with testing requirements. Reserves associated with these discoveries, which are expected to get monetized, are about three trillion cubic feet (TCF), with an associated value of Rs. 90,000 crore.

The Government has awarded 50 Petroleum Exploration Lease (PEL)/ Petroleum Mining Lease (PML) blocks to ONGC and five to OIL India for assessment of shale oil and gas in India.

Post facto the Survey, the Union Cabinet on March 10, 2016, has approved the Hydrocarbon Exploration Licensing Policy (HELP) which has replaced the New Exploration Licensing Policy (NELP). The HELP provides for a single E&P license for all forms of hydrocarbon, an open acreage policy, easy to administer revenue-sharing model and marketing and pricing freedom for the crude oil and natural gas produced. This decision will enhance domestic oil & gas production, bring substantial investment in the sector and generate sizeable employment while enhancing transparency and reducing administrative discretion.

Services Sector

According to the advance estimates for 2015-16, services sector accounted for 53.3 per cent of India's Gross Value Added (GVA) at basic prices (current prices), growing by 9.2 per cent which is marginally lower than 2014-15 value of 10.3 per cent. FDI inflows grew by 27.3 per cent to USD 30.9 billion in 2014-15. The growing trend has been observed in the first seven months of 2015-16 with the FDI inflows in services increasing by 74.4 per cent to USD 14.8 billion. The high growth of FDI inflows in services can mainly be attributed to higher growth of computer software and hardware, services sector category (consisting of financial, banking, insurance, non-financial, outsourcing and R&D), and trading.

Conclusion

The Survey while admitting the harsh realities of a fragile external environment, has projected a growth in GDP of 7-7.5 per cent for the fiscal year 2016-17 while maintaining the fiscal deficit at 3.5 per cent. The Survey also recognizes the burden on Government due to implementation of One-Rank-One Pension and the Seventh Pay Commission recommendations. However, given the Government's commitment to carry forward the reform process and prevailing macroeconomic stability, the Survey has indicated that conditions do exist for achieving GDP growth rate of 8 per cent or higher in the next couple of years.

Cooking for Life

Alison Abbott
Communications Director
World LPG Association

It is human nature to feel hungry and human instinct to seek nourishment. But what if you were told that every meal you have ever cooked caused you more harm than good? This is the disturbing reality for people living in many developing countries where exposure to indoor air pollution is greatest.

According to the World Health Organization, about 4.3 million people annually die prematurely due to exposure to Household Air Pollution (HAP). Household air pollution is primarily caused by cooking with what are referred to as 'traditional fuels' - such as coal, charcoal, wood, animal waste and dirty and dangerous fuels such as kerosene. The environmental and health effects caused by traditional fuels are harmful and an alternative fuel source must be embraced.

Liquefied Petroleum Gas (LPG) or propane is an excellent solution to this problem and is highly suitable as a household cooking fuel due to its portability, efficiency, accessibility and clean burning characteristics. LPG emits almost no particulate matter when it is burned, making it clean enough to use for cooking daily with no negative impacts on people's health.

The World LPG Association (WLPGA) is the global voice of the LPG industry, representing the entirety of the chain of production and distribution. Through its programme Cooking For Life, WLPGA has created a platform for the LPG industry to focus on the benefits of switching to LPG in terms of reducing exposure to HAP.

Cooking For Life aims to facilitate the transition of one billion people from cooking with traditional fuels to clean burning LPG by 2030. The campaign convenes with governments, public health officials, the energy industry and global NGO's to expand access to LPG and bring this modern alternative to people who need it most.

Switching to LPG is not only beneficial for the health of individuals exposed to HAP, but it also allows for social and economic change. Traditional fuels entail a waste of productive time and energy, as they usually have to be collected and transported to the home. The burden of this work almost always falls on women and girls. In communities where LPG is introduced, the quality of life of women and girls increases immediately.

Through Cooking For Life, WLPGA represents the global industry at a variety of events that focus on sustainable development. In 2015, the campaign produced key studies that were overseen by the Cooking For Life Steering Committee, focusing on the different elements of the advantages to switching to LPG. The studies can be freely accessed on the WLPGA website.

Cooking For Life continues to advance in its mission as an integral part of the World LPG Association and the greater LPG industry as a whole. Clean fuels are available for all today, which is why the Cooking For Life campaign will continue to accelerate the natural transition of populations to clean and convenient LPG for cooking.

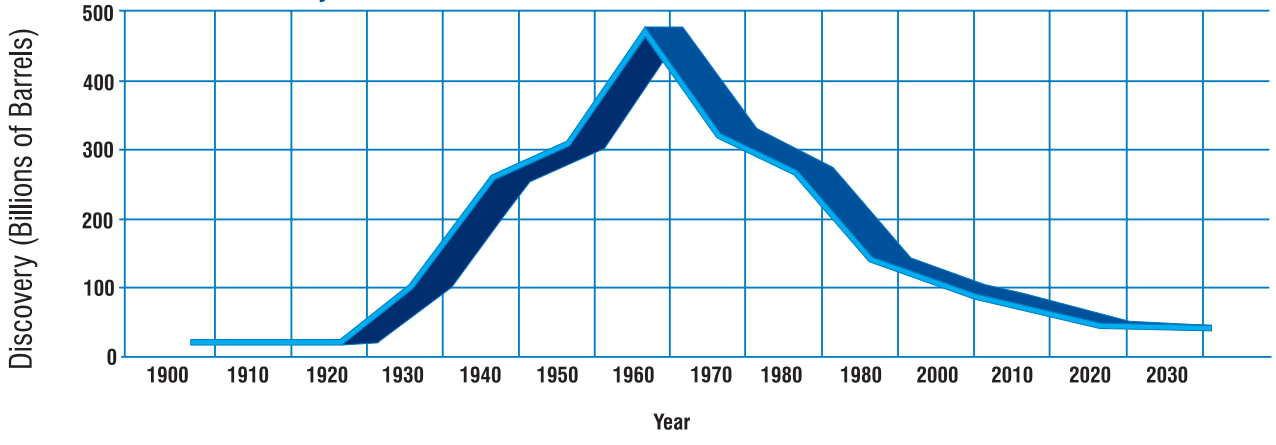
Opportunity Crudes: from Today's Alternatives to Tomorrow's Standard

Bertrand Szymkowiak
CEO of WINTECH Global

Crude oil market evolution

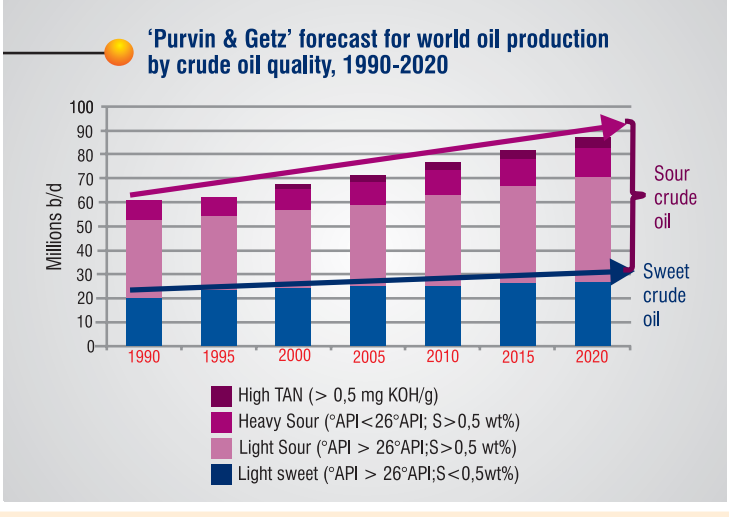
The crude oil market has gone through major restructuring over the last decades. Indeed, the growing exploitation of new natural resources, intended to deal with the ever increasing demand, leads to a diversification of the properties of produced and traded hydrocarbons. This trend nowadays is emphasized by the development and the upgrading of 'unconventional' oils.

History and forecast of world discoveries of conventional oil



Source: 'Brazilian Journal of Chemical Engineering' Vol. 31, No03, July-September 2014

Particularly, the geographic distribution of produced natural resources keeps extending, leading to an increasing variety of product characteristics. In this context of changing oil landscape, the market share of oils stamped 'sour' keeps growing (North Sea, South America, Russia, Western Africa, etc.) and now represents about 70% of the world production.



Source: 'Purvin & Getz'

As a matter of fact, the industry world, and in particular the areas of refining and petrochemicals, does undergo profound changes to adapt to this demanding environment. On one side existing refineries need to adapt their facilities to be able to safely process these new tougher feeds and on the other side brand-new refineries have to be designed taking new criteria into account.

The changing operating conditions make it more difficult to meet the objectives of a safe and reliable performance of the process units. The facilities operate under increasingly harsh conditions even though the equipment are, for the major part, not designed to meet these new requirements dictated by a constantly changing oil market.

In combination with this, the vast majority of equipment is aging and the facilities must therefore withstand the effects of augmented production capacity with increased requirements of availability and reliability of the materials of construction.

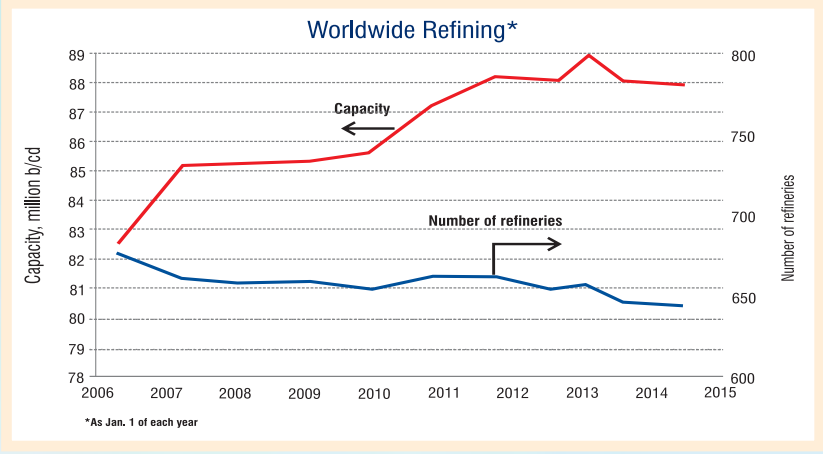
Refineries Daily Challenges

At the beginning, petroleum refineries were designed and operated to run within a narrow range of crude oil feedstock, and/or to produce a relatively fixed mix of petroleum products, matching a local market.

Today the situation has considerably changed. With the increasing scarcity of conventional crudes, refineries are making more and more use of heavy oils, acid crudes and unconventional feeds.

As feedstocks to refineries change, there must be a change in refinery's technology. Refineries need to be constantly adapted and upgraded to remain viable and responsive to ever-changing patterns of crude supply and product market demands.

Paradoxically, even as the supply of heavy crude has increased, the demand profile for refined petroleum products has shifted to a greater proportion of lighter, higher quality products (from heavy fuel oil, bunker & marine fuels, to diesel and gasoline). The increased demand for lighter petroleum products made from heavier crude oil requires more complex refineries (the complexity of a refinery refers to its ability to process crude oil into value-added products) with higher processing capacity.



Source: Oil & Gas Journal, 2014

Process licensors keep improving new process technologies to meet this changing refining market and refineries have been introducing increasingly complex and expensive processes to gain higher yields of lower boiling products from the heavy feedstocks.

This alternative offers the greatest flexibility, but is limited by the constraint of strict complementarity of the new units with the rest of the existing plant. Other options consist in changing the operating conditions or using more efficient catalysis.

In addition to more complex operating conditions, processing tough feeds (heavy crudes, acid crudes, etc.) may cause assets integrity issues because of their composition. Most of these detrimental effects appear in the Crude Distillation Units (CDU and VDU).

Distillation Unit the Key Part of the Refinery

The distillation unit is the first working unit of crude oil fractionation in the refinery. It provides the raw material for the downstream units and is the key tool to produce gasoline, diesel, residue oil etc. from crude oil. Therefore, this unit's safe and steady

operation is directly related to the entire refinery production benefit.

For many years 'master units' such as FCC and HDC gained importance due to their technological complexity and challenging operating conditions. However, the increasing portion of tough feed in the market, contributes to highlight the importance of the Distillation Unit. This key unit, as the true 'refinery front door', is directly subjected to technological issues related to crudes typology and for this reason special attention has to be dedicated to this part of the Refinery.

Tougher feeds contain contaminants like inorganic salts, clays/ fine solids, and naphthenic acids, often at higher concentrations than light crudes because of their higher viscosity and density. Due to the challenging physical properties and higher concentration of these contaminants, processing these feeds can cause technological issues, mainly in terms of equipment integrity.

All these issues have been encountered and extensively reported by the oil community through a multitude of articles dealing with both typical cases of damaging (ex. CDU column overhead) and new-generation cases (e.g. VDU high temperature zone).

For example, high acid crude oils can cause corrosion in the atmospheric and vacuum distillation units. In addition, overhead corrosion is caused by the mineral salts, such as magnesium, and calcium chloride, which are hydrolyzed to produce volatile hydrochloric acid, creating severe corrosive conditions in the atmospheric overhead (OH Line, fin fans, exchangers, etc.).

Essential Coordination for Sustainable Solution

In response to these demanding conditions and potential detrimental effects, Refiners have to take preventive measures to ensure the complete management of their assets and enable the refinery to process these heavy feedstocks without serious deleterious effects on the equipment.

The corrosive nature of Oil reflecting its 'acidity' is typically assessed from its sulfur content and/or its Total Acid Number (TAN). Therefore, to protect their assets, most of refiners avoid to process feeds for which the value of these parameters is considered too high (standard, more or less conservative references are TAN$<$0.5 mg KOH/gr and S$>$ 0.3%wt)

However, on one side the oil community agrees to state that these parameters are not sufficient to establish the overall corrosive potential of a given oil and on the other refiners are definitely tempted to process the mentioned opportunity crudes to increase their profits.

Therefore there is a proven need for establishing the real crude inherent corrosiveness through predictive models based on experimental data. This need is even emphasized by the fact that refiners include dozens of different crudes in their slates, sometimes going beyond 40 different typologies.

Since to date, the appreciation of traded oils is based upon their physical and chemical properties on one hand, and their acidity on the other; the inherent corrosiveness is definitely one of the key parameters which shall be taken into account in the oil supply/ blending strategy.

In this framework, developing programs for a detailed and immediate feedstock inherent corrosiveness assessment is considered an essential step for refiners to determine the quality of a crude oil / blend very quickly. In doing so, the different crudes could be evaluated appropriately and management of the crude processing scheduled meticulously.

This can be achieved by corrosion testing campaigns of crude/blends/cuts at different velocities and temperatures in order to qualify their corrosiveness and anticipate the monitoring and mitigation strategies prior to their processing.

To ensure safe processing of opportunity crudes, several measures should be implemented. First of all, based on the fact that the environment to be controlled is dynamic and variable, the implementation of an enhanced on-line monitoring program, shall be considered to monitor real time integrity of assets.

However, this approach, being not self-sufficient, has to be combined with independent studies by a team of experienced professionals, providing essential technical expertise and support. In this way, the following topics will be properly addressed:

- Full comprehension of degradation phenomena
- Identification of the most critical zones where the surveillance shall be increased by instrumentation
- Cross-checking of the on-line measurements with results obtained by predictive models
- Centralization of the information for all equipment
- Obtaining a global and crosswise vision of the unit or the entire site
- Elaboration of a Central document in which all the information concerning the integrity is recorded, linked and updated as founding information for Advanced Assets Management

This approach allows monitoring the effect of different processed feeds and, in case of confirmed damages, taking dedicated mitigation measures to reduce their impact.

Conclusions

Over the past four decades, the refining industry has been challenged by changing feedstock and product slates. In the near future, the refining industry need to become increasingly flexible to process ever more various and tougher feeds. The main technological progress shall be directed to on line monitoring methods to manage the adverse effects of processed crude oils on assets integrity.

In addition to taking preventative measures to enable the refinery to process these evolving feedstocks without serious deleterious effects on the equipment used, refiners will need to develop programs for detailed and immediate assessment of their inherent corrosiveness so that they can determine the quality of a crude oil very quickly and anticipate correct management of crude oil scheduling.

The Oil Market repositories are changing and crude oils that are today called "opportunity" crudes could quickly become the new standards of a changing market in the near future. The number of refiners who have recognized this on-going mutation is increasing thereby injecting new momentum in procurement methods and in the management of their Refining tools!!!

"No degree of dullness can safeguard a work against the determination of critics to find it fascinating."

~ Harold Rosenberg

"Stay focused and stay determined. Don't look to anyone else to be your determination - have self-determination. It will take you very far."

~ Justice Smith

Intricacies of Sea Clearance - A Case Study

Trideeb Saikia
Chief Manager (V)
Oil India Limited

Kolkata is the earliest major port in India. But the anecdotal history of the present day Kolkata Port started with the grant of trading rights to the British Settlement in Eastern India by the Mughal Emperor, Aurangzeb.

In due course of time, the power to rule India shifted from the East India Company to the British Crown. Subsequently, the affairs of the Port were brought under the administrative control of the Government with the appointment of a Port Commission in 1870.

The Commissioners for the Port of Kolkata continued to manage the port till January 1975 when Major Port Trusts Act, 1963, came into force.

Kolkata Port is the only riverine Major Port in India, situated 232 KMs up-stream from the Sandheads, having arguably the longest navigational channel amongst the Major Ports of India and its navigational channel is one of the longest in the world.

Described by the then Lt. Governor of Bengal in 1877 as one of the best and most convenient ports out of Europe, Kolkata Port is known for its professionalism and commitment to perfectionism.

Despite being situated about 203 KMs away from the sea, Kolkata Port, by far, remains the best choice for eastern gateway to this country. One can still have a view of the remnants of erstwhile British legacy of the port. It is very interesting to take note of the fact that the Britishers laid railway tracks (still visible) upto the dock to dispatch the goods straight from the vessel with an intention to cut both the transportation cost and time. It has two dock systems - Kolkata Dock System at Kolkata and Haldia Dock Complex at Haldia.

Kolkata Dock System (KDS)

It is situated on the left bank of the Hooghly River about 203 KM upstream from the sea. The system consists of:

a) Kidderpore Docks (K.P. Docks): 18 Berths, 6 Buoys/ Moorings and 3 Dry Docks

b) Netaji Subhas Docks (N.S. Docks): 10 Berths, 2 Buoys/ Moorings and 2 Dry Docks

c) Budge Budge River Moorings: 6 Petroleum Wharves

d) Anchorages: Diamond Harbour, Saugor Road, Sandheads

Apart from this, there are around 80 major riverine jetties, and many minor jetties, and a large number of ship breaking berths.

Dry Dock is another marvel constructed by the Britishers, at the port. A dry dock is a narrow basin below the ground level that can be flooded to allow a load to be floated in, and then drained out to allow that load to come to rest on a dry platform at the bottom. Dry docks are used for construction, maintenance and repair of ships/ boats/ water craft.

Netaji Subhas Docks (NSD)

On 23rd February' 2016, I was at NSD, witnessing off-loading of 02 (two) 2000HP diesel-electric Oil rigs along with 9.?? casing tubulars from the mighty ship, called 'TIMU', which docked at the river port 02 (two) days back. The ship or vessel, loaded the rigs in the form of 262 packages in total at Tianjin Sea Port, China as well as casing tubulars at Shanghai Sea Port, China. The ultimate destination of these two rigs and the casing tubulars is Duliajan. It is very much prudent to mention here that both the rigs having top drive system (TDS) and advanced instrumentation system, were bought by OIL from M/s China Petroleum Technology & Development Corporation (CPTDC) - a wholly owned subsidiary of China National Petroleum Corporation (CNPC). With the commissioning of these new rigs, the total rig count at FHQ will be 18 (10+2 = 12 in-house rigs & 6 Charter Hired rigs).

Taking along the above background, I will however restrict myself to Sea clearance only, skipping details of official paper works, under the scope of today's discussion.

Sea Clearance

Perhaps very few Oilindians are fortunate enough to know the intricacies of sea clearance; these personnel are none other than those who worked/ are working in the Shipping section of Calcutta Branch, OIL.

Sea clearance jobs are very complex in nature involving customs and port authority. Many a time, when the import goods do not reach destinations in time, a hue and cry is raised by USERS. This is obvious; because any delay in receiving materials, will have its impact on Company's operations, which may incur heavy loss to the Company. So, one cannot afford to create damage to the Company's exchequer. However, despite discharging the best duties with due diligence, sometimes, our Shipping personnel have to face unusual situations like non-availability or inadequate supply of trucks/trailers, missing of cargo, mis-matching of cargos with packing list etc. and eventually all these factors cascade down to delay in road transportation for onward journey to destinations.

The following case study with regard to the off-loading of 2000HP rigs, as I mentioned earlier, will surely give a fair idea about the intricacies of sea clearance:

Cargos are generally categorised as under:

a) Break Bulk

b) LCL (less than container load)

c) FCL (full container load)

d) ODC (odd dimensional cargo)

To understand cargo shipment, firstly we need to know the meaning of each of the above cargo terminologies - *Break Bulk Cargo* refers to goods that are loaded individually, and not in intermodal containers, in ship; LCL Cargo refers to shipment that is not large enough to fill a standard cargo container; FCL Cargo refers to shipment that is loaded in a standard container and unloaded under the risk and account of one shipper and only one consignee; ODC refers to odd-shaped or the dimension exceeds the size shown in the following table (Fig. 1). In the case of 2000HP rig, the category of cargo was Break Bulk Cargo.

Cargo Dimension/ Container Type	Length	Width	Height
20'	5.5 m	2 m	2 m
40'	11.5 m	2 m	1.9 m

*(Fig. 1) * ODC needs special container for shipment*

Now, on receipt of order acceptance from the shipper (M/s CPTDC) and PBG (performance bank guarantee) followed with PBG authenticity confirmation by accounts, the Shipping Sectional Head applied for establishment of LC (letter of credit) to Bank. After LC establishment, Shipping Sectional Head communicated the LC details to the shipper through email.

As per the terms of the order with shipment on FOB (free on board) basis, the shipper intimated OIL about readiness of material along with a copy of invoice and packing list to get the details of Freight Forwarder (FF). On receipt of this intimation, Shipping Sectional Head arranged to finalise the Freight Forwarder for the shipment. Normally, Freight Forwarder confirmation is done based on the following:

a) For Break-bulk cargo, Freight Forwarder is decided by TRANSCHART against request from Materials Department Duliajan. TRANSCHART is the centralized ship chartering wing of the Shipping Ministry, GOI.

b) For FCL cargo, Freight Forwarder is engaged by Shipping Sectional Head based on competitive rates obtained from probable sources.

c) For LCL cargo, Freight Forwarder is engaged by Shipping Sectional Head on the basis of facilities available at the load port and the prevailing rate.

A Freight Forwarder is a person or company that organizes shipments for individuals or companies like OIL to get goods from the manufacturer/supplier.

After finalisation of the Freight Forwarder, the details of the Freight Forwarder were intimated to the shipper by Shipping Sectional Head to effect the shipment. After the shipment of the rigs, the shipper submitted the original shipping documents to the bank of OIL through beneficiary's (CPTDC) bank. On receipt of proper documents as stipulated in the LC, the bank released the payment (80% now - Rest 20% will be paid after commissioning of the rigs) to

the shipper and sent the original shipping documents along with the debit note to Shipping Office of OIL, Calcutta Branch. The payment was made through NOSTRO ACCOUNT of OIL from Corporate office, Noida (A Nostro Account is a bank account held in a foreign country by a domestic bank, denominated in the currency of that country; for any payment of USD 10,00000 and above, Shipping office of OIL requests Corporate office to make payment through Nostro Account).

Meanwhile, the vessel in-charge filed Import General Manifest (IMG), containing information like vessel name, vessel feeder (owner's name), expected date of arrival (ETA) etc., to Customs. The customs, in turn generated the IGM No. in e-portal called ICEGATE (www.icegate.gov.in).

On receipt of IGM, Port Authority arranged for a planning meeting with all the consignees of the voyage (The rigs and casing tubulars were loaded in the vessel along with consignments of other companies) and steamer agent, to plan about discharge and removal of cargoes from the vessel. It is to be noted here that ETA as mentioned in IGM gets updated as days progress and the concerned information is obtained through a news journal called 'Shipping Times', being published on every Monday, Wednesday and Friday in Kolkata. Accordingly, the concerned officer of Sea Section obtained land on lease from Port Authority for the storage of the cargos till final delivery to destination. It needs to be mentioned here that in case of port congestion, the cargos may be removed to Port Licence Yard (being held by OIL) or Customs bonded area; Handling of the cargos for removal to storage plot (leased land, in this case) and final delivery is carried out by the Stevedore of the vessel (A stevedore is a firm or individual who is engaged for loading or unloading of a vessel); After discharge of cargo the clearing group of Sea Section will arrange for landing payment by debiting OIL's account with KoPT (Kolkata Port Trust).

Constraints

Hook Point Delivery: It means one has to take delivery of the loads from the hook of the ship crane itself. The free-charge period of such a system is ONLY 3 (three) days w.e.f Last Landing Date (LLD); beyond this grace period, we have to pay hefty amount as demurrage [to be levied on Import cargo (other than containerised cargo)] to the port authority. LLD is a date considered from the date and time when the vessel completes her import discharge.

So, one can understand how much effort will have to put in by the clearance group of Shipping Section in order to prevent plausible loss to OIL.

Plot Area Demurrage: In the absence of port licensed land/area, if cargo (non-hazardous) is stored on any plot area under the port complex and port equipment is used for delivery, then the demurrage-free period for such a system is ONLY 6 (six) days w.e.f Last Landing Date (LLD); beyond this grace period, it is chargeable which is of huge amount. However, as OIL booked for a plot on lease already, this problem will not crop up. The validity of licensed plot is for 30 (thirty) days, extendable by another 30 (thirty) days at the same rate. Any extension beyond two consecutive 30-day periods, will incur double the rate for the next 30 days.

As most of the 262 packages of the rigs are stored on the licensed plot area, therefore efforts are going on the part of the clearance group to dispatch the same as soon as possible.

Inadequate supply of trucks: About 170 trucks were calculated to be deployed by the transporter (TP) under contract with OIL, for dispatching the 262 packages weighing 2700MT approximately; however, inadequate supply of trucks at the port is affecting the dispatching process to a great extent. Of course, it is understandable that provision of 170 trucks is a herculean task in practical sense.

Epilogue

From the above discussion, it is seen that Sea Clearance involves a vast range of interdependent activities. As such, the entire gamut of Sea Clearance is so tricky that any default in a particular activity, may lead to huge cost involvement and jeopardise the whole scenario, which is dynamic in nature. Therefore, a very meticulous planning that includes contingency plan too and a dedicated team are warranted for execution of the clearance in the best possible way giving no room at all for cost and time overrun. The role of the team leader (Shipping Sectional Head) is so important in the sense that, not only he has to take decision fast in the event of any eventuality but also to lead the team from the front.

Risk Management - the Foresight and the Hindsight!

Capt. D. C. Sekhar
Director
AlphaMERS Pvt. Ltd.

I remember an unverified but interesting story. A safety inspector boarded an oil platform to confer a safety award to a platform operator for a two year record of Nil LTI (Lost time injury). He could not return from the platform the same day and had to stay over. He was given the upper bunk in one of the cabins. In the dead of the night the fire alarm rang, which later turned out to be a false alarm. The inspector stepped off the bunk, forgetting he was on the upper bunk. Half asleep, he fell and hurt his back badly on the corner of the table and had to be airlifted as medical emergency. The safety inspector thus brought the two year incident free run of the platform to an end. A freak incident like that can happen anywhere. How far do you go to stop such incidents? Wire mesh on upper bunks? Not allow upper bunks at all?

Another incident I remember under my command when a crew member connecting the shore arm on the manifold of an oil tanker fell on the steel deck and injured his back. Though he was back on his feet in a few hours, the safety inspectors visited me to discuss the incident. The safety inspectors saw the manifold site and smiled in understanding. We cannot put up railings on the manifold as we have to move the massive loading arms around, over this area to align it. This was a risk we will live with. We agreed to remind the crew member every time to watch behind himself before he took a step backwards.

No one plans to be unsafe. There is no one who is dares to die in an accident. Even a drunk, driving his car insists, he can drive safely, never says he is ready to die. This will to live is a great incentive, and leverage to make the system safer. You cannot enforce safety procedures on suicide squads. But there are many who will lose their life and limbs purely due to ignorance, impairment or diluted safety standards. The challenge is to effectively communicate to him how ignorant or vulnerable, he is right now.

Safety harness is required to work at a height, who will not agree? But at what height…. suddenly different answers will appear. Everyone wants to be safe, but what level is safe? If we keep aside industry standard and seek individual opinion, the answer will vary widely. People have told me how someone fell off the bed in his sleep and broke his arm. Hence, why not safety harness when sleeping? For every incremental safety standard or procedure, there is a trade off in terms of functionality, process speed or an additional financial cost. The cost benefit analysis (CBA) is a good exercise to think through this trade off. Industry standards is the collective wisdom on this trade off, evolved across geographies and over many decades. The regulatory minimum and insurance helps organizations meet there own risk management needs with a straight face, without debating its CBA arguments in public, especially those debating serious injury risks and budgets for preventive gear.

There is a big cultural component that brings people from various nationalities to a common regulatory environment. There are people in Mumbai who cross the railway track everyday through their working lives. Such a person believes statistics is on his side and crossing railway tracks is a safe thing to do. To win an argument with him and coax him to use pedestrian over bridge is difficult. It is a cultural clash of safety standards. Change has to be enforced as per the management's policy.

Undersigned had a firm belief that when shop floor staff violates a safety standard only twice, it gives birth to a line of thought 'I have done that, there is no problem, and it is quite safe'. The organization must come down with a heavy hand on any such

violations of prescribed safety standard, because the individual concerned does not have the collective experience of the industry or the wisdom gained over decades that went into the SOP.

One example is a boat being overloaded. The humble conductor of the boat is tempted to 'allow' few more persons than is permitted. That seems ok and he is ready to allow 'a couple of more people' now. He does not know when he is loading the straw that will break the camel's back.

Every time a safety standard is violated, it does not lead to an accident. We cannot exclaim - 'I told you so!'. A ship captain has to enforce standards on his vessel and decide on matters outside personal safety where various combinations of factors make up each scenario. Where to lay the bar for safety margin cannot be laid down in SOPs for hundreds of combinations of risks. It is up to the captain to consider each unique scenario and draw this line. It is difficult to prove that so much safety margin was necessary, no more and no less. The captain must appropriate to himself, this elbow room to decide as per his considered judgment. Authority and responsibility always go together.

The decision maker decides on situational information at the time of decision. Occasionally, not always, one had to justify the action or the safety margin chosen, to those with wisdom in hindsight. At the risk of being proven wrong, one takes a call one way or the other now, knowing fully well that history will decide tomorrow, if you were right or wrong. Your action taken today to avoid the predicted storm path, will be judged by people tomorrow, who know where the storm finally re-curved.

Any risk assessment has the probability and impact arguments. The probability numbers are influenced by historical data. Industry which will resist an enhanced safety measure in normal times will soften up and be ready for the change in the immediate aftermath of a high profile accident. Major design changes on ships have happened after major incidents, be it double hull of tankers or securing the ramp of a Ro Ro ship.

When an offshore facility is built to withstand a once in a hundred year storm, there is no reason why a once in a five hundred year storm will not happen tomorrow, even if it has happened just a few years back. It is much like the doctor telling the patient - The bad news is that only one in ten survives your particular illness. The good news is, last nine who came here died and statistically you have a wonderful chance of survival.

There are many similarities and dissimilarities between safety risk management and security risk management. Managing safety risks is comparatively easier as, no one is keenly working towards defeating your purpose. Perhaps you are dealing with human ignorance or carelessness, not integrity issues.

However the need of security management system itself emanates from human integrity issues. If there was none, I can leave my door open, my credit cards on the table and not remember any passwords. In security risk management there are two persons constantly engaged in finding holes in the wall, and one rushing to exploit it while another one rushes to plug it. The intruder and the security manager are constantly outwitting each other. Historical data is of less relevance in such evolving scenarios. The resource of the organization is a big empowerment for the security manager, but the lone wolf intruder gets to decide, when he will strike and test the system.

Security is an area where small resources of the intruder impose high costs on the establishment to protect itself. Threat calls to cities and airlines, is a typical example. A well thought out strategy and a cost benefit analysis will give best results for money spent, knowing fully well that you are not eliminating the risk, but managing it.

We must separate the security and perimeter access control functions in security functions. In an offshore asset like a wind farm or a platform, the private facility can monitor the area and the perimeter. However, the security or the fire power to enforce the law of the state can only be deployed by the state's armed forces.

The security of Navigation, piracy and such issues rarely boil down to a war of strength in the waters. Dealing with a couple of pirates with machine on old boats, does not require a warship, it is policing. The scope is made huge by having to police the vast expanse of shipping lanes, against such boats that could appear anywhere and at any time.

Unfortunately these pirate boats managed to force international shipping to deviate from shortest route, move in convoys, be protected by warships, employ expensive guards and outfit the vessels with new gadgets. That is a huge economic cost imposed by a few pirates.

The ISPS (International Ships and Ports Security code) laid down a platform to manage the maritime security. This code essentially laid down the security protocol between ships of hundred nationalities when visiting hundreds of ports around the world. It is just that, a protocol. The effectiveness of the code will depend on how much strategic thought has gone into the security planning for each port, which is each port state's responsibility.

Mock drills are a good time to check the equipment functioning and familiarity of people to the gear. However, in the author's opinion little is done to prepare the responders psychologically for the realistic scenario. Holding a fire hose in a drill is different from real life fire when a lot of smoke from a small fire can hugely impair situational awareness. This is besides the fear for life that sets on a vessel or a platform scenario, impairing the responders from doing their best. Risk is mitigated by a sound preventive culture and a robust response capability. While the former enjoys cross industry knowledge sharing, the latter is usually culture specific to an organization.

Risk management in financial sectors is well developed while in the industry there is gap between qualitative risk managers and the 'risk management experts'. Converting the qualitative risk elements, assessing snowballing or domino effect, combination of independent risks, all of these into numbers that is understood by project appraisers, regulators and insurance companies requires more expertise, to say the least.

Today's world, is replacing experience with SOPs. Nothing wrong with that per se. This brings few risks caused by lack of experience. One story that came in handy to highlight job familiarization went like this.

Jack a one eyed pirate was telling his grandchildren the youthful exploits of the piracy world. When he was In his 20s, he boarded ships with just 5 of his men and robbed ships with 50 crew on them. It went fine until he lost one of his legs in the fight. He got himself a metal leg the next day. Life went on, though a bit slower. He continued his exploits, until at the age of 35, in one of the bloody battles, he lost his arm. He promptly got himself a metal hook in place of his hand.

The kids who were listening to the story went very silent, staring at Grandpa's metal hand and leg. Finally one of the kids urged him to go on, wanting to know how Jack lost his eye. Jack continued, the tough man's voice was soft now and his eyes moist. 'That was the saddest day of my life, believe me. The first day with the metal hook, I forgot and scratched my eye'. *Proper management of change and job familiarization routines can never be taken lightly.*

(AlphaMERS Ltd. is a company working in developing new technology in marine environment and offshore energy.)

> ***"The spirit and determination of the people to chart their own destiny is the greatest power for good in human affairs."***
>
> ***~ Matt Blunt***

Plasma Pulse Technology for Enhanced Oil Recovery

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The era of "easy oil" is almost over. The emerging technologies for enhancing the recovery are the only ways to improve the efficiency of initial recoverable reserves. The present world average of oil recovery is between 20 and 40 percent. In this case, Enhanced Oil Recovery (EOR) techniques are considered a bright spot in a sagging oil reserves scenario. Worldwide, EOR is estimated to produce 120 to 130 million tons of oil annually. According to forecasts by the International Energy Agency, projects involving latest EOR methods will unlock over 300 million tons of oil annually by 2030.

Various EOR methods have been categorized into four major groups: thermal, chemical, gas injection and microbial methods. The latest advancements in this area include cyclic superheated steam stimulation, solar generated steam injection, radiofrequency/microwaves, ultrasonic waves and foam assisted CO2 injection. Steam injection based processes in heavy oils and tar sands, and miscible carbon dioxide for light oil are found to be successful. There is urgent need for extensive research in EOR technology for producing over two-thirds of the recoverable reserves of oil still unrecovered. This article critically analyses Plasma Pulse Technology (PPT), which are tested in the fields and considered promising for their future applications.

Plasma Pulse Technology is a new technology developed since 2002. The technology mainly originated in the Russian Federation at the St. Petersburg State Mining University with funding and assistance from the Skolkovo (flourishing company responsible for developing new technologies for clean and environmental friendly oil recovery). As if 2013, Plasma Pulse Technology is the newest EOR method which is being used in USA.

What is Plasma?

There is four fundamental states of matter solid, liquid, gas and plasma. Plasma is a state matter which consists of free electrons and positively charged particles called cation, mixed together. Plasma neither a shape or a consistent volume in other words plasma can easily flow and take another container's shape and then expand and redistribute itself for the evenly feel of the container. Although the properties of plasma are similar to those of gases, plasma and gases are not the same thing. In plasma electrons are released from their orbits around the nucleus, creating a soup of free electrons and nuclei. Since, these charged particles are loose; plasma can easily conduct electricity and both produces in response of magnetic field. Plasma is created either when the gas is exposed to high temperature or high velocity is passing through it. High temperature or high voltage electricity makes the atoms in the gas travel very quickly and collide so violently with another, that electrons are knocked from their orbits. Because the way they are created plasma is sometimes called ionized gases.

How it Works?

Before, going with this technique, the basic features and physical properties of all wells within the reservoir systems should be known in detail. The geological structure of rock forming reservoir is not uniform. Using primary and secondary recovery techniques already about 25-30% of oil is recovered. The remaining oil-in-place is concentrated in zones with poor drainage i.e. less connectivity with the flowing formations. According, to its acoustic properties, a reservoir is an array of vibrating

systems. It was ascertained that if the periodic pulse influence the poor drainage layer system, it can result in parametric resident in the flowing formation.

The basic factor determining the permeability and mobility index in the area which are common for all wells are as follows: (i) Congestion of the well drainage area by the solid particles suspended in the liquids used for drilling the wells and its completion; (ii) Congestion by the drill mud; (iii) Congestion of the wells by the salts and paraffin. Plasma Pulse Tool is able to clear the clogging area and increase the permeability of the reservoir at the same time.

The treatment starts by lowering the measuring device to determine the following hydrostatic parameters: (i) pressure; (ii) liquid flow; (iii) temperature; (iv) determination of working perforation intervals. The first parameter can be measured by the use of pressure sensors attached to the measuring tools. The second parameter can be determined by the help of Drill Stem Testing (DST) data, or by the help of pressure build up test data. The third parameter is found by the help of a sophisticated thermometer, which can bear high temperature and pressure. The last parameter can be calculated using a production logging technique called radioactive tracer logging method. Besides this method, there are other ways also to find the fourth parameter. Now after the data is calculated/ measured, plasma pools generator is lowered into position at the prescribed depths to match the perforations. The control module at the surface is used to generate a series of plasma pulses which takes milliseconds to eliminate the clogging within the drainage area and deliver compression wave, resulting in the rise of temperature in the plasma channel. The plasma heating causes increase in pressure in the channel as a result of which the channel extends. At the initial stage of the discharge, the pressure in the channel carries on increasing, despite the continued extension of the channel. In the course of the discharge, the pressure in the channel reaches its maximum. After the energy is no longer generated, the extension still goes on, due to the pressure which is higher as compared to the hydrostatic pressure. Since of the fact that short but powerful impulse accompanied by pressure pulsation, is initiated in a confined space, the elastic shock waves goes through the perforation holes into the reservoir. The first series of pulses clean the perforation from clogging; the next pulses propagate into the reservoir, which cleans the natural fractures and capillaries existing in the reservoir and creates an abnormal web of micro fractures in the formation. As a result, permeability of the perforation zone and drainage area increases.In short the Plasma Pulse Treatment produces a high energy plasma arc that generates a tremendous amount of heat for a fraction of a second and the subsequent hydraulic impulse wave created removes any clogged sedimentation from the perforation zone, i.e. scale, fines, drilling mud, etc. The series of impulse waves/ vibrations also penetrate deep into the reservoir causing nano-fractures in the matrix and increases the permeability. Oil can then flow more easily from the reservoir into the well and be pumped to the surface. The end result is an increase in sustained production which can last for as long as a year

Effect on Environment

In the study of the environmental aspects of oil recovery, there are many subject areas that are of concern for each project. Some of them are:

(i) Atmospheric Emission- the components of concern are dust, engine exhaust, off-well gases, SO2, CO2, NOX, H2S and hydrocarbons. In case of plasma pulse technology, there is a chance that dust, or engine exhaust may pollute the environment but not as much compared to other enhanced oil recovery (EOR) methods.

(ii) Water Use- In steam injection processes and micellar-polymer flooding lots of water is required, which is not any use after it recovered from the well and cannot be dumped in any place, since, it contains harmful substances which should harm the environment. Since, plasma pulse technology only uses plasma; this type of environmental threat is also not there.

(iii) Solid Wastes- The most common solid wastes generated by enhanced oil recovery (EOR) method are ash and sludge.

Like these environmental effects, there are also many other effects caused the EOR methods. But, plasma pulse technology (PPT) is considered the most friendly with environment. In plasma pulse technology, oil recovery is increased by the help of down hole equipments. Most of the operations conducted by digital controller on surface, so, chance of noise pollution is less. This method is very clean because it does not use any chemicals and there are not any possibilities for the creation of solid waste. It also requires moderate power supply. Since, it use velocities of the wave, there is less chance for damaging the well.

Results of Plasma Pulse Treatment

		Before PPT Treatment		After PPT Treatment			
Oil Field	**Depth (ft)**	**Oil BPD**	**% Water-cut**	**Oil BPD**	**% Water-cut**	**Oil, BPD Increase**	**% Increase**
Hvojnoe	9364	0	----	119.20	15	119.2	100
Shkapovskoe	N/A	2.24	43	17.88	45	15.6	700
Fedorovskoe	N/A	5.22	12.5	19.37	18.7	14.2	271
Shkapovskoe	N/A	5.96	97	12.67	96.6	6.7	113
Vasilovskoe	N/A	5.96	20	38.00	21.5	32.0	538
Pashninskoe	4756	6.71	79	14.90	61	8.2	122
Sovetskoe	5904	7.45	75	29.80	69	22.4	300
Djusushevskoe	11808	14.90	85	81.95	70	67.1	450
Krapivinskoe	9315	29.80	66	89.40	77	59.6	200
Severnoye	7052	33.53	2	88.66	2	55.1	164
Tevlinskoe	9184	43.96	74	104.30	39	60.3	137
Tajlakovskoe	10922	52.15	18	163.90	2	111.8	214
pervomajskoe	9610	201.15	20	305.45	20	104.3	52

Table: 1 Results from Oil Producing Fields of Russia

From each field about 62 producing well data are averaged to see the change. As you can see in the table before the plasma pulse treatment barrels of oil per day (BPD) is low, but once the PPT treatment is done the oil recovery rate increases drastically. Also, this method is cheaper than the other enhanced oil recovery method. Most of the wells in Russia start producing after treatment at mere rate of $10,000 or so. The personnel required to do the treatment is also low.

Conclusion

Plasma Pulse Technology works without any chemicals and therefore is deemed to be environmental friendly. PPT is created to clear the well drainage area of sedimentation clogging the perforation zone and increasing the reservoir permeability at the same time. It cost about a third times less than fracking and removes the need for drilling injection wells to deal with the waste. Indeed, Plasma Pulse Technology (PPT) is a weapon of sorts- one that could bridge the gap between oil and gas producers on one hand and environmentalists on other.

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'Cut'ting Edge in Midstream

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The recently inaugurated IOT Common User Terminal at Raipur is a first-of-its-kind Inland Petroleum Storage and Distribution Terminal in India. Here's why:

Way back in 1996, when IOT Infrastructure & Energy Services Ltd (IOT) was born, the concept of Independent terminalling was hardly known to the Indian oil & gas industry. India, then a net petroleum product importer, was largely using captive storage terminals (owned by Oil Companies) even for imports.

With the setting up of its first terminal at Navghar in 1998, IOT ushered in the concept of Independent terminalling into India. IOT, by virtue of being a pure service provider with no marketing interest demonstrated to the Industry the benefits of neutrality in services. At the same time, a new benchmark was created with respect to quality of services and Health, Safety Security & Environment (HSSE) standards, by leveraging its parent company, Oiltanking's wide knowledge base, expertise and vast experience of decades in this business.

Growing Need for Common User Terminals

Today, the oil industry in India has close to 300 terminals and depots, supplying petroleum products to every nook and corner of the country. However, one of the major issues faced by Oil Marketing Companies (OMCs) in the last few years has been the need to re-site various inland terminals due to non-compliance to new safety standards, rapid growth of population in cities / towns engulfing terminals and lack of space for expansion. The industry is also faced with the challenge of trimming their costs to maintain profitability in a deregulated market.

IOT has always believed that Independent terminals on common user basis would be the right solution to the aforesaid constraints faced by the Industry.

The CUT Advantage

The idea of Common User Terminal (CUT) at Raipur was mooted by IOT when Indian Oil Corporation (IOC) and Bharat Petroleum Corporation (BPC) were trying to re-site their ageing terminals in Chhatisgarh. It took some time for the concept to sink in and the benefits of such concept to be understood. The Common User Terminal in Raipur, apart from aiding in re-sitement brings the following compelling advantages to the industry:

- Optimization of storage and distribution costs due to economies of scale.
- Quicker implementation due to integrated EPC competencies of IOT.
- Single point responsibility (Build-Own-Operate) with IOT ensures efficient project management and continuity for smooth transition to Operations.
- Promise of High Operating standards and strict compliance to statutory norms by IOT.

- Increased reliability in operations.
- Long term contract provides stability and sustainability in services enabling Oil companies to focus on marketing and distribution.
- Insulation from IR related issues.

The Building Phase

The construction of this terminal, which began in late 2013, was not without its set of challenges, especially in terms of getting permits, which were eventually overcome. All major permits ranging from those given by the village panchayats to Labour licences were obtained, as was the approval for a rail track for the terminal's railway siding from the railways.

The existing synergies between IOT's Terminalling and EPC business was another reason for the quick implementation of the construction of this terminal.

IOT Anwesha (an IOT EPC business subsidiary, which specializes in tank and civil construction) was appointed as the EPC contractor and worked on constructing the terminal right from building the overground and underground tanks and rail sidings to the administration and control building as well as the Tank Truck gantries overcoming challenges such as:

- Working in summer where the temperature rose to around 45-47degree Celsius.
- Water logging during monsoon.
- Boundary Management .
- Managing workforce.
- Timely placing of materials & equipments
- Inculcating Safety Culture among workers and supervisors.

The IOT Anwesha team magnificently managed the project and was equally supported by the IOT team throughout the project's construction phase.

A World-Class Facility

The terminal, which was completed in record time of 26 months and inaugurated in January 2016, is one of India's most modern terminals. The setting up of this facility has given a huge fillip to the region which scores low on connectivity and development.

Built with a storage capacity of 192,520 KL, the terminal can handle four million KL of fuel annually. It has a total of 21 tanks, including 19 over-ground tanks to store Diesel, Kerosene, Petrol and Furnace Oil, and two underground tanks to store ethanol.

The supplies are received through rail and a cross-country pipeline connected to IOC's newly commissioned Paradip refinery. The terminal will be able to dispatch the petroleum products through a 14-bay truck loading gantry and a two spur railway siding to load two full rakes simultaneously.

IOT, which is a joint venture between IOC and Germany's Oiltanking, brings unparalleled expertise to the Indian terminalling scenario from its illustrious Indo-German pedigree. The Health Safety Security & Environment (HSSE) practices and facilities at the terminal are at par with the best globally. Many features at the terminal highlight its first of its kind concept:

- Built as per the latest benchmarked Global Standards
- Internal Floating Roof tanks for storing Motor Spirit (MS)
- Sprinkler Systems on Truck & Rail Gantries
- Fully Automated Rail Loading Gantry
- Bottom Loading of trucks for Motor Spirit (MS) and Diesel (HSD)
- Best-in-class Flow Meters at Truck Gantry
- Hydraulic Platforms in Truck and Rail Gantry

Apart from these, IOT's terminal team is committed towards protecting the environment through energy efficient features such as:

- LED Lights
- Variable Frequency Drive (VFD) for Pumps
- Rain Water Harvesting
- Vapour Recovery System for MS handling
- Energy Efficient Colour Schemes for Tanks
- Energy efficient Administration Building

Oiltanking's Operational Excellence, World-class technology and globally benchmarked safety standards have been adopted at the CUT Raipur. IOC, as a parent company has demonstrated their unwavering support to the project right from the beginning.

Through the building and operating of this terminal, IOT continues to lead the efforts towards bringing world class independent terminalling services in distribution of petroleum products in India.

HS-FCC for Propylene: Concept to Commercial Operation

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The Fluid Catalytic Cracking (FCC) process has undergone a long evolution of hardware and catalyst changes from bed cracking with amorphous catalyst to short contact time riser cracking with sophisticated zeolite catalyst systems. Improvements to the process have provided a wide degree of flexibility to selectively target production of distillates or gasoline or propylene from VGO and residue feeds thereby making the FCC the most widely used conversion process.

More generally, the objective of the process is to produce high valued products and increasingly this includes fuels and petrochemicals, including light olefins and aromatics. At present, over 30% of the worldwide propylene supply comes from FCC related processes (FCC, RFCC, DCC). Fluctuating product demand and price have caused most new project developers to demand product flexibility for long term profitability and process integration with petrochemical facilities for added synergy and cost savings.

In order to respond to these market demands, a new High Severity down flow FCC (HS-FCC™) process

Figure 1. HS-FCC Semi-Commercial Unit

has been developed by an alliance of Saudi Aramco, JX Nippon Oil & Energy (JX), King Fahd University of Petroleum and Minerals (KFUPM) culminating in a 3,000 BPD semi-commercial unit in operation since 2011 in Japan. The process provides high light olefin yield from a wide variety of feedstocks utilizing high severity reaction conditions, a novel down flow reaction system, and proprietary catalyst. HS-FCC™ is now available for license from a Global Alliance by Axens and Technip Stone & Webster Process Technology.

Features of HS-FCC

FCC utilizes acidic zeolite catalysts to crack heavy hydrocarbons into lighter fuels such as gasoline and distillate, and under more severe conditions into lighter olefins such as propylene and butylene (and to a lesser extent ethylene). Complex secondary reactions that can degrade the primary products to less valuable components should be limited to retain product selectivity and refinery profitability. For HS-FCC, the objective is to not only improve the selectivity for normal fuels production, but also to maximize the potential of light olefin and petrochemical production at high severity. HS-FCC provides a total system to maximize product selectivity and, in particular, propylene yield. Three key elements are required to attain this objective:

- Highly selective catalyst and additive system;
- Optimized reaction conditions; and
- Down flow, short contact time reaction system with rapid catalyst separation.

The balance of these elements and realization at commercial scale is the key to success.

Catalyst System

The catalytic cracking reaction pathways are complex, with primary formation of olefinic products and parallel bi-molecular hydrogen transfer reactions leading to paraffin formation and aromization of naphthenes. Managing the acid site density of the catalyst can suppress hydrogen transfer and isomerization reactions to maximize olefins production. When coupled with ZSM-5 pentasil cracking catalyst additives, the increased olefins in the gasoline cut can be selectively cracked to further increase the propylene yield.

The HS-FCC catalyst uses a high USY zeolite content system with very low acid site density formulated to minimize hydrogen transfer reactions for high olefin selectivity and low coke and gas selectivity. This catalyst has been shown to be more effective for propylene production when coupled with ZSM-5 additives as shown in Figure 2. Commercial catalysts and HS-FCC catalyst exhibited a similar trend in gasoline and propylene yield as a function of conversion (severity), but the customized HS-FCC catalyst was much more effective in 'feeding' the ZSM-5 additive with more olefins, and more accessible linear olefins, to produce more propylene.[1]

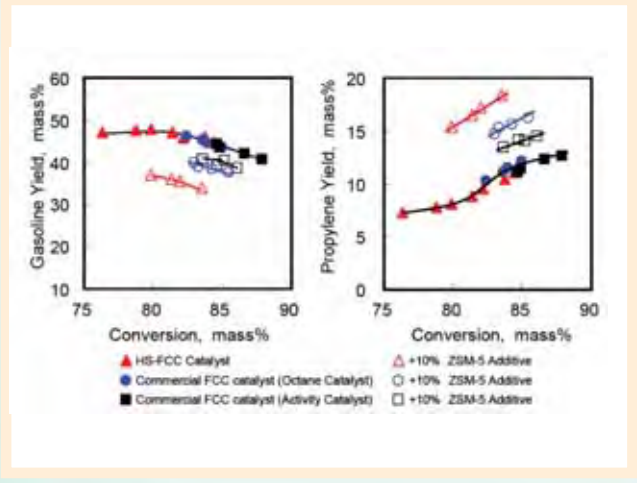


Figure 2: Proprietary catalyst boosts ZSM-5 effectiveness for more propylene

Optimized Reaction Conditions

When targeting maximum petrochemicals production, HS-FCC operates under more severe conditions than conventional FCC. The main reaction conditions applied and the advantages and

(1) Maghrabi, A., "HS-FCC Process for Maximized Propylene Production", 10th Annual Saudi-Japanese Symposium on Catalysis in Petroleum Refining and Petrochemicals, Dhahran, 2000.

challenges presented are summarized below:

	Advantages	Challenges
High Temperature	High conversion & olefins selectivity	Increased thermal cracking, product degradation
Short Contact Time	Reduced secondary reactions & thermal cracking	Reduced conversion, rapid mixing and separation required
High Catalyst / Oil	Increased catalytic cracking	Very high catalyst circulation, uniform flow, mixing, & separation

High reaction temperature coupled with short contact time increases the primary reactions towards olefins while limiting the unwanted secondary reactions of hydrogen transfer and thermal degradation. A consequence of the increased severity and short time is the need for higher catalyst circulation (Catalyst to Oil mass ratio or C/O) to provide the required heat to the reactor and sufficient catalyst activity to achieve high conversion at short contact time. The range of operating conditions for a conventional FCC and HS-FCC are summarized in Table 1.

	FCC	HS-FCC
Reaction T, C	500-550	550 - 650
Contact Time, s	2 - 5	0.5 - 1.0
Catalyst / Oil, wt/wt	5 - 8	20 - 40
Reactor Flow	Up Flow	Down Flow

Table 1 - Typical operating conditions for FCC and HS-FCC

Down Flow Reaction (DFR) System

The specific reaction conditions with very high C/O result in certain challenges in a conventional up flow FCC riser reactor system where the catalyst required for the reaction is lifted up the reactor pipe or riser by the vaporized and cracked hydrocarbon feed. In up flow fluid-solid systems, the solids or catalyst are conveyed upwards against the force of gravity by drag forces from the rising gases (hydrocarbons). As a result, all riser reactor systems have varying degrees of catalyst back-mixing and reflux along the walls, particularly in the feed injection or catalyst pickup zone at the bottom of the riser reactor. At very high C/O significant back-mixing is unavoidable. This problem is overcome in a down flow reactor (DFR) where both the catalyst and feed flow downwards together (Figure 3).

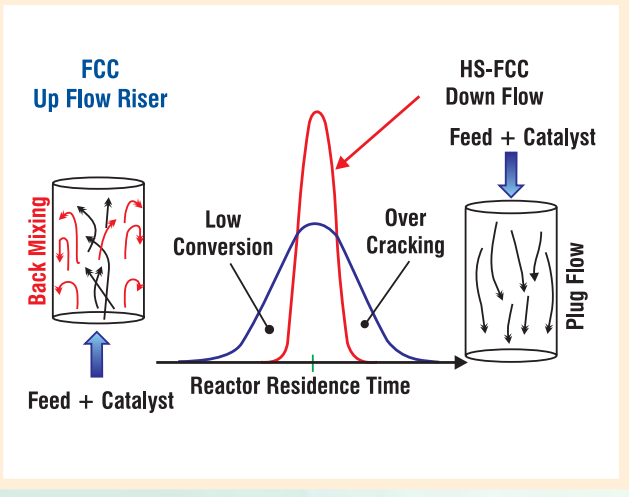


Figure 3: Up Flow vs Down Flow residence time profiles

Down flow fluid-solid reaction systems have been of increasing interest in recent years to achieve plug flow reaction conditions as summarized Cheng[2]. When plug flow conditions are achieved, more selective primary cracking results in greater selectivity. FCC pilot work demonstrating the effects of short contact time and down flow have been reported by Del Poso[3] and Abul-Hamayel[4] as shown in Figures 4 a-b. The general trend reported is that of greater gasoline selectivity at short contact time down flow with a maximum yield achieved at a higher conversion level. This effect is seen in Figure 4a where the maximum gasoline yield is about 5 wt% higher in the down flow system. When olefins are of interest, the more selective down flow reaction environment can produce substantially more light olefins (C2-C4) at the same gasoline yield compared to a conventional up flow system (Figure 4b).

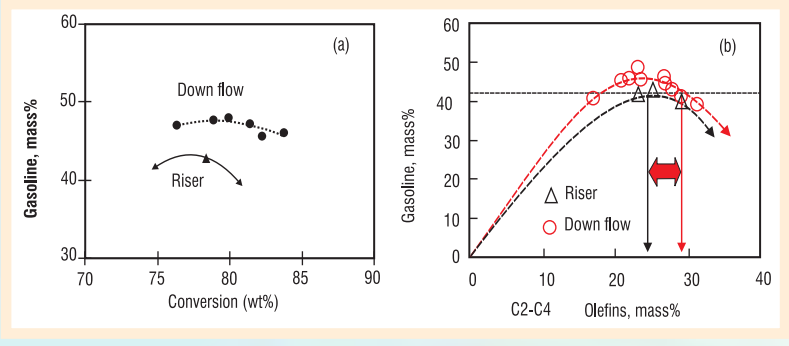


Figure 4: Selectivity benefits of a down flow reaction system (4)

Although the idea of controlled high severity, short contact time down flow reaction, has been considered for some time, achieving this successfully at commercial scale has been elusive. Extensive pilot work at the 0.1 BPD scale demonstrated the principle, catalyst system and operating conditions, but did not address how rapid mixing, reaction and efficient catalyst/gas separation can be achieved at large scale with a target residence time on the order of 0.5 sec. At commercial scale, equipment design for very short contact time with the mechanical integrity to withstand high velocity catalyst circulation in a coking environment requires extensive research, development, and demonstration.

R&D History

The challenges of developing this new technology required a systematic research program undertaken by JX, KFUPM & Saudi Aramco with support of Japan Cooperation Center, Petroleum (JCCP). Early pilot work by both JX and KFUPM in 1996-2000 demonstrated the benefits of high severity operation at controlled short contact time in down flow mode. Aramco became an active participant in the scale up effort to design a 30 BPD demonstration unit. JX conducted large scale, 30 BPD equivalent, cold flow testing of the catalyst circulation loop and reactor-separator equipment to validate the design of the demonstration unit.

The demonstration unit shown in Figure 5 was operated from 2003-2004 at the Aramco Ras Tanura refinery. Results from the demonstration unit validated the HS-FCC concept with good agreement between 0.1 BPD pilot results and 30 BPD demonstration as shown in Figure 6.[5, 6]

Figure 5: HS-FCC Demonstration unit

(2) *Cheng, Y., "Downer reactor: From fundamental study to industrial application", Powder Technology, 183, 2008.*
(3) *Del Poso, M., "Development of Ultra Selective Cracking Technology", 2nd IFP and S&W FCC Forum, The Woodlands, Texas, 1996.*
(4) *Abul-Hamayel, M.A., "Comparison of Downer and Riser Based Fluid Catalytic Cracking Process at High Severity Conditions: a Pilot Plant Study", Petroleum Science Technology, 22, 2004.*
(5) *Redhwi, H., "Meeting Olefins Demand in a Novel FCC Technology", 18th World Petroleum Congress, South Africa, 2005*
(6) *Okazaki, H., "High-severity Fluidized Catalytic Cracking (HS-FCC) - Go for Propylene!", 20th World Petroleum Congress, Doha, 2011.*

A low sulfur VGO was cracked at high severity in both the pilot and demo units using only the new HS-FCC catalyst without ZSM-5 additive. A very high propylene yield over 10% was obtained along with a very high octane gasoline.

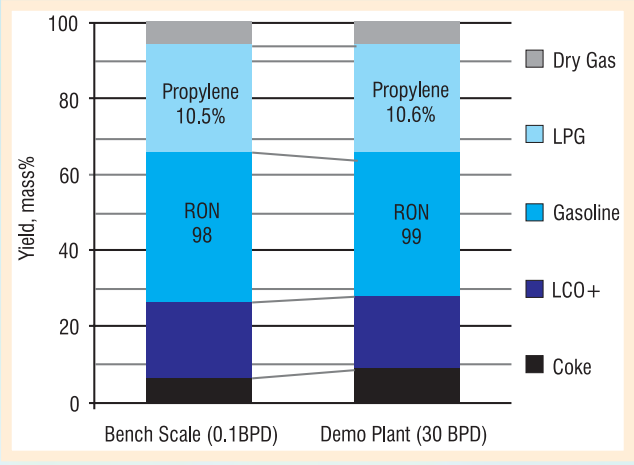


Figure 6: Bench scale vs demonstration scale results on low sulfur VGO at high severity without ZSM-5

Work immediately began on scale-up to a commercial unit. Important lessons were learned concerning equipment design and larger scale cold flow work was undertaken by JX in Japan at the 500 BPD equivalent scale to optimize feed injection zone and separator design - Figure 7. This work was coupled with CFD simulations to assist in larger scale equipment design[6].

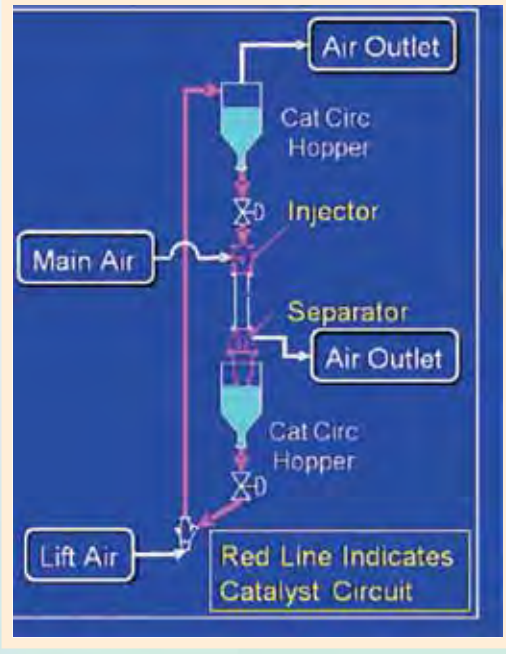


Figure 7: 500 BPD equivalent cold flow testing to scale-up and optimize reaction system

Semi-Commercial Unit

With the successful demonstration of the HS-FCC technology at the 30 BPD scale completed, it was time to look forward to scale-up to a full size commercial unit and plan for future licensing of the technology. Several FCC licensors were interviewed and evaluated before Axens and Technip Stone & Webster Process Technology were selected to assist in the design of a 3,000 BPD semi-commercial unit, plan for a larger commercial unit, and serve as exclusive licensor for the HS-FCC technology, relying on their extensive knowledge in FCC and RFCC design.

A complete 3,000 BPD HS-FCC unit with main fractionator, gas plant, and flue gas treatment was designed for the JX Mizushima refinery. Chiyoda Engineering performed the detailed engineering and construction of the plant (Figure 1) which was put on-stream in early 2011.

Performance trials are on-going to evaluate yields and product properties for widely different feeds and to demonstrate equipment reliability. Preliminary results showing yields for several blends of VGO, Hydro Cracker (HC) bottoms, DAO and Atmospheric Residue are shown in Table 2. Combined light olefins (C2-C4) yields of 30 to 40 wt% have been demonstrated with 15 to 19 wt% propylene and 4 wt% ethylene. The yield of butenes is similar to propylene and offers opportunities for greater petrochemical integration, including oligomerization and the FlexEne™ configuration for even higher propylene production[7]. These results are without the use of post separator quench injection which will improve olefin selectivity further. The catalyst system continues to be optimized for the various feeds.

	VGO + HC Btm	HDT VGO	VGO + DAO	VGO+ AR
Feed SG	0.845	0.860	0.891	0.921
Reactor T, °C	575	600	580	600
Conv, w%	93.2	88.1	83.0	90.6
Light Olefins, w%	39	40	31	33
C2=	4	4	3	5
C3=	**19**	**20**	**15**	**17**
C4=	16	16	13	11
C5-220 Gasoline, w%	35	34	34	31
RON	98.5	96.4	98.1	97.6

Table 2: Semi-Commercial Unit Performance

When viewed from a petrochemicals perspective, the ethylene produced becomes a significant boost to the economics. The gasoline also has value beyond fuels with an octane of 98-99, olefin content of 25 to 40 wt%, and 35 to 50 wt% aromatics.

With a controlled short contact time, high C/O and plug flow reaction system, HS-FCC is well adapted to be highly selective for both light and residue feed conversion to petrochemicals.

Throughout the program equipment evaluation, inspection and reliability data have been gathered to guide further development and scale-up to a fully commercial scale of at least 30,000 BPD and up to 120,000 BPD so far. In parallel to this work, CFD simulation of the Down Flow Reactor (DFR) and separator hydrodynamics are being combined with a kinetic model to analyze the results, validate the kinetic models, and enable accurate predictions at commercial scale for future feeds and reactor configurations.

(7) Ross, J., "(R)FCC Product Flexibility with FlexEne™", WRA Downstream Asia, Singapore, 2011 and www.axens.net website.

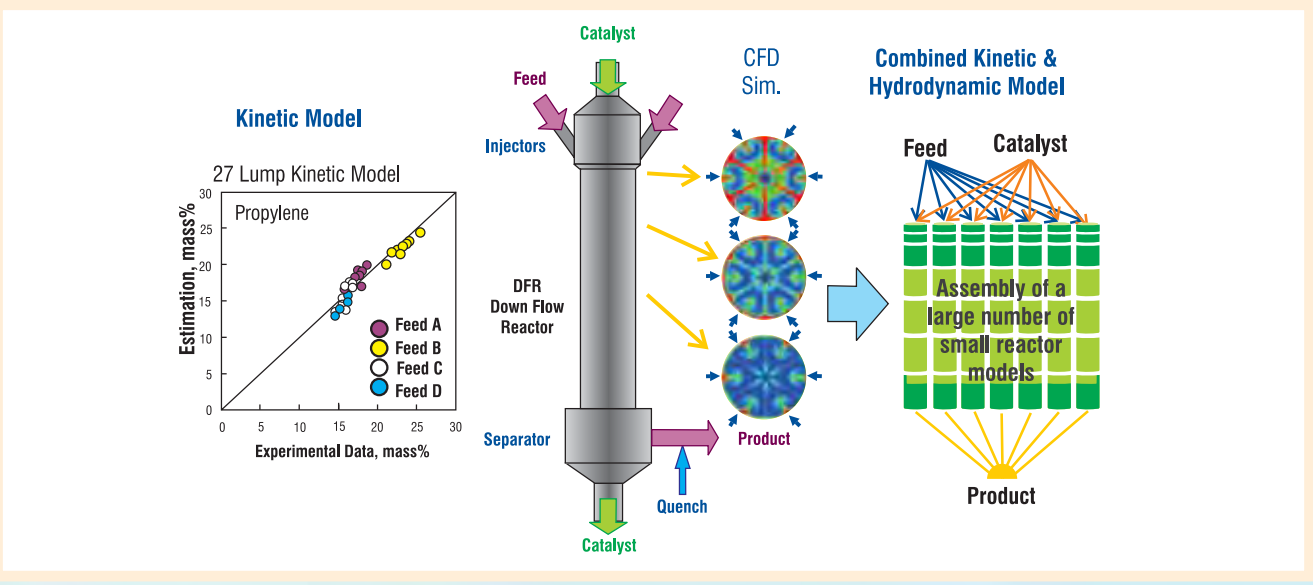


Figure 8: Combined kinetic and hydrodynamic modeling assists design and scale up

Upon completion of the testing program which concluded with a long-term run on residue feedstock, the semi-commercial unit operation was discontinued in 2014. Building on the successful demonstration of the HS-FCC technology benefits, two licenses have been awarded to Axens[8].

HS-FCC in the Family of Catalytic Cracking Processes

The HS-FCC process expands the operating window of catalytic cracking to encompass heavier feeds and greater propylene potential. Commercial processes for high propylene production from light distillate feeds and residue feeds include DCC[9], High Propylene FCC (HP FCC™), and Resid to Propylene (R2P™). More severe conditions for residue feeds to attain higher propylene yield has proven challenging in the past due to undesired secondary reactions. High severity combined with an optimized catalyst system and a controlled short contact time DFR reaction system, allows the new HS-FCC technology to provide selective conversion with lower fuel gas production and greater olefin and petrochemicals yield even with heavy residue feeds. Indeed, the selectivity of the system presents opportunities to crack a wide range of conventional and unconventional feedstocks.

The technology mapping by severity and feedstock is shown in Figure 9.

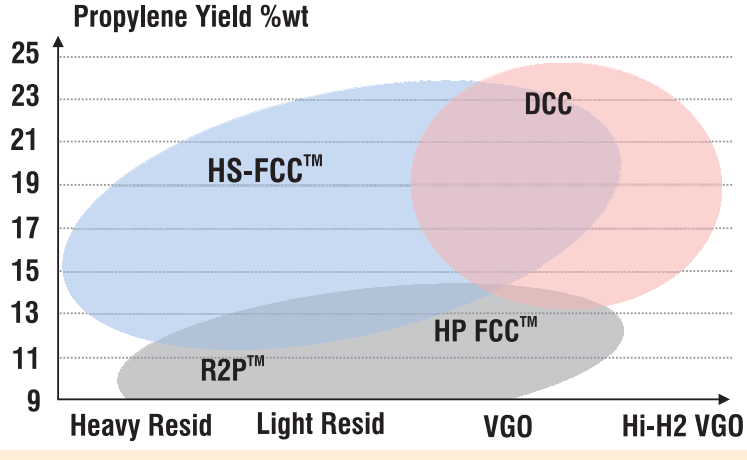


Figure 9: Family of high propylene catalytic cracking processes

(8) *Press release available at http://www.axens.net/news-and-events/news/359/axens-to-supply-technologies-for-s-oils-residue-upgrading-capacity-expansion-project.html#.VqeqO53LQd*

(9) *Dharia, D., "Increase Light Olefins Production", Hydrocarbon Processing, April 2004.*

With the option to operate at conventional severity or high severity, the refiner will have the ability to select an operating mode and feedstock best suited to the prevailing economic conditions. A high severity product slate rich in olefins and aromatics also makes integration with petrochemicals plants more attractive so that the natural synergy of shared intermediate products and recovery schemes can be realized[10]. An example of HS-FCC integration with petrochemical complex is shown in Figure 10.

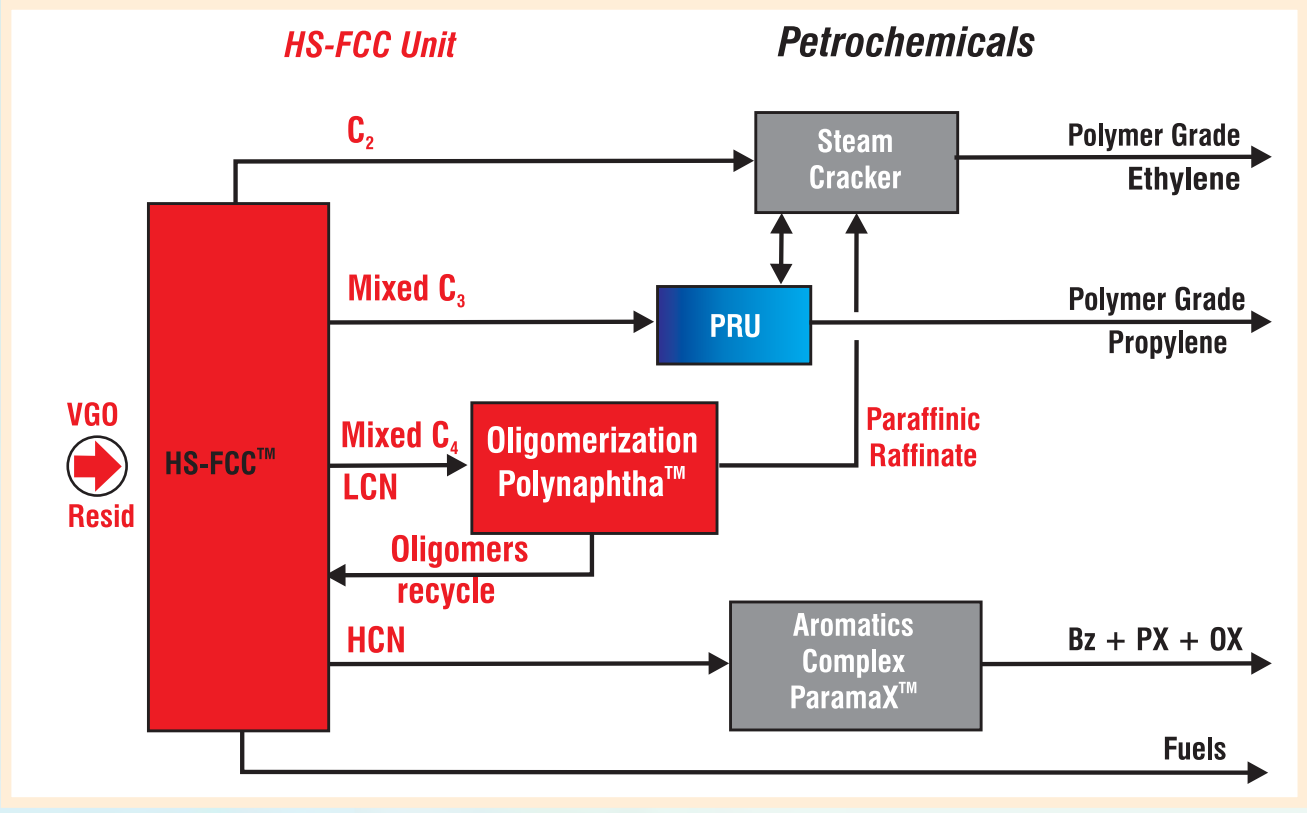


Figure 10: Integrated refinery-petrochemical complex

Global Alliance for Commercialization

The HS-FCC technology is the product of systematic process research, catalyst development, pilot work, 30 BPD demonstration unit testing, and on-going semi-commercial operation and testing at the 3,000 BPD scale associated with the commitment of several actors. These successful results and the modeling tools developed for further scale up ensured a fast and sound readiness for commercialization of this innovative technology. Axens and Technip Stone & Webster Process Technology are now offering HS-FCC technology on behalf of the HS-FCC Global Alliance team.

[10] *Roux, R., "Upgrading of Heavy Cuts into Max Olefins through HS-FCC", JPI Petroleum Refining Conference, Tokyo, 2012 and www.axens.net website.*

> *"Strength does not come from physical capacity. It comes from an indomitable will."*
>
> *~ Mahatma Gandhi*

Optimum Performance of Topsoe SCR DeNOx Technology in Refinery

Sachin Panwar
Business Development Manager
Haldor Topsoe India Pvt. Ltd.

The emission of nitrogen oxides, or NOx, is a major, global pollution problem. The damaging effect of nitrogen oxides on health and environment is substantial. NOx contributes to acid rain resulting in deforestation and destruction of coastal and fresh-water life. NOx further reacts in the atmosphere to form ground-level ozone, bringing about the health-threatening yellowish smog in urban areas.

Various technologies have been developed to control emissions of nitrogen oxides. The SCR process is by far the predominant choice of technology. The SCR process works by reacting the NOx with gaseous ammonia over a catalyst to produce elemental nitrogen and water vapour. It has been applied to a variety of applications since the 1970s including flue gases from boilers, refinery off-gas combustion, gas and diesel engines, gas turbines and chemical process gas streams. In general the SCR is the technology which gives the highest possible NOx removal rates, in excess of 95%. In case of demand of Best Available Control Technology SCR will be the chosen technology.

Recently, Government of India has issued very stringent norms for Thermal power plants to reduce NOx emission. Similarly, Government has decided to implement BS VI in 2020 throughout India and skipping BS V to curb increasing pollution from Automobiles which will significantly reduce emission of NOx from vehicles. With the SCR technology, it is possible to achieve NOx removal rates higher than 98% with an ammonia slip lower than 2 ppm.

NOx emissions from petrochemical plants primarily originate from utility boilers, co-generation units, process heaters, steam methane reformers, ethylene cracking furnaces and FCC regeneration units. Topsøe is a supplier of catalyst and technology for environmental processes and has catalysts for NOx reduction in operation in such units in several refineries in the USA and Europe. We will deal here with design and operational issues for NOx reduction units.

In the past there has been reluctance from the plant operators to install SCR's because of risk of up-set in the units caused by the SCR's. However, the results from SCR's installed in the process industry are that they are very reliable and actually have very low running and maintenance costs. By selecting SCR, plant operators are getting a very forgiving system, in that the burners in furnaces will not have to be tuned to low NOx but can instead be tuned to optimum combustion and stable flames which gives a safer and more reliable operation of the furnaces.

SCR is the best proven technology to achieve maximum NOx reduction in ethylene cracking furnaces. As ethylene furnaces cycle between olefin production and decoking, the SCR system is able to smoothly accommodate the transition. This back-end technology offers 95%+ NOx reduction across a wide operating range requiring little or no maintenance while essentially remaining transparent to the rest of the furnace operation.

Deactivation of the catalyst has to be taken into account in the SCR design. High metal temperature in ethylene cracking furnaces and steam methane reformers release chromium that results in masking of the catalyst by chromium accumulation at the surface and in the pores of the catalyst. The deactivation can be minimised by applying a catalyst with a pore structure that reduces this effect. The Topsøe DNX® SCR catalyst is developed with a tri-

modal, highly porous pore structure which enables the catalyst to tolerate high levels of chromium.

A further advantage of a high-porosity catalyst is that this assists in providing a very low SO_2 oxidation, an undesired side reaction of the SCR catalyst. When using high-sulphur heavy fuel oil, minimising the formation of SO_3 is of crucial importance.

Operational experiences show that with the use of a properly designed SCR reactor and catalyst, very low NOx emissions are possible in FCC units that have high NOx, SOx and particulates in the flue gas. Several years of uninterrupted, trouble-free operation has been achieved even with the catalyst in a high-particulate atmosphere without an ESP upstream the SCR.

In refineries, installation of SCR's on the highest NOx-producing units serve as a buffer to the overall NOx-emission balance of the refinery, allowing for compensation of higher NOx emissions of other sources, without exceeding the refinery's cap of total NOx emission.

Selective Catalytic Reduction

The selective catalytic reduction is a catalytic reaction of nitrogen oxides, NO and NO_2, with gaseous ammonia to form elemental nitrogen and water according to the reaction schemes:

$$4\ NO + 4\ NH_3 + O_2 \rightarrow 4\ N_2 + 6\ H_2O \quad (1)$$

$$NO + NO_2 + 2\ NH_3 \rightarrow 2\ N_2 + 3\ H_2O \quad (2)$$

$$2\ NO_2 + 4\ NH_3 + O_2 \rightarrow 3\ N_2 + 6\ H_2O \quad (3)$$

Reactions 1 and 2 are the predominant ones with one mole of ammonia consumed per each mole of NOx converted. Reaction 3 occurs in gases in which the majority of the NOx is present as NO_2. At very high temperature, the reactions occur in homogeneous gas phase. To carry out the reactions at lower temperatures, typically 250-450°C a catalyst is used. The most common SCR catalyst is a vanadium pentoxide (V_2O_5) catalyst on a titanium dioxide (TiO_2) carrier. A reaction mechanism suggested by Nan Yu Topsoe (J. Catal., 151, 1995) is illustrated in Figure 1:

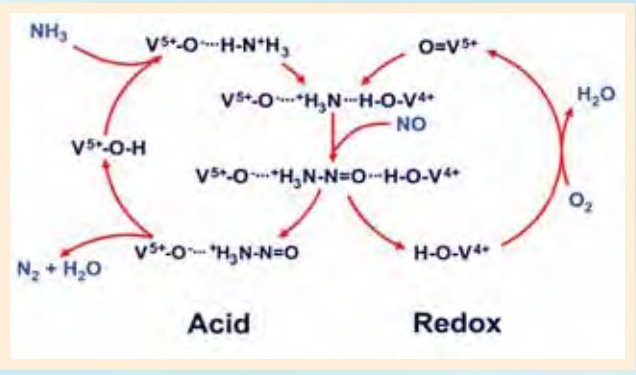


Figure 1

Basically, the SCR reaction involves both acid-base and redox catalytic functions. The reaction is initiated by the adsorption of ammonia on Brønsted acid sites (V5+-OH), followed by "activation" of ammonia via reaction with redox sites (V=O). This "activated" form of ammonia then reacts with gaseous or weakly adsorbed NO, producing N_2 and H_2O while releasing V4+-OH. To complete the catalytic cycle, the V4+-OH species is oxidised by either NO or O_2 to regenerate the original V=O species.

The optimum operating temperature for the SCR catalyst is from 350°C to 420°C (~570-790°F).

Topsoe's SCR DeNOx Process and Catalyst

The Process

The main components of the SCR system are basically a reactor with the catalyst, ammonia storage and injection system and a control system. Figure 2 shows the typical Process Flow Diagram of an SCR system. The abatement of nitrogen oxides results from injection of ammonia into the gas and subsequent passage through the catalyst, forming elemental nitrogen and water. Ammonia is injected into the gas at slightly above the molar equivalent ratio as its NOx concentration. The ammonia injection rate is automatically controlled by combining feed-forward control based on amount of NOx to the SCR DeNOx unit and feedback control measuring outlet NOx downstream of the catalyst.

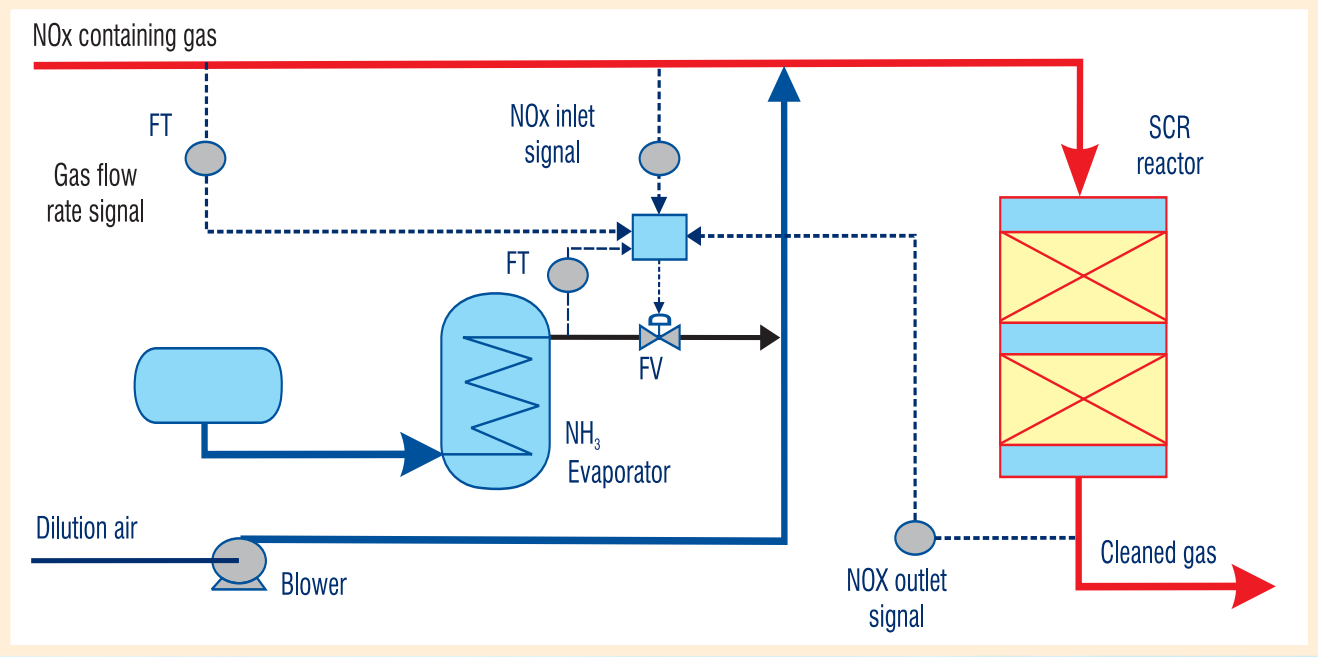


Figure 2 Basic flow diagram for an SCR DeNOx System

The ammonia reducing agent can be either anhydrous ammonia under pressure or it can be an aqueous ammonia solution (typically 25% by weight) at atmospheric pressure. A 30-40% solution of urea which decomposes into ammonia and CO_2 at high temperature can also be used if warranted by safety.

The SCR Catalyst

The applied catalyst is based on a porous titanium-dioxide carrier material on which the catalytically active components in the form of vanadium pentoxide combined with tungsten- and/or molybdenum oxides are dispersed. To cater for a large gas contact area with a minimum pressure loss, the catalysts are provided as corrugated which contains a large number of parallel channels (Figure 3) or as elements with a stack of spaced, coated wire-mesh sheets.

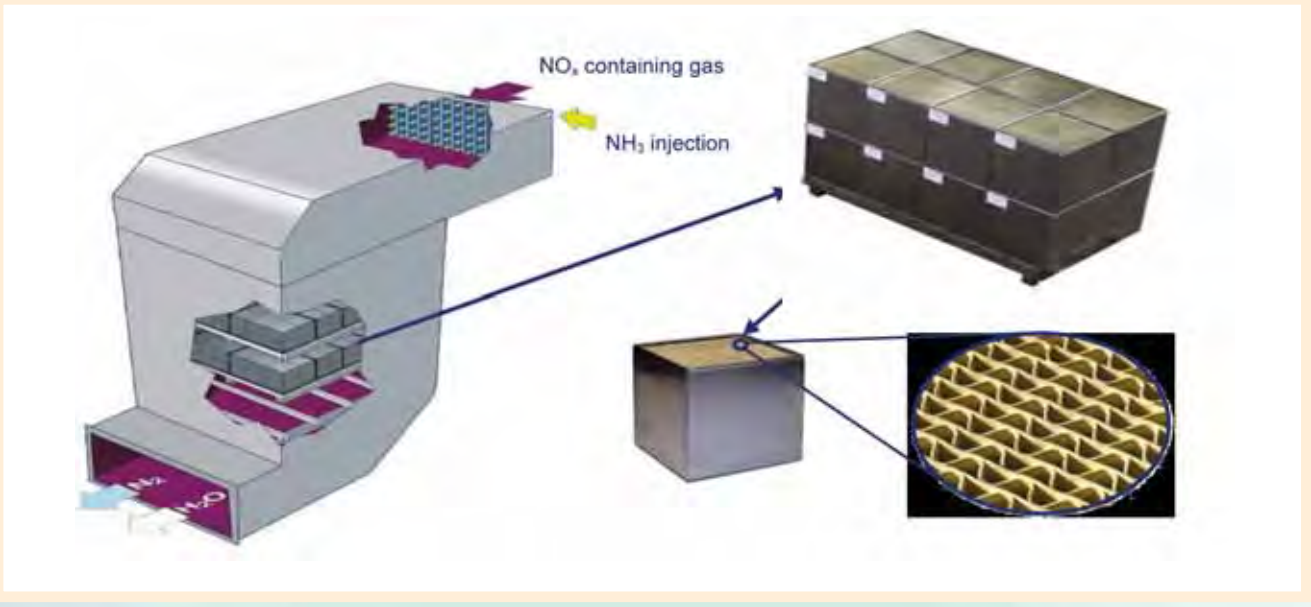
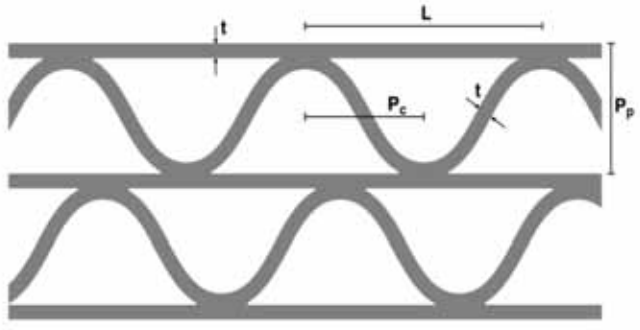


Figure 3 The SCR DeNOx reactor and catalyst

The monolithic SCR catalyst elements are assembled into modules for easy installation. Ammonia is injected in a grid in the flue gas duct upstream the catalyst

Each type of catalyst is offered in a number of different models with varying channel size (often referred to as pitch), wall thickness and with varying chemical composition adapted to specific operating conditions. The choice of pitch and wall thickness for a given SCR installation is determined mainly by the concentration and properties of the dust in flue gas. For low-dust applications, channel sizes of up to approximately 5 mm are selected. Larger-channel catalysts (6-10 mm pitch) should be selected for operation in dust-laden gases in SCR units on e.g. Fluid Catalytic Cracking (FCC) units in which FCC catalyst fines are carried over from the regenerator.



L: Wave length
t: Wall thickness
P_c: Channel pitch
P_p: Plate pitch

	L	t	P_c	P_p
DNX-939[1]	8.1	0.4	4.1	4.1
DNX-958[2]	14.4	0.8	7.2	6.8

1) Catalyst type for heaters, reformers etc.
2) Catalyst type for FCC units

Figure 4 Geometry of Topsøe corrugated DNX® catalyst

The required catalyst volume and thereby the size of the SCR reactor depends, of course, on the NOx concentration in the flue gas and the desired NOx reduction efficiency but specific operating conditions, e.g. temperature and flue gas dust content, and the selected catalyst model adapted to these conditions also have a large influence.

In order to optimise reaction conditions and catalyst replacement strategy, the total catalyst volume necessary usually is distributed on several layers. Typically, an empty spare layer is included for addition of catalyst. Addition of catalyst instead of immediate replacement results in a better utilisation of the remaining catalyst activity prior to a final replacement.

Refinery SCR Applications with Industrial Experience

Many refineries in the U.S. and Europe are using SCR technology for NOx emissions reduction after considering advantages of SCR technology over other NOx emission controlling technologies, catalyst availability, capital costs, and budget. Refiners have found it necessary to install SCRs in many of the large heaters, hydro-treaters, catalytic reformers, thermal crackers, fractionators, and utility boilers, cogeneration equipment, and FCC regenerators.

In Steam Cracking and Reformer Furnaces

Ethylene is produced by steam cracking processes where a hydrocarbon feedstock reacts with steam in a high temperature environment 700°C ~ 1,100°C. The reaction is highly endothermic and is carried out in relatively small-diameter (2-15 cm) closely arranged reaction tubes.

Steam methane reforming (SMR) is used in the production of hydrogen from a hydrocarbon feed, usually natural gas by reacting methane with steam

across a catalyst in heated high-alloy tubes which operates at high temperature by direct heat exchange with the integral furnace that surrounds the reactor tubes.

The tubes in the SMR or ethylene cracker's firebox section are constructed from chromium-nickel alloys containing 25%-35% Cr and heated by gas- or oil-fired burners. At these temperatures, chromium in the radiant coil is released into the flue gas. Catalyst selection plays important role in SCR system trouble free operation as Chromium is evaporated predominantly as chromium-oxy-hydroxide ($CrO_2(OH)_2$), which accumulates in downstream SCR catalyst installations and has a negative impact on catalyst lifetime. The release of chromium from furnace tubes is seen in all heated high-temperature cracking and reformer processes.

At wet flue gas conditions chromium is evaporated according to:

$$Cr_2O_3(s) + 2\,H_2O + 1.5\,O_2 \rightarrow 2\,CrO_2(OH)_2\,(g)$$

During test it was observed, that, Cr accumulation is 200-2,000 ppmw per 1,000 hours in the first catalyst layer. At a partial pressure of chromium at 750°C of 0.012 atm, the chromium uptake in the catalyst would be approximately 900 ppmw Cr per 1,000 hours at a space velocity 10,000 Nm^3/m^3 catalyst per hour, assuming 100% retention. The general effect of chromium on the catalyst is a decrease in activity that amounts to around 2.6% of the initial activity per 0.1% by weight chromium accumulated in the catalyst. The chromium is deposited as extremely fine aerosols with high diffusivity. This also results in significant overall capture in the SCR catalyst with more than 90% of the chromium being accumulated in the first catalyst layer. Presumably the chromium is present as sub-cooled gas-phase monomers that precipitate at the catalyst surface. This results in reduced life time, activity and high pressure drop across the system.

Topsoe DNX® catalyst test coupons inserted in a number of ethylene cracking and steam methane reformer furnace showed better life and activity due high porosity. DNX® catalyst deactivation rate was in the range of 12% - 19% per 10,000, whereas other type of catalyst deactivation rate was observed between 21% -35% per 10,000 operating hours. This clearly revealed that Topsoe DNX® catalyst has high activity and high resistance to poison due to its tri-modal porosity. Porosity of Topsoe catalyst is nearly double when compared to extruded catalyst.

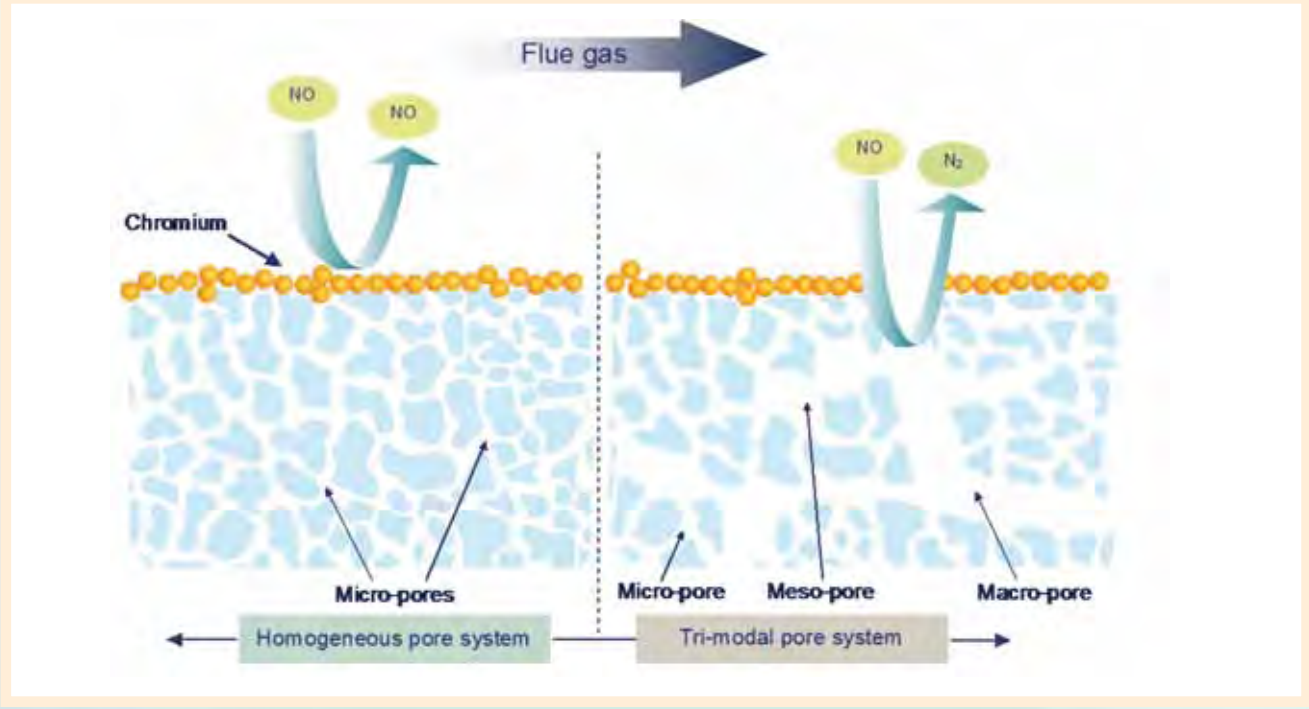


Figure 5 The tri-modal pore system of Topsøe's DNX® catalyst (right) provides a high resistance towards poisoning from e.g. chromium as the presence of macro-and meso-pores ensures access to active sites

Industrial Experience

Topsoe has a rich experience of implementing DeNOx technology in various Industrial sectors from late 80s i.e. around 1300 references worldwide. The reference mainly covers:

- Fired boilers based Coal, Oil, Gas, Biomass and Petcoke : 300+ units
- Refinery / Petrochemical: 203 units
- Gas Turbine application: 342 units
- Stationary diesel engines: 107 units

Conclusions

Selective catalytic reduction, SCR, is the best proven technology to achieve maximum NOx reduction and SCR units for NOx abatement can be designed to meet stringent requirements by offering 95%+ NOx reduction.

SCR units have successfully been installed on ethylene cracking furnaces and steam methane reformers. Deactivation of the SCR catalyst as a result of chromium accumulation has to be taken into consideration in the SCR design. The deactivation from chromium masking can be minimised by using an SCR catalyst with a high-porosity diverse pore structure which offers less susceptibility to poisoning.

One of the largest NOx emission sources in a refinery is the flue gas coming from the regenerator in the fluid catalytic cracking unit. It can be the source of 50% of the total NOx emitted from the refinery. The high sulphur oxides concentration and carry-over of FCC fines in the flue gas represent a challenge. With the use of a properly designed SCR reactor and catalyst, experience shows that very low levels of NOx emissions can be achieved from FCC units that have high NOx, SOx and particulates in the flue gas.

Flow modelling by CFD as well as cold-flow modelling in scale models of the SCR unit are useful tools to verify proper ammonia mixing and flow conditions to the catalyst as well as to identify and eliminate areas for possible dust build-up. The SCR operating temperature should be selected well above the temperature for formation of ammonium bisulphate, ABS, in the catalyst and the catalyst layers in the SCR reactor should be equipped with soot blowers for regular removal of possible build-up fine-particulate FCC catalyst.

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Hon'ble Prime Minister Shri Narendra Modi dedicated to the Nation the Brahmaputra Cracker and Polymer Limited (BCPL) Petrochemical Complex, a flagship project of Assam, at Dibrugarh on 5th February, 2016 in the august presence of Hon'ble Governor of Assam Shri Padmanabha Balakrishna Acharya, Hon'ble Chief Minister of Assam Shri Tarun Gogoi, Hon'ble Union Minister of Chemicals and Fertilizers Shri Ananth Kumar, Hon'ble Union Minister of State (I/C), Petroleum and Natural Gas, Shri Dharmendra Pradhan, Hon'ble Union Minister of State (I/C), Youth Affairs and Sports, Shri Sarbananda Sonowal, Hon'ble Union Minister of State (Independent Charge), Development of North Eastern Region, Dr. Jitendra Singh, Hon'ble Union Minister of State for Chemicals and Fertilizers Shri Hansraj Gangaram Ahir, Hon'ble Member of Parliament, Lok Sabha, Shri Rameswar Teli, Hon'ble Member of Legislative Assembly, Assam, Shri Prithibi Majhi, besides a host of other dignitaries.

Set up with an investment of approx. Rs. 10,000 crore, the BCPL plant will have the capacity to manufacture 2,80,000 tonnes per annum of polymer products. GAIL (India) Limited is the main promoter of BCPL having 70% equity participation in the company.

Shri S Varadarajan, C&MD BPCL and Shri K K Gupta, Director (Marketing), BPCL gave a warm welcome the Hon'ble MoS(I/C), MoP&NG Shri Dharmendra Pradhan to the BPCL Stall at Make In India. BPCL showcased the world class facilities and expansion plans of our frontier Refineries, the cutting edge technologies, R&D and innovations as well as our marketing initiatives in automation and customer connect activities. A separate section dealt entirely about how BPCL is giving back to society through our award winning CSR initiatives.

Indian Oil Corporation Limited (IndianOil), India's flagship national oil company, Oil India Limited (OIL) and Bharat PetroResources Limited (BPRL), acting jointly as the Indian Consortium, signed definitive agreements to acquire participatory shares representing 29.9% of the charter capital of LLC "TYNGD", a wholly-owned subsidiary of Rosneft Oil Company, the National Oil Company (NOC) of Russia. Mr. Dharmendra Pradhan, MoS (I/c), MoP&NG, Mr. K.D. Tripathi, Secretary, MoP&NG, Mr. Igor Sechin, Chairman of the Management Board, Rosneft and Mr. B. Ashok, Chairman, IndianOil were present on the occasion.

Hon'ble Minister of State (I/C) for Petroleum & Natural Gas, Shri Dharmendra Pradhan at HPCL's stall at 'Make in India Week 2016' that was held in Mumbai from 13th to 18th February, 2016. A brochure on 'Entrepreneurship Development Programme for SC/ST Youth' was handed over to the Hon'ble Minister by C&MD, HPCL, Ms. Nishi Vasudeva. Also seen in the photograph are Director - Human Resources, HPCL, Shri Pushp Joshi; Executive Director - Human Resources, Shri Rakesh Misri and Executive Director - Direct Sales, Shri H. C. Mehta.

The Managing Director of ONGC Videsh Mr. Narendra K Verma and Rosneft Chairman of the Management Board Mr. Igor Ivanovich Sechin signing a Memorandum of Understanding for the potential acquisition of 11% shares in the Vankorneft by ONGC Videsh in addition to the 15% shares for which the definitive agreement was signed earlier in September 2015 in New Delhi on 16th March 2016 in the presence of Minister of State (Independent Charge) Petroleum and Natural Gas, Government of India, Mr. Dharmendra Pradhan.

BPCL bagged the NIPM National Award for Best HR practices - 2015 winning the GOLD Award in Category A (the highest category for large organizations) at the National Conference of the National Institute of Personnel Management (NIPM). Shri S. P. Gathoo, Director (HR) received the award from Mr. Partha Chatterjee, Hon. Minister for Education, West Bengal. Mr. Gathoo was accompanied by his team-Mr. Kurian Parambi (DGM-HRD), Mr. M V Prabhakaran, DGM (HR) Kochi Refinery, Mr. A. Suresh Kumar, Senior Manager Admin(HRS-South) and Ms Vasudha Agarwal, Assistant Manager-HRD.

Secretary, MOP&NG, Shri K. D. Tripathi being explained the posters displayed at HPCL's Stall at 'Make in India Week 2016' by Director - Marketing, Shri Y. K. Gawali along with Director - Human Resources, Shri Pushp Kumar.

Hon'ble Prime Minister of India, Mr. Narendra Modi, dedicated IndianOil's 11th refinery at Paradip, Odisha in the service of the nation on February 7, 2016. Envisioned as the Energy Gateway to Eastern India, the 15 MMTPA Refinery has been set up at an estimated cost of Rs. 34,555 crore. Mr. Dharmendra Pradhan, MoS (I/C) for Petroleum & Natural Gas and Mr. Naveen Patnaik, Chief Minister of Odisha , Mr. Jual Oram, Union Minister of Tribal Affairs and Mr. B. Ashok, Chairman, IndianOil also graced the occasion with their presence.

Mr. D. D. Misra, Director (HR), ONGC addressing the celebrations on International Women's Day 2016 at Scope Minar Auditorium, New Delhi on 18 March, 2015, wherein the Guest of Honor was renowned folk artist Padmashri Mrs. Malini Awasthi. Others present included ED Chief Security Mr. Devesh Chandra Srivastva, ED HRO Mr. Har Govind and President WDF Delhi GM Head-CSR Mrs. Alka Mittal.

Hon'ble MoS (I/c), Petroleum and Natural Gas, Shri Dharmendra Pradhan was given a very warm welcome to Bharat Petroleum Head Quarters in Mumbai on 12 January 2016. He was here to Review the LPG Distributorship Guidelines at a joint meeting of OMC, convened at BPCL.

Hon'ble MoS (I/c) for Petroleum & Natural Gas Shri Dharmendra Pradhan, addressing the BPCL family at NCPA, Mumbai at the jubilant Ruby Anniversary of Bharat Petroleum. He also presented the Energising Bharat Awards, the first ever National Level social impact awards instituted by Bharat Petroleum.

Mr. Dharmendra Pradhan, Minister of State (Independent Charge), Petroleum and Natural Gas, Govt of India, laid the foundation stone of ambitious OCTAMAX project of Mathura Refinery on 6th March 2016. This OCTAMAX UNIT is conceived by IndianOil's R & D Division and is in line with the "Make in India" vision of Honourable Prime Minister, Mr. Narendra Modi. Mr. Sanjeev Singh, Director (Refineries), IndianOil welcomed Mr. Pradhan to the refinery.

BPCL's loyalty programs PetroBonus & SmartFleet were adjudged the "Best Cards Product & Programme of the Year - Loyalty Card" at the AIMIA Loyalty Awards 2016. The award was received by Mr.George Paul, ED-Retail, Mr. A.K.Kaushik, GM-IT & BI, Mr. Vijay N Tilak, DGM-Strategy & Loyalty, Ms. Vinita Kunder, Asst.Manager-Loyalty, at a prestigious ceremony attended by reputed Loyalty Brands across countries.

IndianOil took a big leap towards realising the Hydrocarbon Vision 2030 for North-East, with the announcement of INDMAX - Indane Maximisation Unit at Bongaigaon Refinery. Indmax technology, developed in-house by IndianOil R&D, is more competitive and highly suitable for heavy feed contaminated with metals.

The Lions CSR Precious Award 2016 has been conferred upon Bharat Petroleum for the conscious contributions to energizing lives. Mr. Pradeep K Iyengar, Chief Manager Admin Services & CSR and his team received the award for BPCL from the Lions Clubs International Foundation (LCIF) Chairman Mr. Joe Preston at Mumbai.

IndianOil R&D bagged the prestigious Bangalore India Nano innovation award for the successful development and commercialization of Indane Nanocut technology - the Hitherm cutting grade LPG. Bharat Ratna Prof CNR Rao presented the award trophy to the IndianOil R&D team led by Mr. BP Das, ED I/C (R&D).

HPCL recently commission Automated Online Blending Facility of Bio-Diesel for Indian Railways (WR) at Railway Consumer Depot at Vatva, on the outskirts of Ahmedabad. The facility was inaugurated by General Manager, Western Railways Shri GC Agarwal in the presence of DGM - I&C, HPCL, Shri Shuvendu Gupta and senior officials of Railways and HPCL

Hon'ble Minister for Sports and Youth Welfare Dr.S.Sundararaj, has inaugurated the project on Solid Waste Management on 2 March 2016 at Rameswaram in the presence of Dr. S.Natarajan, IAS, District Collector, Ramanathapuram. ONGC was represented by its Executive Director - Asset Manager, Cauvery Asset, S.C.Singh, Executive Director - Basin Manager, Cauvery Basin R.K.Khanna, and other senior officials of ONGC.

Bharat Petroleum is proud to that our Chairman & Managing Director Mr. S. Varadarajan has been adjudged as the Best CEO in the Oil and Gas Sector by Business Today. He received the Best CEO Award from Mr. Jayanta Sinha, Honble Union Minister for Finance at the Business Today Awards ceremony on December 18, 2015.

SERVO, the world-class lubricants from IndianOil, were launched in the Kingdom of Saudi Arabia by IOC Middle East FZE. SERVO will partner with the Mohammed Yousuf Naghi group, one of the biggest conglomerates of the country with business interests ranging from logistics to luxury cars and consumer products to catering. (L to R) - Mr. Mohammed Yousuf Naghi, Chairman, Naghi group, & IndianOil's trade partner for the Kingdom of Saudi Arabia with Mr. KL Murthy, Executive Director (Lubes); and Mr. Indrajit Bose, Executive Director (CC & Branding), IndianOil, during the launch.

Ms. Saina Nehwal, the ace badminton player, decorated with the Padma Bhushan, Padma Shri, Rajeev Gandhi Khel Ratna, Arjuna award amongst the many awards and a member of the Bharat Petroleum Family championed the "GIVEITUP" movement at Bangalore. At a function held at the Bharat Petroleum petrol pump M/s Nagpal Garage, Residency Road, Bengaluru in February, 2016, Saina who has already given up subsidy herself, made an emotional appeal to people to give up their LPG subsidy so that some BPL household could benefit.

Bhawana Kanth, daughter of T.N. Kanth, Electrical Engineer at IndianOil's Mathura Refinery, is among India's first trio of women fighter pilots selected by Indian Air Force.

Image Courtesy - www.ibnlive.com

HPCL won two awards at the recently concluded 'Business Excellence Awards' held on the side-lines of the 12th Asia Retail Congress.

a) *'Retailer of the Year Award' for enhancing customer experience through 'SOP', Club HP and Club HP Star*

b) *'Best Technology Initiative' for launching the Mobile App - 'My HPCL'*

ONGC has won the prestigious ***Netapp Innovation Award-2016*** *in the Trendsetter Category for Aryabhata-2, a state-of-the-art High-performance Computing Cluster (HPCC) system, recently installed at GEOPIC and inaugurated by CMD, ONGC on 26th Jan 2016. The winner's trophy was presented by Shri Kapil Dev on 3 March 2016 at Mumbai. The Chairman of Rameswaram Municiplaity A.Arjunan, Municipal Commissioner, Rameswaram K.Jayarama Raja and Dr. Kalpana Sankar, Chairman and Managing Trustee, Hand-in-Hand, a NGO who jointly implement the project with ONGC were also present.*

For the 4th time consecutively, ONGC Basketball team has won the Federation Cup which was held at Bambolim, Goa from 9-14 March 2016. Top 8 teams of the country participated in the Championship. ONGC now stands qualified to represent India in Champions Cup to be played in Iran.

Bharat Petroleum has been adjudged MOST ATTRACTIVE BRAND by TRA. BPCL C&MD Mr. S Varadarajan, Director (Marketing) Mr. K K Gupta, Director (HR) Mr. SP Gathoo and Mr. Milind S Patke, GM(Brand & PR) are seen with Corporate Brand & PR Team. Mr. Patke received the award on behalf of Bharat Petroleum recently.

HPCL was conferred with 2 awards at the National Quality Excellence Awards held as part of 'Stars of Industries Award 2016'.

a) *Quality Excellence Award for Best Retail Company in recognition of the various customer centric initiatives*

b) *Quality Excellence Award for Customer Loyalty Program for the Drive Track Plus program*

MRPL. With Energy to OUTPERFORM

Mangalore Refinery and Petrochemicals Ltd. (MRPL), a **'Schedule A, Mini Ratna Cat- 1' ONGC Group Company** adds sparkle to the lush green glades of Dakshina Kannada as the **Jewel of Karnataka.**

A 15 MMTPA Refinery with a complexity of around 9.5, MRPL is the nucleus of Petroleum Product supplies in the South of India and is a picture of excellence in the Indian Hydrocarbon Industry.

So much so that MRPL has been declared "Refinery of the Year" twice*.

Cutting edge technology * World-class Quality Control Lab* 3 Captive Power Plants *State of the art Auto Tank Gauging System *First Refinery to make Euro I, II, III, and now, IV Petrol and Diesel * Exports to 21 countries * Varied Product yield with customization *Benchmarked Environment Management systems * Diversifying into new Petrochemicals *ISO 14001, ISO 9001 & ISO 50001 Certified *AAA Rating from CRISIL & ICRA *Dedicated Jetties at the New Mangalore Port. *SPM with coastal booster pumping station* State of Art FFCCU *DCU * Committed Team of professionals.

**Petrofed award for 2010, 2012*

4th IAHC 2016

The two-day 4th India-Africa Hydrocarbons Conference concluded in New Delhi on January 22, 2016 with a resolve to strengthen the relations between India and Africa in all its dimensions, particularly in the hydrocarbon sector. The event saw enthusiastic representation from 21 African countries at various levels, including nine delegations being led by their respective ministers.

In her valedictory address the Hon'ble Minister for External Affairs, Smt. Sushma Swaraj called for working together and moving towards energy justice from energy poverty. She called for injecting new dynamism in the centuries old relationship between India and Africa by pursuing win-win opportunities in all areas for the larger common good of the people of both regions.

Expressing a great degree of satisfaction over the conduct of the conference the Hon'ble Minister of State (I/C) for Petroleum & Natural Gas, Shri Dharmendra Pradhan said that India recognizes Africa as a valued partner for the comprehensive development of our peoples. During the calendar year, he said, the ministry plans to mount composite delegations comprising upstream, downstream and EPC service providers from both public and private sector to countries where we assess potential for future co-operation. He also announced additional 250 fully funded scholarships for African nationals for technical and professional courses in the hydrocarbon sector in Indian Institutes. He recalled the Indian Prime Minister's remarks at the inaugural ceremony of the 3rd Africa-India Forum Summit in October, 2015 - 'African energy helps run the engine of the Indian economy and its resources are powering our industries.' This conference the Hon'ble Minister said, with the theme 'Energizing the Bottom of the Pyramid - Together Towards Tomorrow' provided the platform to discuss specific opportunities in hydrocarbon space.

The delegates were welcomed at the Inaugural Session by the Secretary, Ministry of Petroleum & Natural Gas, Shri K. D. Tripathi.

The lead organisers for the two-day conference were PetroFed and ONGC Videsh Limited with active support from GAIL, IOCL, ONGC, BPCL, EIL, HPCL, OIL, CPCL, MRPL, NRL and Balmer Lawrie. The conference witnessed a theme presentation by Shri N. K. Verma, Managing Director,

Hon'ble Union Minister of State (I/C) for Petroleum & Natural Gas, Shri Dharmendra Pradhan (6th from right) along with dignitaries from African countries during inaugural session. Also seen in the pic is Shri K. D. Tripathi, Secretary, MoP&NG (2nd from right) and Shri Sunjay Sudhir, Joint Secretary (IC), Ministry of Petroleum & Natural Gas (right).

Shri Dharmendra Pradhan, Hon'ble Union Minister of State (I/C) for Petroleum & Natural Gas along with other dignitaries lighting the ceremonial lamp during inaugural session.

OVL; a presentation on the upstream sector by Shri S. Mahapatra, Director (Exploration & Development), Oil India Limited; and a presentation on the downstream sector by Shri Sanjiv Singh, Director (Refineries), IndianOil. There were two ministerial sessions of African nations besides an opportunity to participating countries to make a presentation. The two panel discussions on 'Emerging challenges and mitigating measures in hydrocarbon sector and beyond' and 'Regulatory & Fiscal regime challenges and potential solutions to stimulate investment in Upstream and Downstream Sectors' were moderated by knowledge partner, IHS with participation of senior officials from the Ministry of Petroleum & Natural Gas and key industry members from both India and Africa. Dr. R. K. Malhotra, Director General, PetroFed was also a panelist in one of the sessions.

At the valedictory session participants were welcomed by Shri A. P. Sawhney, Additional Secretary, MoP&NG and a vote of thanks was proposed by Shri Sunjay Sudhir, Joint Secretary (IC), MoP&NG.

The Minister-led delegations were from Mauritius, Morocco, Algeria, Sudan, South Sudan, Tunisia, Senegal, Equatorial Guinea and Liberia. Senior officials led the delegations from Nigeria, Ghana, South Africa, Egypt, Tanzania, Kenya, Mozmbique, Uganda, Libya, Cote d'Ivory, Gabon and Sierra Leone.

During the conference the Hon'ble Minister of State (I/C) for Petroleum & Natural Gas, Shri Dharmendra Pradhan held bilateral meetings with his counterparts as well as the delegations from the other visiting countries. The Hon'ble Minister referred to India's thrust for achieving a geographically diversified energy basket and said that India will try to increase its oil and gas sourcing from Africa even further. The African countries evinced specific interest in using India's expertise and assistance in refining, capacity building and training of their manpower for the petroleum industry.

A section of the participants.

Shri K. D. Tripathi, Secretary, MoP&NG welcoming participants.

Hon'ble Union Minister of State (I/C) for Petroleum & Natural Gas, Shri Dharmendra Pradhan delivering inaugural address.

Inaugural session in progress.

Shri Sunjay Sudhir, Joint Secretary (IC), MoP&NG proposing a vote of thanks at the conclusion of inaugural session.

A group photograph of leaders of various African delegations along with MoP&NG officials after inaugural session.

Shri N. K. Verma, Managing Director, ONGC Videsh Limited making Theme Presentation on 'Energizing the Bottom of the Pyramid - Together Towards Tomorrow' on Day-I.

Shri S. Mahapatra, Director (Exploration & Development), Oil India Limited making a presentation on 'Indian Upstream Growth Story - Complementarities with African E&P Sector' during Session 2.

Shri Sanjiv Singh, Director (Refineries), Indian Oil Corporation Limited making a presentation during Session 3 on 'Overview of India's Downstream Sector'.

Participants keenly watching the presentation.

HE Dr. Salah Khebri, Minister of Energy, Algeria making a presentation on 'Opportunities of Partnership in Algerian Hydrocarbon Sector'during Ministerial Session 1.

Panel Discussion-I on 'Emerging Challenges and Mitigating Measures in Hydrocarbon Sector and Beyond' in progress. Panelists from India included (seated 3rd from left to right): Dr. R. K. Malhotra, Director General, PeroFed; Shri D. K. Sarraf, Chairman & Managing Director, ONGC; Shri U. P. Singh, Additional Secretary (Exploration), MoP&NG and Chairman & Managing Director, Oil India Limited; Shri B. Ashok, Chairman, Indian Oil Corporation Limited.

Dr. R. K. Malhotra, Director General, PetroFed (4th from left) sharing his perspective during Panel Discussion which was moderated by Shri Ronald Kapavik, Vice President Asia (Gas, Power, Coal & Renewables), IHS Energy (extreme left).

Shri B. Ashok, Chairman, IndianOil (R) making his viewpoint during Panel Discussion-I on 'Emerging Challenges and Mitigating Measures in Hydrocarbon Sector and Beyond'.

Shri N. K. Verma, Managing Director, ONGC Videsh Limited (6th from left) sharing his outlook during Panel Discussion-II on 'Regulatory & Fiscal Regime Challenges and Potential Solutions to Stimulate Investment in Upstream and Downstream Sectors' which was moderated by Shri Stanislas Drochon, Director Africa Oil & Gas, IHS Energy (extreme right).

Panelists from India at Panel Discussion-II: Shri Ajay Prakash Sawhney, Additional Secretary, MoP&NG (4th from left); Shri Sandeep Poundrik, Joint Secretary (Refinery), MoP&NG (5th from left); Shri N. K. Verma, Managing Director, ONGC Videsh Limited (4th from right); Shri Ashok Dhar, Advisor (Refinery Business), Reliance Industries Limited (R) and Shri Sujit Kumar, Regional Head, S.E. Asia, Schlumberger (2nd from left).

Dignitaries at the Conference. Seated (L-R): Shri Sandeep Poundrik, Joint Secretary (Refinery), MoP&NG; Shri K. D. Tripathi, Secretary, MoP&NG; Smt. Sushma Swaraj, Hon'ble Minister for External Affairs; Shri Dharmendra Pradhan, Hon'ble Union Minister of State (I/C) for Petroleum & Natural Gas and Shri A. P. Sawhney, Additional Secretary, MoP&NG.

Dignitaries from India and Africa at the Valedictory Session.

Shri Ajay Prakash Sawhney, Additional Secretary, MoP&NG welcoming participants at the Valedictory Session.

Shri Ronald Kapavik, Vice President Asia (Gas, Power, Coal & Renewables), IHS Energy presenting a summary of the proceedings.

Hon'ble Union Minister of State (I/C) for Petroleum & Natural Gas, Shri Dharmendra Pradhan delivering his address.

Smt. Sushma Swaraj, Hon'ble Minister for External Affairs delivering valedictory address.

Shri Sunjay Sudhir, Joint Secretary (IC), MoP&NG proposing a vote of thanks at the Valedictory Session.

A group photograph of dignitaries at the dais during Valedictory Session.

Implications of the Union Budget 2016 on the Oil & Gas Sector - Delhi

PetroFed organized Senior Management Meet on 'Implications of the Union Budget 2016 on the Oil & Gas Industry' in knowledge partnership with KPMG on March 1, 2016 at New Delhi. The participants were welcomed by Dr. R.K. Malhotra, Director General, PetroFed.

Shri B. Ashok, Chairman, PetroFed and Chairman, IndianOil gave opening remarks. The detailed implications of the Union Budget on the Oil & Gas Sector for Direct Tax and Indirect Tax were presented by Shri Nabin Ballodia, Partner, KPMG and Shri Priyajit Ghosh, Indirect Tax Specialist respectively.

The industry perspective for the downstream, gas and private sector was presented by Shri A.K. Sharma, Director (Finance), IOCL; Shri Subir Purkayastha, Director (Finance), GAIL and Ms. Bela Mao Sheth, Tax Director, Shell India respectively.

The event was attended by senior industry leaders from the Oil & Gas sector, who keenly listened to the experts from KPMG. The question and answer session invoked a healthy debate on the economy and implications of the Budget on oil & gas sector.

Dr. R.K. Malhotra, DG, PetroFed welcoming the participants.

Shri B. Ashok, Chairman, PetroFed and Chairman, IndianOil delivering opening remarks.

Shri Nabin Ballodia, Partner, KPMG presenting Budget Implications on Direct Tax.

Shri Priyajit Ghosh presenting Indirect Tax Implications of the Union Budget.

Session in Progress.

Shri A.K. Sharma, Director (Finance), IOCL presenting downstream industry perspective.

Shri Subir Purkayastha, Director (Finance), GAIL presenting gas sector perspective.

Ms. Bela Mao Sheth, Tax Director, Shell India presenting private sector perspective.

Standing (L-R) Shri Rajiv Bahl, Director (Finance, Taxation & Legal), PetroFed; Shri Priyajit Ghosh, Indirect Tax Specialist; Shri Nabin Ballodia, Partner, KPMG; Shri Subir Purkayastha, Director (Finance), GAIL; Shri A.K. Sharma, Director (Finance), IOCL; Ms. Bela Mao Sheth, Tax Director, Shell India; Dr. R.K. Malhotra, DG, PetroFed.

A section of the participants.

Shri A.K. Sharma answering a query.

Implications of the Union Budget 2016 on the Oil & Gas Sector - Mumbai

Continuing with its tradition, PetroFed organized a Senior Management Meet on 'Implications of the Union Budget on the Oil & Gas Sector' in Mumbai in knowledge partnership with member company KPMG on March 2, 2016.

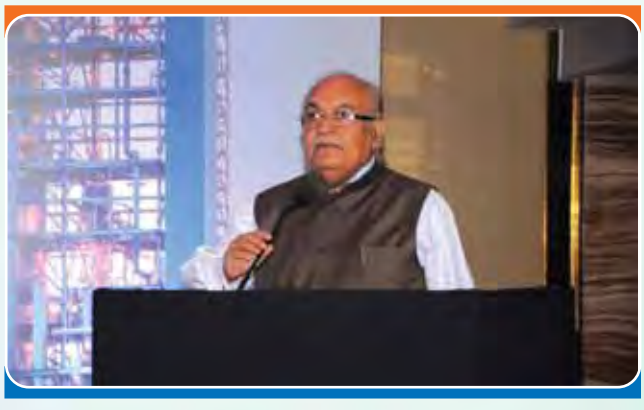
Welcoming participants, Dr. R.K. Malhotra, DG, PetroFed mentioned that many suggestions made by PetroFed to the Government on behalf of the industry in the Pre-Budget Memorandum could find place in the Finance Bill 2016 and assured that PetroFed would continue its efforts in this direction.

In his Opening Remarks Session chair Shri P. Raghavendran, President (Refinery Business), RIL and Vice Chairman, PetroFed gave a brief roundup of the economic situation in the country and how it is affecting the Oil & Gas sector.

The detailed implications of the Union Budget on the Oil & Gas Sector for Direct Tax and Indirect Tax were presented by Ms. Neetu Vinayek, Partner, BSR & Company and Shri Santosh Dalvi, Partner, KPMG respectively. Shri Mitul Shah, Director, BSR & Company also covered the amendments affecting individual taxation.

The industry observations were shared by Shri V.K. Jain, GM (Taxation), HPCL, Shri N V N Ramsai, Executive Director (Finance), IOCL and Shri R. Ganapathisubramanian, Senior Vice President, RIL and Convener, Tariff, Duties & Taxes Committee, PetroFed.

The question and answer witnessed a healthy debate on the technical implications of the some of the amendments proposed in the budget.



Dr. R.K. Malhotra, DG, PetroFed welcoming the participants.

Shri P. Raghavendra, President (Refinery Business), RIL delivering Opening Remarks.

Ms. Neetu Vinayek, Partner, BSR & Company presenting impact of Direct Tax proposals.

Shri Mitul Shah, Director, BSR & Company making his presentation on Individual Tax.

A section of the participants.

Shri Santosh Dalvi, Partner, KPMG presenting impact of Indirect Tax proposals.

Shri V.K. Jain, GM (Taxation), HPCL presenting industry perspective.

Shri N.V. N Ramsai, Executive Director (Finance), IOCL presenting downstream sector perspective.

Shri R. Ganapathisubramanian, Senior VP, RIL giving industry perception of Budget implications.

Dr. R.K. Malhotra, DG, PetroFed presenting a memento to Shri P. Raghavendran, President (Refinery Business), RIL.

Standing (L-R) Shri Mitul Shah, Sr. Director, KPMG; Ms. Neetu Vinayek, Partner, BSR & Company; Shri V.K. Jain, GM (Taxation), HPCL; Shri Santosh Dalvi, Partner, KPMG; Shri N.V.N Ramsai, ED (Finance), IOCL; Shri R. Ganapathisubramanian, Sr. VP, RIL and Shri Rajiv Bahl, Director (Finance, Taxation & Legal), PetroFed.

Oil Market Outlook

In its series of Guest Lectures and Thought Leadership Programmes, PetroFed organized a lecture on 'Oil Market Outlook 2016' by Mr. Johannes Benigni, Chairman & Founder, JBC Energy Group on March 9, 2016 at New Delhi.

Mr. N.K. Bansal, Director (Oil Refining & Marketing), PetroFed welcomed the participants.

While comprehensively covering the oil market scenario and outlook Mr. Beningni. He opined that oil & gas will continue to occupy centre stage in energy basket in midterm. Although prices seem to have bottomed out, the price is likely to remain range bound to $50 per barrel in 2016. Effectiveness of proposed collaboration between Saudi Arabia, Russia and others to freeze production needs to be watched, he added. For Natural Gas, Oil related contract in Asia may remain in near future. China moving away from coal will support LNG price. Increasing availability from Australia will reduce dependency on Middle East for LNG, Mr. Benigni said.

The presentation was followed by an active Q&A Session.

Mr. Johannes Benigni, Chairman & Founder, JBC Energy Group being welcomed by Dr. R.K. Malhotra, Director General, PetroFed.

Mr. Johannes Benigni making his presentation.

Dr. R.K. Malhotra, DG, PetroFed raising a query.

Mr. Johannes Benigni replying to a query.

Q&A session in progress.

Dr. R.K. Malhotra, DG, PetroFed presenting a memento to Mr. Johannes Benigni.

BP Energy Outlook 2016 in India

PetroFed organized the launch of the latest edition of the BP Energy Outlook in India in knowledge partnership with BP, a member company of PetroFed.

Tthe BP Energy Outlook has, over the time, guided the Oil & Gas industry players in identifying future strategy. Since 2008, BP has been associated with PetroFed for releasing the BP Energy Outlook in India.

Continuing with that tradition, Mr. Spencer Dale, BP's Chief Economist presented the Energy Outlook to leaders of oil and gas Industry and other stakeholders on March 9, 2016 in New Delhi. The presentation was well received and applauded by the leaders of the Oil and Gas Industry, government officials and other stakeholders.

Mr. Spencer Dale, BP's Chief Economist being greeted with a bouquet of flowers by Dr. R. K. Malhotra, Director General PetroFed.

Mr. Spencer Dale making his presentation.

A section of the participants.

Shri N K Verma, MD, OVL raising a query.

Group Photograph. (L-R) Dr. Preeti Jain, Joint Director(Economic Policy and Planning), PetroFed; Mr. Spencer Dale, Group Chief Economist, BP; Dr. R. K. Malhotra, Director General, PetroFed; Shri Sashi Mukundan, Regional President and Head of Country, BP Group; Shri R Bahl, Director(Finance, Taxation and Legal), PetroFed; S. Rath, Director(E&P), PetroFed; Shri Rajeev Kumar, Director(Regulatory Affairs), BP.

Natural Gas Infrastructure and Markets in India

A National Workshop on "Natural Gas Infrastructure and Markets in India" was jointly organised by KPMG and Petrofed on Thursday, March 17, 2016 under the Prosperity Fund Programme of the British High Commission. The workshop presented outcome of a study undertaken by KPMG to identify the imperatives for accelerated gas sector development in the country. The event witnessed presence of industry leaders and experts who deliberated on the issues pertaining to gas markets and how they can be addressed through suitable policy measures.

Dr. R. K. Malhotra, Director General, PetroFed welcoming the participants.

(L-R) Dr. R.K. Malhotra, Director General, PetroFed; Ms. Melissa Else, Energy & Resource Security, Energy Climate & Growth Unit, British High Commission; Mr. Anish De, Partner and Head- Strategy & Operations, Infrastructure, Government and Health, KPMG

Mr. Anish De making his presentation.

Mr. Sarthak N. Behuria, Former Chairman, Indian Oil delivering opening remarks while chairing the session. Others (L-R) Mr. Arvind Mahajan, Partner and Head - Strategy & Operations, Infrastructure, Government and Health, KPMG (IGH); Mr. Nitin Shukla, MD & CEO, Hazira LNG, Mr. Rajeev Mathur, MD, Mahanagar Gas; Mr. Vivek Joshi, ED, Natural Gas Society; Mr. Akhil Mehrotra, Director - Downstream Business, British Gas.

Mr. Surjit Ghosh, Partner, Advaita legal making his presentation. Others (L-R) Mr. S. N. Goel, CEO and MD, Indian Energy Exchange, Dr. B. Mohanty, Member, Petroleum & Natural Gas Regulatory Board; Mr. S. K. Soonee, CEO, Power System Operation Corporation Ltd.; Ms. Belo Mao, Sheth, Tax Director, Shell India Markets Pvt Ltd; Mr. Vijay Duggal, GM - Gas, BPCL.

(L-R) Mr. Anish De; Mr. R.S. Butola, Former Chairman, Indian Oil; Mr. Amit Kapur, Partner, J. Sagar Associates; Mr. Stephen C Beatty, Partner, Advisory Services, Head - Global Infrastructure, KPMG; Mr. Vaibhav Chowdhary, National Energy Adviser, British High Commission.

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