



Petroleum Federation of India

**Petroleum Economic Zone for Developing
a World Class Global Upstream Services
Hub in India**

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A study by PetroFed in association with Member Company and Knowledge Partner

PRICEWATERHOUSECOOPERS 

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1 Foreword

1.1 Background

- 1.1.1 In a meeting organized by the Petroleum Federation of India (PetroFed), as a follow up of the discussion on encouraging global E&P technology and oilfield service providers to set-up Technology and Oilfield service providers' hub in India, the then Minister of Petroleum and Natural Gas, constituted a National Working Committee (NWC) under the Chairmanship of Mr. Sanjay Barman Roy of Reliance Industries Limited (RIL) to suggest a strategy to facilitate such an initiative. Other Committee members appointed to the NWC were Mr. Y Sahai of PetroFed, Mr. Malcolm V Lall of DGH and Mr. AJ Das of ONGC. The Committee finalized its report with assistance of PricewaterhouseCoopers, and submitted to MoPNG on December 30, 2005.
- 1.1.2 A follow-up discussion was held in June 2007 in a meeting chaired by the Joint Secretary MoPNG and attended by the NWC and PwC. The attendees reiterated the need to motivate service providers to invest in India including if possible by creating sector specific investment zones as recommended earlier by NWC and named "Petroleum Economic Zone" (PEZ). The meeting concluded that Petrofed, in association with its knowledge partner, on behalf of the NWC should carry out in-depth study of the proposed PEZ concept with the goal of making services available if required, by establishing PEZ.
- 1.1.3 Towards this end, PetroFed has approached PricewaterhouseCoopers (PwC) to prepare and submit an approach paper to suggest ways to develop the PEZ model.

1.2 Scope of Assignment

- 1.2.1 PwC finalized the scope of the approach paper after deliberations with the members of the NWC. The scope for the approach paper was divided under four broad sections.
- **Section 1: Need for Services and opportunity for India to be a world-class Upstream Services Hub:** An assessment to understand the prevailing scenario in upstream services sector globally, need of services by Indian companies and reasons for India to target becoming a hub of services.
 - **Section 2: Analyse Global Models:** Overview of successful PEZ or equivalent zones in other countries to understand their unique value proposition for oilfield service providers and outline Indian model by incorporate their key success factors and learnings.
 - **Section 3: Current framework:** Review of current framework in India to analyse any existing provisions for setting-up and operation of sector specific special economic zones.
 - **Section 4: Suggested Framework:** Having assessed the need and the current framework, recommendations on options available for developing the proposed PEZ.

1.3 Approach & Methodology

1.3.1 The approach and methodology adopted for each of the above mentioned four Sections have been discussed as under.

- **Section 1: Need for Services and opportunity for India to be a world-class Upstream Services Hub:** Indian oil and gas companies in the upstream sector were contacted through direct questionnaire for in-depth understanding of the major areas of services that oil and gas companies need in India. Service providers' views have also been collected through direct questionnaire. Inputs from DGH were taken wherever necessary. An independent research was also carried out to estimate upstream sector activities in India and the services required for that. (Note: Substantial inputs from DGH and responses to questionnaires from oil and gas service companies are awaited and shall be incorporated before final report is issued).
- **Section 2: Analyse Global Models:** Three successful PEZs or equivalent zones were studied using literature available publicly. Aspects such as incentives, sizes, infrastructure and markets were studied to identify what were the critical success factors and which aspects are worth incorporating by India if it goes in for a PEZ model.
- **Section 3: Current Framework:** Considering that the infrastructure required for service providers and for deployment of services will be best suited for operation from coastal location, a study was carried out focusing on current regulatory framework of all the 8 coastal states of India where PEZ are potentially possible. Similarly SEZ Act 2005, feasibility/suitability for proposed PEZ has also been reviewed to identify gaps for a PEZ to be developed.
- **Section 4: Suggested Framework:** A framework/way forward has been suggested for the proposed PEZ in line with current SEZ regulation. This suggested framework has been developed based upon the understanding derived from prevailing scenario, industry interaction and benchmarking of other country PEZs. The critical factors for successful implementation of a PEZ, in India, have also been analyzed.

1.3.2 It may be noted that excluding Section 3, quality and outcome of study and the concomitant analysis was critically dependent upon the responses received from the oil companies and service providers to the survey questionnaire and, the information shared by DGH and other stakeholders. PwC had developed the questionnaire and the feedback process was administered by PetroFed.

2 Executive Summary

2.1 Importance of Oilfield Services

- 2.1.1 These are boom times in the oil and gas services industry, prompting some old hands in the industry to recall the exciting days of the 1970s. Then, as now, the proximate cause is high energy prices whose rapid rise has caught much of the oil and gas industry by surprise. Behind the price rises lie robust and sustained world economic growth, propelled in significant part by China, India and other developing countries, which has pushed oil prices to record levels and reawakened fears of energy and product shortages in the decades ahead.
- 2.1.2 Once again, the rush is on to find and develop additional oil and gas supplies: exploration, production, refining, distribution, petrochemicals, liquefied natural gas (LNG) and research and development are attracting quantities of capital they have not seen in a decade or more. The oil and gas services industry is crucial to making these new investments successful and profitable. It provides a large part of the vital design, engineering, construction and management skills and personnel.
- 2.1.3 High energy prices and the consequent capital investment have sharply raised demand for oil and gas services across the whole value chain of designing, delivering and supporting oil and gas projects. The situation has been aggravated by a global shortage of skilled personnel, which has created a mismatch between the number of projects and the number of people available to carry them out. As demand for services intensifies therefore, all sections of the oil and gas industry have to find new ways of implementing projects and working together to produce the energy the world craves.

2.2 Upstream Service Provider Industry

- 2.2.1 E&P service providers have played a key role in enabling success for E&P operators worldwide. Since the late nineties, the balance in technology development and intellectual property has clearly shifted towards service providers. E&P companies leverage on latest technology and specialist services of oilfield service providers to reduce underground risks thereby improving chances of success in E&P operations.
- 2.2.2 Types of oil and gas services in upstream oil and industry may be classified under the following broad headings:
- **Drilling services** including directional drilling of oil and gas wells, re-drilling oil and gas wells, re-working oil and gas wells, spudding in oil and gas wells, well drilling gas, oil and water intake.
 - **Oil and gas field exploration services** including aerial geophysical exploration, exploration, geological exploration, geophysical exploration and seismograph surveys.
 - **Other oil and gas field services** including excavating slush pits and cellars, grading and building of foundations at well locations, well surveying, running,

cutting, and pulling casings tubes, and rods, cementing wells, shooting wells, perforating well casings, acidizing and chemically treating wells, cleaning out, bailing, and swabbing wells, Well testing and completion services.

- **Asset development services** including project management, FEED (front end engineering design) and EPCC (engineering, procurement, construction and commissioning services).
- **Facilities/asset management services** including maintenance modifications and operations.

2.3 Current Global Upstream Services Scenario

- 2.3.1 Investment decisions by the oil majors are rooted in the delicate balance between global supply and demand for oil, and key variables in the revenues of these companies are the prices of crude oil and natural gas. When prices are low, companies tend to focus on acquiring or developing new reserves. When prices are relatively high, companies step up drilling programmes, seeking to produce greater quantities.
- 2.3.2 Oil equipment and services companies are currently enjoying the strongest operating environment in more than two decades, due to a tight supply/demand balance for both oil and natural gas, which led to record high prices. With demand still growing despite the rise in prices, oil producers are seeking to expand their production, causing drilling activity to soar globally. Intense demand for rigs from producers is pushing day-rates higher and increasing rig utilization rates. These, in turn, are driving profits for drilling contractors, as well as for other service and equipment providers, to new records.
- 2.3.3 The total worldwide oilfield services market has been expanding rapidly in recent years as a result of several developments. First, the oil majors have all been outsourcing non-core activities, including many service activities which they previously handled in-house. Second, the role of independents in worldwide oil exploration and production has increased, and these companies normally follow a stringent policy of keeping capital charges low through outsourcing. Third, in recent years high prices and the resulting big profits for oil companies, have led to an upsurge in E&P investments.
- 2.3.4 The outlook for contract drilling and equipment and service providers is generally strong. Most of the industry's largest companies expressed confidence that the current environment (of strong demand for all types of oil equipment and services) will last throughout 2007 and well into 2008, citing currently strong conditions and rising levels of order backlogs. Driving these gains are expectations that worldwide spending on exploring for and producing oil and gas will keep growing in the future as it has in the past.

2.4 India's Upstream Services Sector

- 2.4.1 The current Indian upstream services scenario is no different from the global scenario. The oil and gas services market in India is dominated by foreign players

such as Schlumberger, Haliburton, Transocean, etc. While domestic service companies, in association with foreign technology providers, are also present in the Indian market, they have to do a lot of catching up with their counterparts in terms of technology, skilled manpower and revenues.

- 2.4.2 Operators are finding it difficult to contract rigs, particularly offshore rigs, to fulfil their exploration, development and production work programme. Those who have been successful in doing so have entered into contracts at high day-rates and for periods more than the industry norm.
- 2.4.3 The severity of the situation can be gauged from the fact that the issue of non-availability of rigs in the market has prompted the Government to push back announcement of the seventh round of NELP which is now expected to be announced in November this year. Such a delay could upset the Government's stated plan of undertaking exploration of the entire sedimentary basins in next few decades.
- 2.4.4 As is the case globally, the concept of rig sharing amongst operators is currently being examined with increased interest in India. Other alternatives are also being explored, with E&P companies considering whether to acquire and operate their own drilling rigs through joint ventures with contractors or farm-out a participating interest in the field to service contractors. Some companies are also mulling over the prospects of either setting up or investing in fabrication yards for the construction of offshore drilling rigs and offshore structures such as platform topsides.

2.5 Human Resource Crunch in Upstream Services Sector

- 2.5.1 While there is no dearth of opportunities in the upstream service sector worldwide, the oil and gas industry is confronted with a shortage of brawn and brains so severe that it threatens to stall exploration and production growth around the world.
- 2.5.2 The energy boom of recent years has exposed the under-investment in the oil and gas industry in the 1990s and poor prediction of future demand for people and services. Although oil and gas companies have stepped up spending in the last two or three years, much of it has gone on reserve replacement and raising production rather than service provision. Graduates and other younger people are entering the industry but many experienced engineers are close to retirement and underinvestment has left the ranks of middle managers – the next senior generation – particularly thin.
- 2.5.3 Not all regions suffer equally. Skill shortages are worst in Africa, the Middle East and parts of the Former Soviet Union. By contrast, South East Asia and the Far East do not face quite the same problems. A ready supply of labour from the Philippines, India and to a degree Indonesia alleviates some of the strain in South East Asia, where many expatriates enjoy living in any case. China is training hundreds of thousands of engineers and other qualified personnel. But overall the picture is broadly the same: oil companies, contractors and other enterprises are locked in fierce competition for a skilled labour pool which is too small for the available work.

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- 2.5.4 As per SPE the average age of a technical professional in the oil and gas industry is about 50 years. This means that within the next 15 years, about half of our colleagues will retire. Add to this the projected 30% additional professionals that will be needed to take care of our growing industry, and we end up with a staggering projection: By 2020, about 80% of the professionals who will be in the industry are currently not working in it. This means that, on average, we will need to hire 5.5% more people each year. When we add the normal attrition rate of 5 to 10%, it means that for the next 15 years, on average, one out of every seven members of a technical staff will be new in his/her job.
- 2.5.5 The Indian institutes churn out about 400+ post graduates in geosciences and petroleum engineering streams and 350,000 engineers per annum. Grooming this talent pool for taking up jobs in the E&P industry will give India an opportunity not only to meet its growing requirement of skilled E&P human resources but also to service the global E&P talent demand.

2.6 Shortage of Upstream Equipments and Services

- 2.6.1 Perhaps the biggest and more immediate challenge for the upstream services industry is to ensure timely availability of E&P equipments and services to E&P companies worldwide which has upset their plans.
- 2.6.2 The scarcest of the commodities today happens to be drilling rigs, specially offshore drilling rigs. Rig demand has generally risen globally in response to the relatively high energy prices and the service companies are operating at their fullest capacity. Other oilfield service providers are also facing similar situation. In the present scenario and future requirements, timely implementation of the work program using advance technology, is getting affected, quite often.
- 2.6.3 Rig operators have placed large orders on fabrication yards around the world but owing to the long lead time associated with rig construction this tight market situation is not expected to ease any further in the near future. Fabrication yards are running huge backlogs and some of the reputed yards are completely booked with current orders till 2010.
- 2.6.4 Indian E&P companies are also suffering due to this global shortage of rigs in the market. Further, regulatory and tax compliance procedures involve long lead time and often considered as constraint by oilfield service providers. Only a few international service companies in the field of drilling, seismic data acquisition, processing, mud logging etc. have established themselves in India. This has left very limited choice of service providers available to E&P companies with maximum unfavourable impact on small operators in the current scenario.
- 2.6.5 Rising demand for services has also led to escalation of service related costs leading to higher operational costs.

2.7 E&P Services Potential in India

- 2.7.1 The total sedimentary area being operated as on April 1, 2007 adds up to about 1.4 million km² leaving another 1.7 million km² of sedimentary area yet to be issued for

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- exploration. Even till today only 15 of the total 26 basins have been explored leaving a large portion of our sedimentary area practically untapped. As on April 1, 2006, almost 36 percent of our total sedimentary area remains unexplored or poorly explored with another 20 percent area as moderate to well explored. Presence of such unexplored and poorly explored sedimentary areas in India speaks of the potential for upstream services in the country.
- 2.7.2 While DGH has taken steps to acquire data through various surveys on such unexplored and poorly explored sedimentary areas, still there are deepwater areas where even regional data lines useful for preliminary assessment of presence of hydrocarbon are not available. Non-availability of data for such regions is a major hurdle for investments in such challenging areas by competent international oil companies for whom presence of adequate data is an essential investment prerequisite.
- 2.7.3 Upstream service such as aerial geophysical surveys, geological, geophysical and seismograph surveys etc. would certainly be much in demand in India. This conclusion is corroborated by the fact that in order to roll out the proposed Open Acreage Licensing Policy (OALP) in India DGH is committed to establishing a national repository of data relating to sedimentary basins of India.
- 2.7.4 DGH has already set about this task and active data collection exercises are being conducted in previously unknown and virgin areas. Establishment of such a data repository is expected to provide a fillip to the E&P activities in the country with more and more international E&P companies also joining in. Increased exploratory efforts increase the probability of a hydrocarbon discovery which again leads to enhanced upstream services potential in India. All this is expected to contribute to a robust upstream services market in India.
- 2.7.5 Perhaps the most important step of the Government of India towards stepping up of E&P activities in the country was the introduction of New Exploration and Licensing Policy (NELP). The new policy offers attractive fiscal and contractual terms designed to attract private investment in India's E&P sector. Under NELP the bidders submit a minimum work programme commitment. Till now a total of six rounds have been announced by the Government of India under the NELP regime. A total of 162 PSCs have been signed till date of which 52 were signed under the last round i.e. NELP VI. Another 28 PSCs were signed during the pre-NELP regime.
- 2.7.6 These work programme commitment for each block on offer is expressed in terms of number of exploratory wells, 2D, 3D seismic survey, reprocessing of existing data and other surveys such as Gravity-Magnetic, Magneto Telluric, Transient Electro-Magnetic and Geochemical analysis etc.
- 2.7.7 We shall now analyze the work commitments bid under NELP in terms of the 2D and 3D seismic surveys and number of exploratory wells. These are firm commitments and renegeing on these commitments attaches financial liability on the defaulting operator. Hence it would not be incorrect to base our estimate of upstream services requirement upon these work commitments. This could be assumed to be the basic upstream services market potential with huge upsides in case of any hydrocarbon discoveries as a result of added appraisal and development activities.

- About 59 percent of the total **2D seismic** LKM commitment for onland blocks has been completed with another 9,129 LKM of 2D seismic yet to be shot. In case of offshore blocks, about 53 percent of the committed 2D seismic LKM have been shot and another 97,055 LKM of 2D seismic is yet to be surveyed.
- About 39 percent of the total **3D SKM seismic** commitment for onland blocks has been completed with another 9,359 SKM of 3D seismic yet to be shot. In case of offshore blocks, about 61 percent of the committed 3D seismic SKM has been shot and another 50,941 SKM of seismic is yet to be surveyed.
- A total of 978 **wells**, both onland and offshore, have been committed to be drilled under the pre-NELP and NELP rounds announced till date. More than 50 percent of these well commitments have been made in the last three rounds under NELP. Of the 978 wells committed to be drilled only 23 percent i.e. 222 wells have been actually drilled with only 1 out of the 527 odd wells committed in the last three NELP rounds having been drilled so far.
- In case of onland blocks about 47 percent of the committed number of exploratory wells has been actually drilled with another 126 wells yet to be drilled. In case of offshore blocks only 40 percent of the committed number of exploratory wells has been drilled while another 125 offshore wells are yet to be drilled. Such a poor performance on the part of the operators is mainly due to the global shortage of drilling rigs, specially offshore rigs.

2.7.8 Over the next five years the average annual E&P activity growth in India under the NELP regime is expected to be about 200 percent in geophysical surveys and 500 percent in the drilling and related activities. This quantum jump in E&P activities across the country will increase the demand for E&P equipment and services such as drilling rigs, seismic vessels, cementing services, electro-logging services, and completion and testing services. Recent discoveries made in the offshore basins will lead to additional requirement of infrastructure and services such as offshore platforms, sub-sea pipelines, completion equipment and services and work-over rigs.

2.8 E&P Investments in India

2.8.1 Total E&D expenditure, in India, as on April 1, 2007 is accounted to be more than 5 billion USD. This expenditure is spread over a period of 13 years. Since year 1999-2000 exploration expenditure has gone up fivefold. Development expenditure, though not evenly spread over the years, has also been multiplied.

2.8.2 F&D expenditure has grown at a very high rate since 1999-2000. Total F&D expenditure in 1999-2000 was approximately 25 Million USD which has gone up to 2 billion (approx) in 2006-2007.

2.8.3 According to DGH estimates as on April 1, 2007, a total of US\$ 2.6 billion has been spent on 74 exploration blocks in India. Another US\$ 1.1 billion has been spent on development of 6 blocks. These exploration and development investment figures relate to the blocks awarded under the pre-NELP rounds and first two NELP rounds.

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- 2.8.4 The committed exploration investments in India has touched the US\$ 10 billion mark with the last offering of 52 blocks by the Government of India accounting for half of this investment commitment. This investment figure is besides the investment requirement for development of discovered oil and gas fields. Escalation in cost of upstream services has prompted operators to revise their investment estimates submitted in the field development plans.
- 2.8.5 The prognosticated reserve as projected by DGH is 28-32 billion tones¹ or approximately 205.24 billion barrel of oil Equivalent. Worldwide F&D cost, as referred by J.S Harold² in terms of dollar per barrel of oil equivalent is around USD 11³. To estimate the expense with an assumption that this F&D unit cost is applicable to all type of reserve and irrespective, we may project the current F&D prospect in India is approximately 2257 billion USD. This estimate is expected to be increased as the unit cost will increase manifold in future.
- 2.8.6 Major development projects in India include RIL's KG basin and Cairn's Rajasthan fields. Owing to the rising field development costs RIL has revised its development cost estimates from US\$ 2.47 billion to US\$ 8.83 billion. Cairn had submitted a field development plan with US\$ 3.2 billion development cost estimates which will go up approximately by another US\$ 750 million with the new pipeline being included in the field development plan to evacuate the viscous crude.
- 2.8.7 Other major gas discoveries currently under evaluation include ONGC and GSPC's KG basin gas discoveries for which development plans are yet to be submitted. Other discoveries include RIL's discovery in Orissa offshore. Most of this E&P investment will be towards oilfield services which form a major part of the E&P cost.

2.9 Global Offshore Exploration and Development Drilling Expenditure

- 2.9.1 Typically, E&P operators spend in excess of 60 percent of their total E&P costs on outsourced work to service providers of which drilling cost is a major component. Global offshore exploration drilling expenditure, both shallow and deepwater, for the five years to 2010 is forecast to be US\$ 112.5 billion, up from US\$ 86.3 billion over the five years to 2005. Expenditure in the short to medium term is forecast to average around \$20 – \$21 billion per annum before rising to \$25.6 billion by 2010.
- 2.9.2 Deepwater exploration drilling is growing at a faster rate than shallow water and is forecast to increase its share of total offshore exploration drilling from 22.6 percent in 2001 to 30.6 percent in 2010. Deepwater exploration drilling expenditure is forecast to increase from an estimated US\$ 5.2 billion in 2005 to US\$ 7.8 billion by

¹ Source : DGH

² Source : J S Harold in S&P Industry surveys Oil and Gas Equipment and Services August 23 2007.

³ Source : J. S Harold, 2005, S&P Industry surveys Oil and Gas Equipment and Services August 23 2007 page 22

2010. Total deepwater exploration expenditure for the five years to 2010 is forecast to be US\$ 32.3 billion compared with US\$ 20 billion for the five years to 2005.

- 2.9.3 Shallow water exploration expenditure is forecast to increase from US\$ 66.3 billion for the five years to 2005 to US\$ 80.2 billion for the five years to 2010. Engineering services is the largest cost element accounting for 46 percent of the total shallow water drilling expenditure. Major engineering cost includes well testing, completion and abandonment, drilling bits and fluids and casing and cementing.
- 2.9.4 Offshore development expenditure is forecast to rise to US\$ 31.2 billion by 2010. Shallow water development drilling expenditure in 2005 was estimated as US\$ 22.3 billion and 87.5 percent of all development drilling expenditure. Deepwater development drilling expenditure in 2005 was estimated at US\$ 3.2 billion and 12.5 percent of all development drilling expenditure.
- 2.9.5 According to the trend, deepwater development drilling expenditure is growing at a faster rate than shallow water drilling expenditure and the deepwater development drilling expenditure is forecast to continue to increase from 12.5 percent of development drilling in 2005 to over 20 percent by 2010.
- 2.9.6 A deepwater investment in the African continent is expected to drive the increase in the deepwater development drilling expenditure followed by the Asia Pacific region. By 2010 the share of the Americas in the total deepwater development drilling expenditure is forecast to decline.
- 2.9.7 The major difference between shallow and deepwater drilling is the share of cost of rigs in the total deepwater drilling expenditure. Cost of rigs accounts for 31 percent of the total cost. Engineering costs account for another 38 percent of the total deepwater drilling costs.

2.10 Will Upstream Service Companies come to India?

- 2.10.1 Recent escalation in finding and development costs due to a tight services market coupled with a new focus on the difficult to operate frontier regions has forced industry experts to revise the estimated growth rate for worldwide oil E&P expenditures (E&P) for 2007 from 9.0% (\$291 billion) at the end of 2006 to 13% (\$308 billion) at the start of June 2007⁴. These estimates are based on the investment plans of major oil and gas companies worldwide.
- 2.10.2 How does India fare as compared to such high volumes of global E&P spending? As on April 1, 2007, a total of US\$ 2.6 billion has been spent on 74 exploration blocks in India. Another US\$ 1.1 billion has been spent on development of 6 blocks awarded under the Pre-NELP and first two NELP Rounds. Thus in terms of quantum of E&P investments, India appears to be a fledgling as compared to some of the other oil and gas investment hubs.

⁴ Lehman Brothers Original E&P Spending Survey

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- 2.10.3 Given the volume of E&P activity expected over the next five years and beyond in India, the E&P service company may not find a reason compelling enough to set-up base in India. The situation is not that grim as it may appear today. New discoveries have attracted the attention of companies with big pockets towards India. India now appears as a strong investment option for the oil majors. Case in point being the deepwater bids submitted by BP under NELP VI. India's sedimentary basins remains largely unexplored but hold immense potential to be rich in hydrocarbons.
- 2.10.4 The recent discoveries have opened up a window of opportunity for upstream service providers who believe in India's prospectivity and are convinced about their investments in India. Monetisation of these discoveries would translate into a lot of business for these service companies. The current E&P activity in India is therefore expected to significantly increase over the next decade and would certainly interest upstream service companies desirous of setting up a base in India.

2.11 **Should India go for PEZ?**

- 2.11.1 The current global oil and gas services industry revenue is close to USD 150 billion. This is based on the global revenues of major players in the upstream services market. This industry revenue of major players, however, includes realisations from the sale of equipments used in the prospecting for and exploration, development and production of hydrocarbons.
- 2.11.2 Through the responses received during the primary survey of Indian E&P companies it is may be inferred that approximately 60 percent⁵ of the total E&P expenditure is spent on E&P services. This 60 percent of the total E&P spend on services is leaving the Indian shore without adding any value to the national economy.
- 2.11.3 We can make three inferences from this fact; **first:** E&P companies are hiring services from outside India as local market of such services is not present or developed so the multiplier effect of this industry segment is absent in the national economy; **second:** India is missing an opportunity to claim its share in a USD 150 billion market segment; **third:** due to lack of recognizable presence of such an important industry segment in India, the country is being deprived of an opportunity of developing a skill-set within the oil and gas sector which would be essential in the "difficult oil" era.
- 2.11.4 Presence of such a growing market segment in Indian shore will not only add convenience to E&P operators in India but will also act as a multiplier to the oil and gas sector in specific and the economy as a whole. PEZ can be considered as a strategic move to promote a hi-tech oil and gas upstream services market segment. A more holistic approach could be promoting manufacturing and production units within the PEZ for products like offshore platforms, well fluid, drill bits etc. Thus, a PEZ can be one stop support system for the E&P sector in the Indian subcontinent.

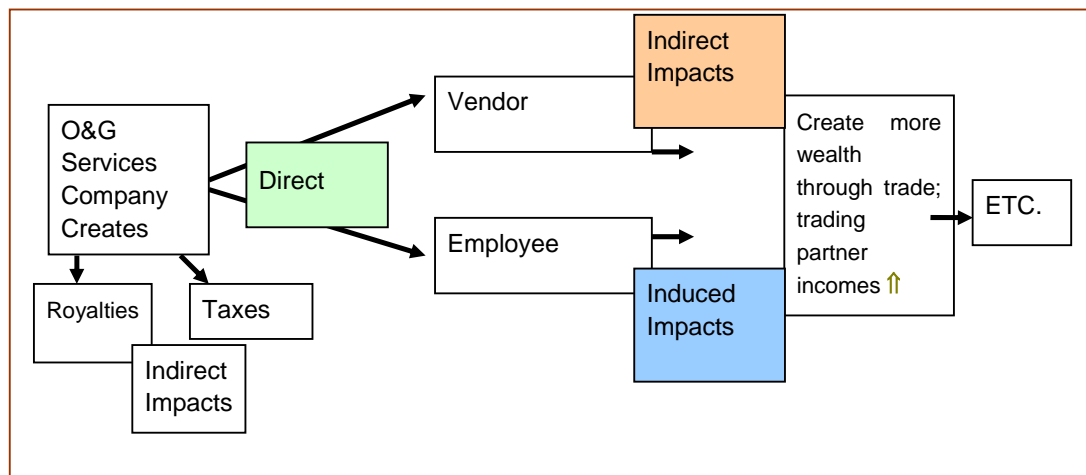
⁵ Petrofed study

2.12 Multiplier Effect

- 2.12.1 Multiplier effects are used to capture the secondary effects of the spending in a region. There are two basic kinds of secondary effects.
- 2.12.2 **Indirect effects** are the changes in sales or output, income or earnings, and jobs within backward-linked industries in the region i.e. businesses that supply goods and services to the oil and gas industry. For example, a natural gas provider buys supplies and equipment from a local store. Each business that provides goods and services locally benefits indirectly from natural gas spending.
- 2.12.3 **Induced effects** are the changes in sales or output, income or earnings, and jobs in the region resulting from household spending of income earned either directly or indirectly from natural gas spending. Employees working for natural gas firms, residents receiving royalty checks and backward-linked industries spend their income in the local region, creating additional sales and economic activity.

2.13 Successful PEZ's Worldwide

- 2.13.1 Currently there are many success stories revolving around development and promotion of a region as a Petroleum Economic Zone. Nigeria has a Free Zone, called **Onne Oil and Gas Free Zone**, dedicated solely to the oil and gas industry. This bold initiative has proved to be very important for the local community, where it supports numerous jobs and has helped to drive forward infrastructural development.
- 2.13.2 Nigeria has invested heavily in the development of the Onne Port and the private sector has invested heavily in this Free Zone. Over US\$ 300 million has been



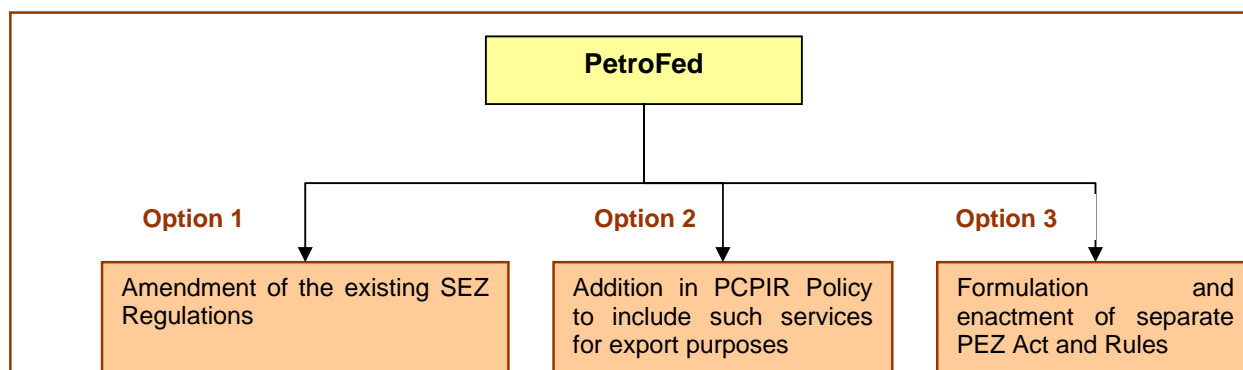
invested till date and more than 30 international oil and gas companies, including many of the world's largest corporations, are now registered as Free Zone users.

- 2.13.3 Many of the incentives available to investors are comparable to other successful Free Zones throughout the world. The facilities at Onne provide an excellent base for international companies to conduct their business operations in the dynamic West African oil and gas industry. As more and more companies set up base in the Free Zone it will further stimulate local and regional industrial and economic growth.

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- 2.13.4 Other countries such as Panama, the United Arab Emirates, Iran and the Persian Gulf have set up PEZs and Special Petrochemical Export Zones extending fiscal incentives to oil and gas companies who set up base in that country.

2.14 Way Forward for PEZ

- 2.14.1 Under the present circumstances, the following diagrammatic representation highlights the options that can be considered in order to evolve policies and regulations relevant to them:



Option 1

- 2.14.2 Under the present SEZ regulations: Represent to concerned ministries and departments of the Central Government for the appropriate Amendment of SEZ Rules:

- To expand the definition of services
- To include and suitably amend other operational provisions to facilitate the movement of goods and people for undertaking these services outside the Zone in DTA and off-shore.
- To Amend the tax legislation to include these services for tax benefits

Option 2

- 2.14.3 Revision in PCPIR Policy to include such services for export purposes.

- As the government is in advanced stages of notifying the PCPIR Policy in order to give a fillip to the petroleum and petrochemicals industry in India.
- PetroFed can represent the concerned ministry and department to include the desired services in the ambit of the PCPIR Policy. This would ensure that a unit providing such services from within a PCPIR is able to provide such services not only to other units located within that or other PCPIR's in India but is also able to export such services as and when desired.

Option 3

2.14.4 Formulation and enactment of PEZ Act and Rules

- Represent to the concerned ministries of Central Government to formulate a comprehensive, self sufficient Act duly passed by the parliament and the Rules there under and provide for necessary fiscal benefits as part of the PEZ Act akin to SEZ Act.
- The Central Government has already shown its inclination towards boosting the petroleum and petrochemicals sector with the formulation of PCPIR policy. With the representation by a reputed federation such as PetroFed the government may give this proposal a serious thought

3 Global Energy Consumption – Trends and Forecast

3.1 World Primary Energy Consumption

3.1.1 Over the past several years global economic expansion has resulted in a steady growth in world energy requirement. Over the last 40 years world primary commercial energy consumption has grown at a compounded annual growth rate (CAGR) of 3 percent. Today we consume energy 20 percent more than what we consumed ten years back. In 2006, we consumed 10,878 Mtoe of primary energy, almost three times what we consumed in 1966. These consumption figures represent only the commercially traded energy sources and do not include any non-traded energy sources which continue to play an important role in some developing countries.

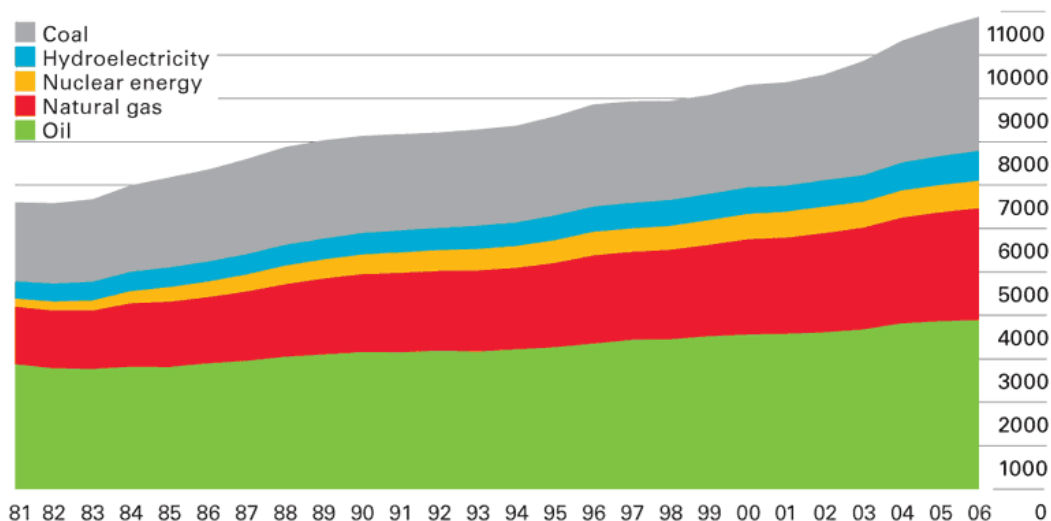
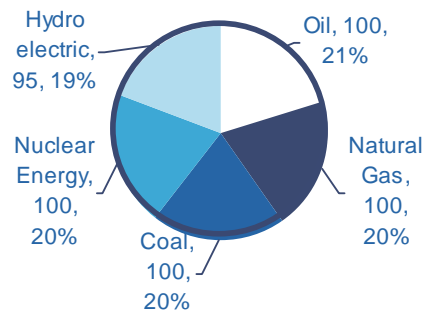


Figure 1: World Primary Energy Consumption 1981-2006 (Mtoe) (Source: BP Stats 2007)

Figure 2: World Primary Energy Mix 2006 (Source: BP Statistics 2007)

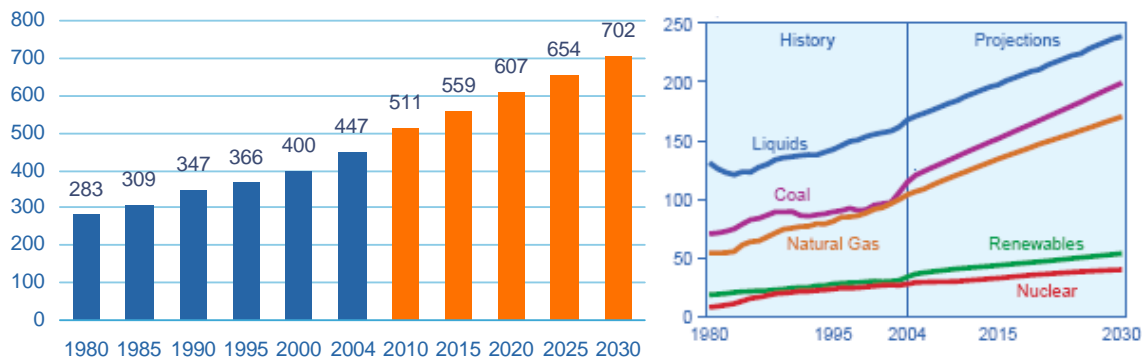
3.1.2 The commercially traded primary energy sources include oil, natural gas, coal, nuclear energy and hydro-electric power. Hydrocarbons – oil and natural gas – dominate the world primary energy mix and put together contributed a total of 41 percent in 2006. The primary energy mix varies from region to region based on the availability and economics of alternative fuels. For example, India and China rely on coal for servicing more than 55 percent and 70 percent of its primary



energy requirement respectively.

3.1.3 The dominance of oil and gas in the global primary energy basket is expected to continue as evidenced by the projections made by various agencies worldwide including EIA. It is expected that total world consumption of commercially traded energy is projected to increase by 57 percent from 2004 to 2030. The largest projected increase in energy is from the non-OECD region. Much of the growth in energy demand among the non-OECD economies occurs in non-OECD Asia, which includes China and India.

3.1.4 Fossil fuels continue to supply much of the incremental marketed energy use worldwide throughout the projection period till 2030. Liquids (primarily oil and other petroleum products) are expected to continue to provide the largest share of world energy consumption till 2030. Worldwide oil consumption is projected to increase from 83 million barrels per day in 2004 to 93 million barrels per day in 2015 and 118 million barrels per day in 2030. Natural gas consumption increases by 1.9 percent per annum on average over the next 23 years, from about 100 TCF in 2004 to 163



TCF in 2030.

Figure 3: World Marketed Energy Consumption, 1980-2030 and World Marketed Energy Use by Fuel Type 1980-2003 (Source: EIA 2007)

3.1.5 Countries, specially developing countries, realize the importance of energy security and in order to meet the economic growth targets on a sustained basis have set about at the task of securing reliable supply of oil and gas through increased exploration and production (E&P) activity worldwide. Robust economic growth demonstrated by emerging economies such as China and India and persistently high crude oil prices have resulted in a spurt of E&P activity worldwide.

3.1.6 E&P spends by companies is on the rise, the “easy oil” era is now a passé as companies move to the deepwater and ultra-deepwater regions and companies are committed to develop cutting-edge technology which is critical in accessing reserves in difficult and harsh terrains. All this translates into increased demand for oilfield services and equipments to support the E&P activities worldwide. Drilling companies are finding it difficult to service the requirements of E&P companies, fabrication yards manufacturing drilling rigs, platforms etc and equipment manufacturers worldwide are running huge order backlogs and there is an acute shortage of skilled manpower.

3.1.7 Day-rate for drilling rigs, specially deepwater rigs, has significantly shot up, specialized field management services such as directional drilling etc command huge premium, and skilled manpower draw handsome emoluments. As a result the E&P costs have considerably increased over the past few years.

4 Upstream Services Sector

4.1 Introduction

- 4.1.1 Oil and gas field services related to the development of oil and natural gas resources may be divided into two major categories: drilling and support activities. Drilling services include the supply of land and sea rigs, other specialized equipment, and expertise to oil and gas producers on a contract basis. Support activities include various services, such as seismic imaging and analysis, used in the exploration and evaluation of potential wells; wire-line services like measurement-while-drilling (MWD) which supports the drilling activity itself; and artificial lift and stimulation services, which aid in the recovery of oil and gas after the well has been drilled.
- 4.1.2 The oil and gas field services industry is composed of two tiers of firms: large, integrated companies with competence in a broad range of activities; and small and medium-sized firms that perform specialized activities. Although large firms have a distinct competitive advantage in the provision of services that are highly capital-intensive, there remain considerable opportunities for small- and medium sized enterprises to provide services. For example, geological, geophysical, and other prospecting services can be provided by relatively small specialized firms. In addition, onshore drilling and certain other support activities can be performed by smaller firms with specialized expertise.
- 4.1.3 The primary consumers of oil and gas field services are exploration and production (E&P) companies, which include large integrated companies and state-owned enterprises. These companies hold or acquire the right to explore for and produce oil and gas within a designated region. Recent changes in government policy have encouraged greater private-sector participation in the E&P segment while retaining clear state control over the management of natural resources. In exchange for the rights to market the resource, private companies provide all investment capital and compensate the government with royalties and taxes from the sale of oil and gas. By increasing the number of private companies engaged in production, these policy reforms have helped to expand the overall market for oil and gas field services.

4.2 Oilfield Services

- 4.2.1 Oilfield services cover a range of activities that originate from exploration and continue at every level of production up to the final delivery of crude. These services include operation and management services in connection with developing, producing or distributing hydrocarbon resources. Also classified as oilfield services are consultants and engineers recruited on a permanent or continuing basis at the well site or inside the oilfield who contribute to the exploration and production of oil and gas, the monitoring and reduction of the environmental impacts of these activities, and the management of relationships with local communities. Finally, oilfield services include the routine maintenance activities which are required for uninterrupted flow and delivery of oil and gas. Descriptions of oilfield services often overlook the decommissioning phase of oil activities but it is worth noting its importance to the oil and gas industry in the light

of the environmental concern about unplugged wells and the costs of dismantling rigs and of demolition and refurbishment work.

4.2.2 Corresponding to the lifecycle of a typical oil or gas field, the description of oilfield services is often categorized into services in the exploration, development, production and decommissioning phases. In recent years, production-phase services have seen the highest growth, with increased activity in well stimulation, testing, pumping and maintenance, and in work-over services for old wells.

4.2.3 The exploration phase is characterized by high technology activities. Both onshore and offshore exploration utilizes seismic surveys and detailed laboratory work for an improved understanding of the subsurface structures. Other activities involved in the exploration phase include data management and data interpretation, processing and modeling usually undertaken by specialist geologists, petroleum professionals and engineers. Types of oil and gas services in upstream oil and industry may be listed as under :

4.2.4 Oil and gas field exploration services

- Prospect Generation
- Seismic and attribute mapping
- Aerial geophysical exploration;
- Exploration;
- Geological exploration;
- Geophysical exploration;
- Seismograph surveys.

4.2.5 Development Services

- Initial development
 - Development Planning
 - Well test analysis
 - Reservoir Simulation
 - Reservoir management
 - Facilities design and construction
- Drilling services
 - Directional drilling of oil and gas wells;
 - Re-drilling oil and gas wells;

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- Re-working oil and gas wells;
 - Spudding in oil and gas wells;
 - Well drilling gas, oil and water intake
 - Field development services
 - Excavating slush pits and cellars;
 - Grading and building of foundations at well locations;
 - Well surveying;
 - Running, cutting, and pulling casings tubes, and rods;
 - Cementing wells;
 - Shooting wells;
 - Perforating well casings;
 - Acidizing and chemically treating wells;
 - Cleaning out, bailing, and swabbing wells;
 - Well testing and completion services.

4.2.6 Asset development services

- Project management;
- FEED (front end engineering design);
- EPC (engineering, procurement, construction and commissioning services).

4.2.7 Facilities/asset management services including

- Maintenance;
- Modifications;
- Operations.

4.3 Various market segments in upstream services

Table 1: Various market segments in E&P services (Source: Spares and Associates)

Artificial Lift Equipment	Offshore Contract Drilling
Casing and Tubing Services	Offshore O&M Contracting
Casing Hardware & Cementation Products	Oil Country Tubular Goods
Coiled Tubing Services	Petroleum Aviation
Completion Equipment & Services	Pressure Pumping Services
Contract Compression Services	Production Testing Services
Directional Services	Rental Services
Downhole Drilling Tools	Rig Equipment
Drill Bits	Solids Control Equipment
Drilling & Completion Fluids	Specialty Chemicals
Floating Production Contractors	Subsea Equipment
Geophysical Equipment & Services	Supply Vessels
Inspection and Coating	Surface Equipment
Land Contract Drilling	Unit Manufacturing (CT/Cement/Frac/Wireline)
Logging While Drilling	Well Servicing
Mud Logging	Wireline Logging
Offshore Construction Services	

5 Current Global and Indian Upstream Services Scenario

5.1 Introduction

- 5.1.1 Developments in the global oil service business are driven primarily by the state of E&P investments by the oil majors in different oil-producing regions of the world. Investment decisions by the oil majors are rooted in the delicate balance between global supply and demand for oil, and key variables in the revenues of these companies are the prices of crude oil and natural gas. When prices are low, companies tend to focus on acquiring or developing new reserves. When prices are relatively high, companies step up drilling programmes, seeking to produce greater quantities.
- 5.1.2 Oil equipment and services companies are currently enjoying the strongest operating environment in more than two decades, thanks to a tight supply/demand balance for both oil and natural gas, which led to record high prices during 2006. With demand still growing despite the rise in prices, oil producers are seeking to expand their production, causing drilling activity to soar globally. Intense demand for rigs from producers is pushing day-rates higher and increasing rig utilization rates. These, in turn, are driving profits for drilling contractors, as well as for other service and equipment providers, to new records.
- 5.1.3 The total worldwide oilfield services market has been expanding rapidly in recent years as a result of several developments. First, the oil majors have all been outsourcing non-core activities, including many service activities which they previously handled in-house. Second, the role of independents in worldwide oil exploration and production has increased, and these companies normally follow a stringent policy of keeping capital charges low through outsourcing. Third, in recent years high prices and the resulting big profits for oil companies, have led to an upsurge in E&P investments.

5.2 Tight supplies fuel drilling boom

- 5.2.1 More than a decade of global economic growth has caused global demand growth for oil and gas to outpace new supply, pushing prices higher and higher. With demand for both oil and gas forecast to keep rising, oil and gas producers have become increasingly confident that elevated prices since 2002 will last well into the future, helping to support a surge of drilling activity around the world.
- 5.2.2 Demand for new wells caused the number of active drilling rigs to spike in 2006 worldwide. Globally demand for rigs was strong. There were 3,174 rigs operating around the world in August 2006, according to Baker Hughes - the highest monthly total since January 1986.

5.3 Offshore drilling activity hits new highs

- 5.3.1 Demand for offshore drilling is extremely strong, with more rigs working more days per month at higher rates during 2006. As of November 22, 2006, there were 653 mobile offshore drilling units (MODUs) in the worldwide fleet, according to ODS-Petrodata, an industry consultant and data publisher, compared with 641 rigs a year ago.
- 5.3.2 Utilization rates of the larger fleet are higher as well, at 91.1%, compared with 89.1% a year earlier. That is pushing day-rates higher as well. The average day-rate for the worldwide fleet of semi-submersible rigs that can drill in waters of 5,000 feet or deeper reached a record high of \$444,000 in July 2006, up 75% from a year earlier, according to ODS-Petrodata. In October, Bermuda-based SeaDrill Ltd. announced that it had contracted its deepwater drillship West Polaris, currently under construction in South Korea (with a finish date in 2008), for three years at an eye-popping day-rate of \$520,000 upon completion.
- 5.3.3 Market conditions for rigs vary around the world, with the market for jack-up rigs in the US Gulf of Mexico - where 23% of the worldwide fleet is based - notably weaker than other regions. The utilization rate for the 84 rig fleet in Asia/Australia was an extremely strong 96.4% in November, according to ODS-Petrodata, with five more rigs in operation and nine more rigs under contract compared with a year ago. In West Africa, 10 more rigs have joined the fleet, for a total of 53; the utilization now stands at 100%, compared with 97.7% a year earlier.
- 5.3.4 Concerns over hurricanes, which caused severe damage in 2005, and strong demand elsewhere have served to undermine market conditions in the Gulf, where the fleet has dropped to 140, from 155 a year ago and from 250 in 2001. The utilization rate also has suffered, dropping in November 2006 to 80.0%, compared with 83.9% a year ago. The changes in the fleet and utilization rates are mirrored in day-rates, with the rates in the Gulf lagging behind that elsewhere. For example, day-rates for a 300-foot independent cantilevered varied between \$100,000 and \$130,000 in November 2006, according to ODS-Petrodata, while a similar rig in the Mediterranean/Africa region fetched between \$170,500 and \$188,000. Day-rates for those rigs in the Middle East were between \$161,000 and \$195,000, while those based in Asia/Australia commanded between \$185,000 and \$220,000 per day.

5.4 Strong drilling activity brings record earnings

- 5.4.1 Many oil equipment and services companies posted record profits during the first nine months of 2006, as strong drilling activity boosted demand for their services. Contract drillers, both onshore and offshore, are reporting record results, while equipment and service providers have also experienced profit gains.
- 5.4.2 The four largest offshore contract drillers - Transocean, GlobalSantaFe, Diamond Offshore Drilling and Noble Corp posted dramatic profit growth during the first three quarters of 2006, thanks to the exceptionally strong operating environment of strong rig utilization rates and high day-rates.
- 5.4.3 Land drillers reported record profit gains and strong demand for their rigs in 2006, though the surge in demand has been causing delays in repairs and delivery of new

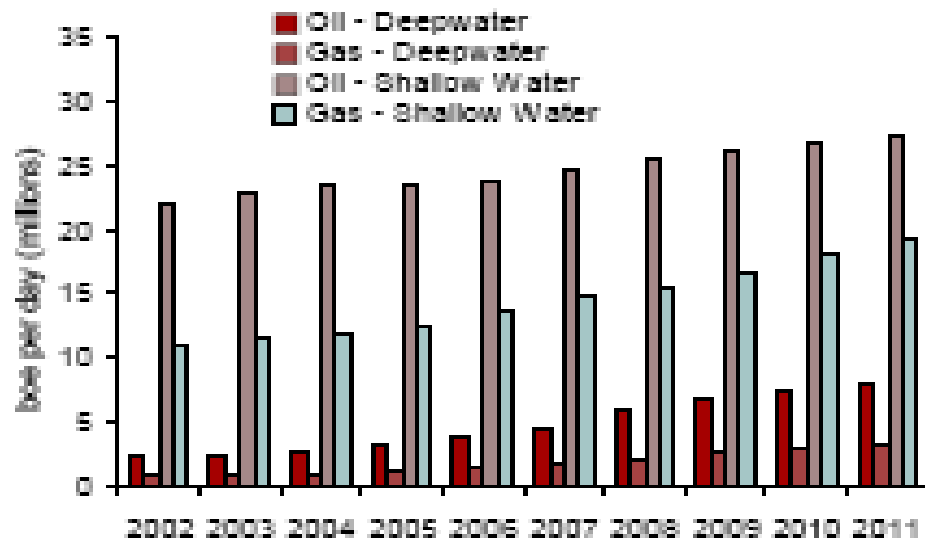
rigs, as well as an escalation of costs for refurbishing rigs and manning them. A worrying development for land drillers may be the fact that cost inflation is growing, since less of the company's revenue increase is showing up on the bottom line.

5.4.4 Drilling equipment makers and service providers also benefited from the drilling boom, with sales volumes rising along with prices, though earnings growth was not as strong as it was for contract drillers.

5.5 Deepwater – Technology and Trends

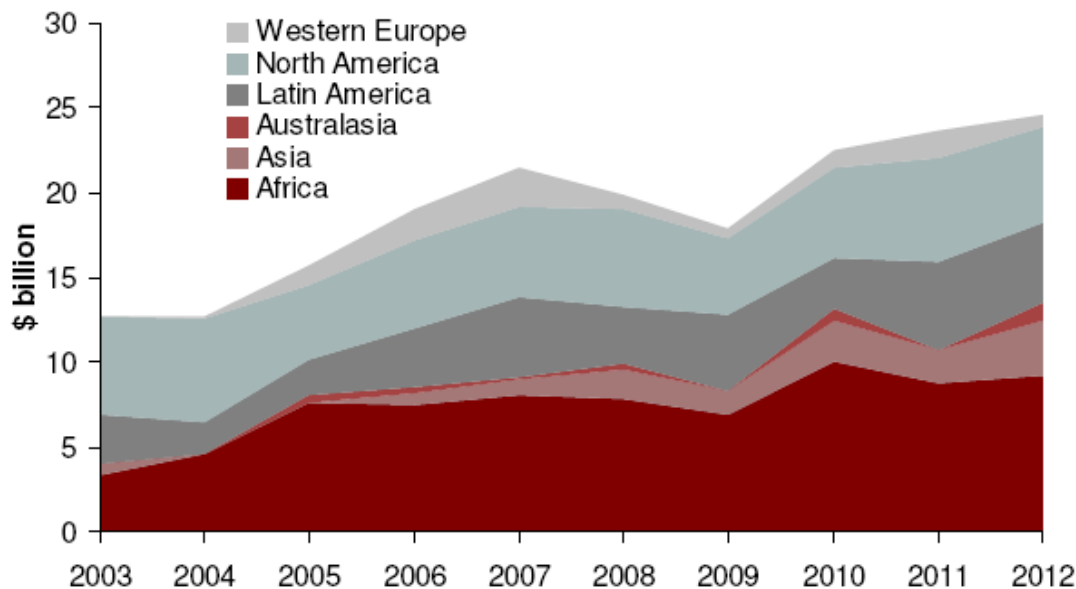
5.5.1 Deepwater activity continues to provide the engine of growth for offshore oil and gas activity and with declining alternatives for many operators, is likely to continue so for many years to come. As commodity prices have increased and the debate over future reserves has intensified the significance of deepwater has become very evident. All of the top oil and gas companies regard deepwater exploration and production as a key element of their strategic development for the coming decades.

5.5.2 Douglos Westwood in a presentation to a deepwater forum has presented the data till 2006 on deepwater, as follows. In 2005, 33 new deepwater discoveries were announced, compared to 40 in 2004 and 57 in 2003 and to date 19 in 2006. 33 fields have been brought into production in 2006, compared to 19 in 2005 and 23 in 2004. Total deepwater production to grow from 6 mm boe/d in 2007 to 11 mm boe/d in 2011⁶. The production in deep water is presented in figure below:



5.5.3 As projected by Douglos-Westwood the deepwater expenditure is likely to reach USD 25 billion annually by 2012. The region wise breakup, as presented in the report is represented in the figure below.

⁶ Source : Douglos west wood



Deepwater Capex by Region 2008-2012

- 5.5.4 Deepwater oil production accounts for almost 15% of total offshore production, but over the next few years its share relative to shallow water output will grow – accounting for around 20% of offshore production by 2011.
- 5.5.5 In deepwater, as expressed by the industry pioneers, service life and well-stream properties are critical for the design basis of a field development plan. Deeper reservoirs – starting at 25,000 feet beneath the seabed – are high-pressured and very hot. There are endless variety of other challenges such as swift currents, complex geology, salts, and the potential formation of ice-like hydrate crystals and waxes inside equipment and lines. High end technologies even robotics are used to extract oil from deep and ultra deep waters.
- 5.5.6 Deep water is unpredictable and unknown and thus prospect and challenge are intertwined to make the E&P activity expensive yet unavoidable. However, deepwater and arctic reserves are future prospects yet to be explored.

5.6 Global upstream services sector outlook

- 5.6.1 The outlook for contract drilling and equipment and service providers is generally strong. Most of the industry's largest companies expressed confidence that the current environment (of strong demand for all types of oil equipment and services) will last throughout 2007 and well into 2008, citing currently strong conditions and rising levels of order backlogs. Driving these gains are expectations that worldwide spending on exploring for and producing oil and gas will keep growing in the future as it has in the past.

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- 5.6.2 For offshore rigs, 2007 looks to be another strong year. ODS-Petrodata's World Rig Forecast predicts that an expected marketed surplus of 29 rigs in December 2006 will disappear and turn into a supply deficit by March 2007. Overall, supply will fall short of potential demand by an average of 16 rigs during 2007, according to ODS-Petrodata forecasts, while average annual utilization rates will hit 99%. Demand for jack-ups and semi-submersibles will outstrip supply during 2007, while the supply and demand for drill-ships will be about equal. Offshore driller Noble Corp. predicts that offshore capital and operating spending will rise by a compound annual rate of 6.4% from 2006 to 2010.
- 5.6.3 The outlook for land drilling is still strong, though somewhat less bright. Experts believe that the current land drilling boom may be in its last phase, and profit margins will begin to subside somewhat as costs keep rising. In Canada, for instance, the Petroleum Services Association of Canada is predicting a 10% decline in the number of new wells drilled in 2007 - the first annual decline since 2002. A key issue will be whether US natural gas prices rebound from their decline during 2006, or keep falling back to levels closer to historical averages.

5.7 **India's Upstream Services Sector**

- 5.7.1 During the early days of E&P sector development in India the NOCs were given the responsibility of developing upstream services outfits within the company. ONGC and OIL have since developed an in-house upstream services portfolio ranging from ownership and operation of drilling rigs, seismic surveys, associated oilfield services and R&D institutes. The NOCs, however, had to depend upon foreign service providers such as Schlumberger for any specialised services required in some challenging formations.
- 5.7.2 While the in-house upstream services department of NOCs continued to provide service the NOCs found it increasingly difficult to meet the ever increasing upstream services requirements. These in-house outfits, while performing commendable services for the NOCs, have demonstrably been slow to align with the advancements in upstream services technology worldwide which has placed their foreign counterparts in a competitively better position. The hydrocarbon sector opened up in 1993 and the foreign oilfield service companies, eyeing the opportunities made available in India with the conscious efforts made by the Government of India in promoting its acreages, set up shops in India and have since managed to garner a sizeable share in the Indian oilfield service market.
- 5.7.3 The current Indian upstream services scenario is no different from the global scenario. Operators are finding it difficult to contract rigs, particularly offshore rigs, to fulfil their work commitments. Those who have been successful in doing so have entered into contracts at high day-rates and for periods more than the industry norm.
- 5.7.4 The Directorate General of Hydrocarbons (DGH) had initiated a study on the issue of global shortage of offshore drilling rigs and its impact on India and based on the findings of the study recommended to the Ministry of Petroleum and Natural Gas (MoPNG) to merge the duration of exploration phases of NELP III and NELP IV blocks in which the exploration Phase I have expired or will be expiring shortly. MoPNG, accepting this recommendation has promptly issued a notification to that

effect in 2007. DGH had recommended the merger of phases due to non-availability of offshore rigs on the analogy of relief extended by the Mineral Management Services (MMS) of USA, subject to fulfilment of certain conditions, in case of areas (leases) operated by companies in the Gulf of Mexico.

5.7.5 The severity of the situation can be gauged from the fact that the issue of non-availability of rigs in the market has prompted the Government to push back announcement of the seventh round of NELP which is now expected to be announced sometime in November this year. Such a delay could upset the Government's stated plan of undertaking exploration of the entire sedimentary basins in next few decades.

5.7.6 The concept of rig sharing amongst operators, therefore, is currently being more widely examined with increased interest including in India. Other alternatives are also being explored, with E&P companies considering whether to acquire and operate their own drilling rigs through joint ventures with contractors or farm-out a participating interest in the field to contractors.

5.7.7 Hiving off of the in-house oilfield services department of ONGC and OIL has been discussed at various official forums and differing views have emerged. While it makes sense to follow the worldwide trend of outsourcing "non-core" activities such as ownership and operation of drilling rigs and recommend the hiving-off option, the current situation of non-availability of upstream services such as drilling rigs has, however, sent the "lean and thin" organisations into serious sourcing and contracting problems for such essential but scarce upstream services. ONGC, after a long time interval, has placed orders for the fabrication of onland drilling rigs on Bharat Heavy Electricals Limited (BHEL).

6 Challenges in Upstream Services Sector

6.1 Human Resource

- 6.1.1 From the industrial platforms of oil rigs to air-conditioned design offices, the oil and gas industry is confronted with a shortage of brawn and brains so severe that it threatens to stall exploration and production growth around the world. The energy boom of recent years has exposed the under-investment in the oil and gas industry in the 1990s and poor prediction of future demand for people and services. Although oil and gas companies have stepped up spending in the last two or three years, much of it has gone on reserve replacement and raising production rather than service provision. Graduates and other younger people are entering the industry but many experienced engineers are close to retirement and underinvestment has left the ranks of middle managers – the next senior generation – particularly thin.
- 6.1.2 Not all regions suffer equally. Skill shortages are worst in Africa, the Middle East and parts of the Former Soviet Union. By contrast, South East Asia and the Far East do not face quite the same problems. A ready supply of labour from the Philippines, India and to a degree Indonesia alleviates some of the strain in South East Asia, where many expatriates enjoy living in any case. China is training hundreds of thousands of engineers and other qualified personnel. Indeed, some Chinese companies are competing with western contractors, offering their services in the Middle East and even Calgary, where the oil and gas boom is causing typical labour market overheating. But overall the picture is broadly the same: oil companies, contractors and other enterprises are locked in fierce competition for a skilled labour pool which is too small for the available work.
- 6.1.3 The most significant shortage is the lack of experienced professionals in almost every part of the oil and gas business. Years of underinvestment in new talent have led to a limited and ageing pool of skilled workers. Replacing these people cannot be done overnight and while the industry has begun to hire again in considerable numbers, it takes time to train the large numbers of new recruits.
- 6.1.4 At present, the average employee working for a major operator or service company is 46 to 49 years old, according to the Interstate Oil and Gas Compact Commission (IOGCC) in the United States. Today, there are some 1,700 people studying petroleum engineering in 17 US universities compared with over 11,000 in 34 universities in 1993.
- 6.1.5 Industry participants and watchers look east for new hire solutions, citing, for example, the Moscow Institute of the Petrochemical and Gas Industry, which has an enrolment of 8,000 students and is adding 1,500 each year. But this might only provide local solutions, with western-based international oil companies (IOCs) struggling to attract and integrate large numbers of foreign nationals.
- 6.1.6 Until now, companies have been able to work around the growing talent gap with increasing automation, process efficiencies and by turning to universities and outside service companies for incremental operating and project delivery capacity. But these adjustments alone are increasingly inadequate to make up for the

growing shortage of skills and knowledge as activity levels rise and senior employees leave the industry. In many companies the 2007 planning cycle will likely show growing staffing and skills gaps opening up over the next 5 years.

6.1.7 As per SPE the average age of a technical professional in the oil and gas industry is about 50 years. This means that within the next 15 years, about half of our colleagues will retire. Add to this the projected 30% additional professionals that will be needed to take care of our growing industry, and we end up with a staggering projection: By 2020, about 80% of the professionals who will be in the industry are currently not working in it. This means that, on average, we will need to hire 5.5% more people each year. When we add the normal attrition rate of 5 to 10%, it means that for the next 15 years, on average, one out of every seven members of a technical staff will be new in his/her job.

6.1.8 A global survey quantifying the supply and demand of petro-technical expertise indicates that Asian countries like India, China, Indonesia, Venezuela and Mexico generate more talent. While this study considers the situation as of 2005, with increasing focus within this region and in Africa, significantly higher talent pool needs to be generated than what is projected in the study

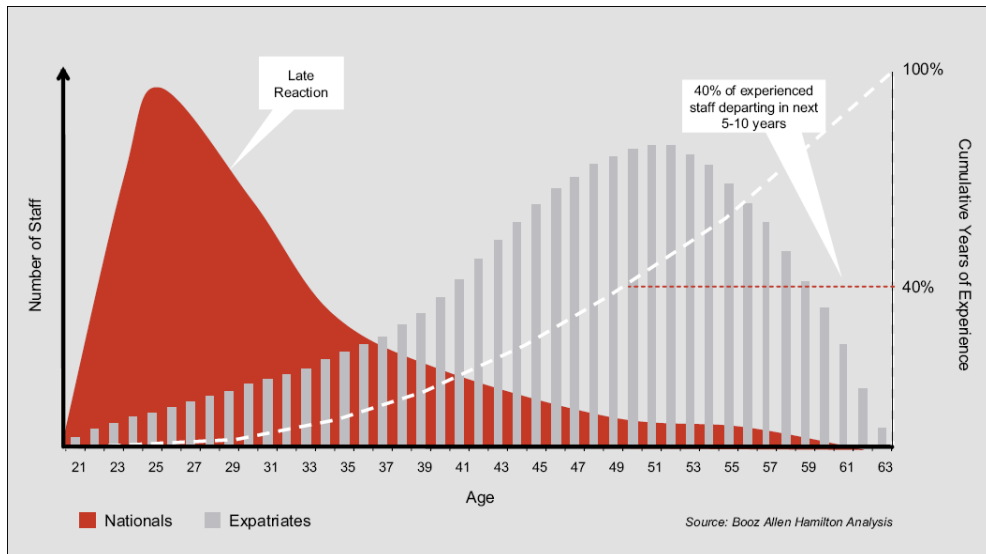


Figure 4: Staff profile in a typical Middle East/Asian national oil and gas operating company (Source: Booz Allen Hamilton)

6.1.9 Increasing gap between demand and supply of human resources in the E&P sector has led to:

- Cost escalation
- Poor service response
- Deteriorating service quality

6.1.10 The Indian institutes churn out about 400+ post graduates in geosciences and petroleum engineering streams and 350,000 engineers per annum. Grooming this talent pool for taking up jobs in the E&P industry will give India an opportunity not

only to meet its growing requirement of skilled E&P human resources but also to service the global E&P talent demand.

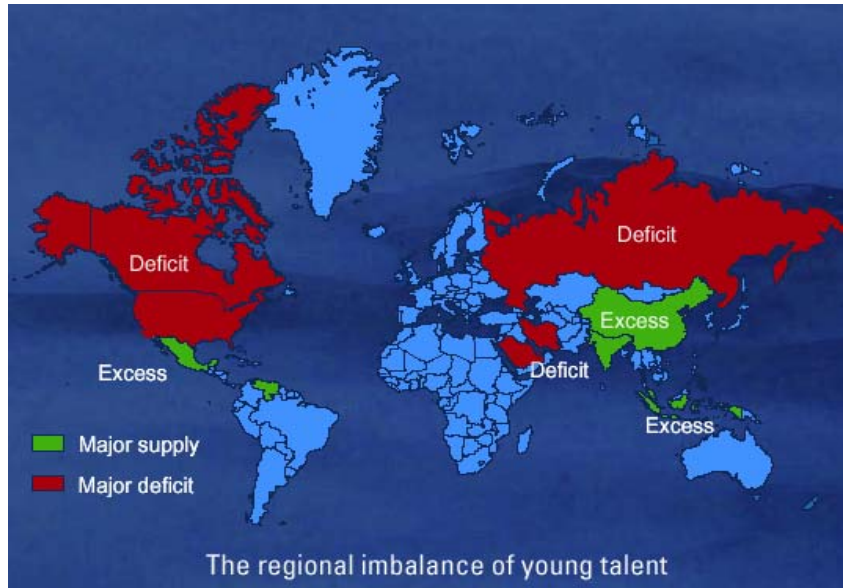


Figure 5: Global Manpower Supply and Deficit Regions (Source: Booz Allen Hamilton)

6.2 Equipment and Services

6.2.1 There are four major types of equipment and services businesses: offshore oil rigs, onshore oil rigs, drilling equipment, and services. Drilling companies provide the rigs and operate them, either on a project or long-term contract basis. Typically, land-drillers operate under varying types of contracts, with rates charged either by the day, foot drilled, or on an all-inclusive or "turnkey" basis. Offshore drilling contracts are mostly written on a day-work basis, with an occasional turnkey contract.

6.2.2 **Offshore Rigs:** Offshore drillers own and operate rigs known as mobile offshore drilling units (MODUs) that are used to drill for oil and gas in coastal or inland waters of varying depth. These rigs are highly complex structures, with large work crews that often live on board, and the companies that own them tend to specialize in that specific task rather than offering onshore drilling rigs as well. Types of Rigs are:

- Submersible Rigs
- Jack-up Rigs
- Semi-submersible Rigs
- Drill ships

6.2.3 **Onshore Drilling Rigs:** These rigs are generally categorized by how deep they can drill. Light duty rigs can drill up to 5000 feet; medium duty rigs upto 10,000 feet; heavy duty rigs upto 16,000 feet and very heavy duty rigs up to 30,000 feet.

6.2.4 **Drilling equipments:** Normal drilling operations proceed from drilling the hole, to adding a new joint of pipe as the hole deepens, to hoisting the drill string out of the hole to put on a new bit and running it back to the bottom. The drill string, also called the drill column or stem, is an assembly of drill pipe and collars that extends from the rig floor to the bottom of the hole. The process of raising and lowering it with a new drill bit is called a “round trip.” Finally, large diameter steel pipe (casing) is run into the hole and cemented at various predetermined intervals. Major equipments used for drillings are

- a) **The Drill Bit:** Three companies dominate the market: Smith Bits, Hughes Christen Co. (Baker Huges Inc) and Security DBS (Halliburton). Presence in India is through agency/dealers. In India there is no production unit or warehouse facility to cater Southeast Asia.
- b) **Drilling Fluids:** The drilling fluid market is dominated by Halliburton’s Baroid Drilling Fluids, M-I Swaco (A JV by Smith Intl and Slumberger Ltd) and Baker Huges
- c) **Mud Pumps:** Major mud pump manufacturers National Oilwell Varco Inc, Gardner Denver Inc., and Rowans Ellis Williams.
- d) **Drill Pipe Casing and Tubing:** Major market participants are Grant Prideco Inc., Smith International’s Services, United States Steel Corp and its subsidiary Lone Star Technologies Inc.
- e) **Well head Equipment:** Leading manufacturer of wellhead equipment include Cameron International Corp., Hydril, National Oilwell Varco, Aker Kaverne ASA etc.

6.2.5 Perhaps the biggest and more immediate challenge for the E&P industry is the shortage of E&P equipment and services which has adversely impacted the plans of E&P companies worldwide. The rig demand has generally risen globally in response to the relatively high energy prices and the service companies are operating at their fullest capacity. Other oilfield service providers are also facing similar situation. In the present scenario and future requirements, timely implementation of the work program using advanced technology, is getting affected, quite often. Rig operators have placed large orders on fabrication yards around the world but owing to the long lead time associated with rig construction this tight market situation is not expected to ease any further in the near future. Fabrication yards are running huge backlogs and some of the reputed yards are completely booked with current orders till 2010.

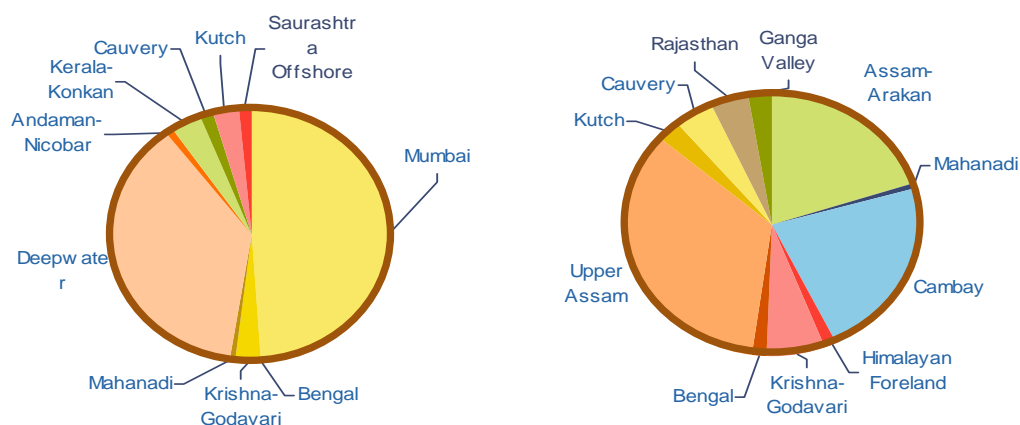
6.2.6 Indian E&P companies are also suffering due to this global shortage situation in the rig market. Further, regulatory and tax compliance procedures involve long lead time and often considered as a constraint by oilfield service providers. Only a few international service companies in the field of drilling, seismic data acquisition, processing, mud logging etc. have established themselves in India. This has left very limited choice of service providers available to E&P companies with maximum unfavourable impact on small operators in the current scenario. Rising demand for services has also led to escalation of service related costs leading to higher operational costs.

7 Assessment of E&P Services Potential in India

7.1 Sedimentary Basins in India

- 7.1.1 India has sedimentary area comprising of 26 sedimentary basins and deepwater basins with an estimated hydrocarbon potential of about 28 billion tonne of oil and oil equivalent of gas. The sedimentary basins add up to approximately 3.14 million km² with 1.78 million km² comprising of the onland (44%) and shallow offshore (13%) areas up to the 200 metre isobaths line. In the deepwaters beyond 200 metre isobaths, the sedimentary area has been estimated to be about 1.35 million km².
- 7.1.2 Even till today only 15 of the total 26 basins have witnessed exploratory efforts leaving a large portion of our sedimentary area practically untapped. As on April 1, 2006, almost 36 percent of our total sedimentary area remains unexplored or poorly explored with another 20 percent area as moderate to well explored. This indicates the potential for upstream services sector in India. Of the total sedimentary area, 40 percent of the area is in non-frontier basins while the balance 60 percent area is in the difficult to explore frontier basins. Majority of this frontier basin area lies in the deepwaters while only 28 percent area lies in the onland and shallow-water area.
- 7.1.3 Currently it is estimated that the 15 sedimentary basins in India hold 205 billion barrels of prognosticated resources. As on April 1, 2006, India has an established reserve base of 61 bn bbls. As on April 1, 2006, of the total hydrocarbon resources of 28 bn ton of oil and oil equivalent of gas estimated to be in India, about 67% is in the offshore sedimentary basins while the balance 33% is in the onland sedimentary basins. About 86% of the total offshore hydrocarbon resources are situated in the Mumbai and the deepwater basins. In the onland basins about 76% of the estimated hydrocarbon resources are situated in Assam-Arakan and Upper Assam basins in the north-east part of India and in the Cambay basin in Gujarat.

Figure 6: Offshore and Onland Distribution of Hydrocarbon Resources in India As on April 1, 2006 (Source: DGH)



7.2 Upstream Regulatory Regimes in India

- 7.2.1 The evolution of the Indian E&P industry can broadly be discussed based on the then existing regulatory regime for upstream investment. From the nomination phase India graduated to the exploration bidding rounds till the introduction of the New Exploration Licensing Policy in 1999. We shall briefly discuss these phases and focus on the NELP rounds which have been successful in attracting both foreign and domestic private upstream investment in India.
- 7.2.2 Till late 1970s the upstream sector was dominated by the upstream NOCs of ONGC and OIL. These companies were responsible for the development of oil and gas resources of the country. Both ONGC and OIL had in-house departments to make surveys, assess data, analyze prospects, and drill exploratory, development and producer wells.
- 7.2.3 It was soon realized that NOCs with technology and capital constraints cannot effectively develop India's hydrocarbon resources. The Government, therefore, sought to invite foreign E&P capital in the country. The earliest effort at attracting foreign companies to invest was in the mid-seventies. The Government, however, received a very poor response from foreign companies.
- 7.2.4 Exploration bidding rounds started in 1979, but the early rounds were not successful. The first four rounds took twelve years to come (1979-91). The next five rounds came in two years (1994-95) and succeeded in generating some interest in the international oil industry. An innovation was also introduced in the ninth round – known as the JV round – to reduce the risk for the private investors by associating ONGC/OIL as partners in these exploration ventures. However, the rigid decision making structures of NOCs created problems of compatibility and reduced the attractiveness of this innovation.
- 7.2.5 To raise the interest of foreign companies in the E&P sector, the government decided to award some small and medium size fields for development in the private and joint sectors respectively and came out with two rounds in 1992 and 1993. These rounds evinced tremendous response from foreign players. Also, in order to upgrade the information on hydrocarbon potential of India's unexplored sedimentary basins, the GoI offered blocks for speculative geophysical survey during 1993 to 1995.
- 7.2.6 Despite favourable terms and conditions extended to bidders the nine pre-NELP bidding rounds conducted for exploratory blocks met with poor response. This dismal performance could be attributed to a number of reasons such as perception of low prospectivity of blocks offered carried by bidders, lack of suitable incentives to match the high exploration risk in India, delays in policy making and implementation of exploration policies, 40% risk-free equity for PSUs in case of discovery, and non-availability and lack of good quality data to evaluate the blocks on offer.
- 7.2.7 The Government sought to make amends with the introduction of the New Exploration Licensing Policy (NELP) which offered very attractive fiscal and contractual terms and conditions to the bidders. Introduction of NELP in 1999 triggered increased E&P activity in India. In the next chapter we shall analyse the

achievements of the six NELP rounds announced so far in order to assess the potential for E&P services in India.

7.3 Introduction of NELP

- 7.3.1 As discussed above the previous bidding rounds for exploration blocks were not successful in attracting private investment in the E&P sector and hence the reserves accretion targets set were not met. NELP was introduced by the Government to attract such private investment in the domestic E&P sector by offering a conducive regulatory environment in India.
- 7.3.2 Perhaps the most important step of the Government towards stepping up of E&P activity in the country was the introduction of New Exploration and Licensing Policy (NELP). NELP offered attractive fiscal and contractual terms designed to attract private investment in the E&P sector. Under NELP, mandatory state participation was removed, NOCs were made to compete with private companies on an equal footing, companies were given freedom to market their produce at market determined prices, and there was no cess on production or signature, discovery or production bonus. Fiscal incentives under the new policy encouraged companies to bid for even those blocks which had not attracted much attention under the previous policy environment.
- 7.3.3 The first round of bidding under NELP took place in 1999 and the Production Sharing Contracts (PSCs) were signed by the Government in 2000 with the successful bidders. For the very first time offshore blocks were categorized and offered as shallow water and deepwater blocks.
- 7.3.4 The objective of NELP is to facilitate and hasten the exploratory efforts being undertaken by public and private sector companies in India. To achieve this objective, the bid evaluation criterion (BEC) under NELP is designed to encourage bids committing higher work commitment. This is done by suitably awarding marks, under the BEC, to the Minimum Work Programme (MWP) bid by the bidders for each of the phases during the exploration period. MWP is the bare minimum commitment of the bidder and the actual work programme on the block may exceed this minimum commitment. Non-completion of MWP invites penalty and the operator has to pay the money's worth of the unfinished work programme to the Government of India.
- 7.3.5 In the sixth round under NELP a mandatory work programme requirement was introduced for each block on offer which was besides the biddable MWP. Under NELP bidders are free to bid only a seismic work obligation in the first exploration commitment phase, with a minimum commitment of one exploratory well in the second phase.
- 7.3.6 This work programme commitment bid for by the bidders under NELP for each block on offer is expressed in terms of exploratory wells, 2D, 3D seismic survey, reprocessing of existing data and other surveys such as Gravity-Magnetic, Magneto Telluric, Transient Electro-Magnetic and Geochemical analysis etc.
- 7.3.7 Owing to the attractive fiscal and contractual terms offered under NELP and the subsequent world-class oil and gas discoveries in the blocks awarded under NELP,

it has been successful in meeting its stated objective of attracting private investment in India's E&P sector. Major private players active in the E&P scenario in India include the likes of Reliance Industries Ltd, British Gas, Cairn Energy, Hindustan Oil Exploration Company, Niko Resources, Hardy Exploration and Production (India) Ltd etc. The public sector companies ONGC and OIL, however, continue to dominate India's E&P sector in terms of acreage held, current oil and gas production etc.

7.4 E&P Services Potential

- 7.4.1 The total sedimentary area being operated as on April 1, 2007 issued under the PELs and Mining Lease (ML) adds up to about 1.4 million km² leaving another 1.7 million km² to be issued for exploration. Presence of such unexplored and poorly explored sedimentary areas in India speaks of the potential for upstream services in the country.
- 7.4.2 While DGH has taken steps to acquire data through various surveys on such unexplored and poorly explored sedimentary areas, still there are some deepwater areas where even regional data lines useful for preliminary assessment of presence of hydrocarbon are not available. Non-availability of data for such regions is a major hurdle for investments in such challenging areas by competent international oil companies for whom presence of adequate data is an essential investment prerequisite.
- 7.4.3 Upstream service such as aerial geophysical surveys, geological, geophysical and seismograph surveys etc. would certainly be much in demand in India. This conclusion is corroborated by the fact that in order to roll out the proposed Open Acreage Licensing Policy (OALP) in India DGH is committed to establishing a national repository of data relating to sedimentary basins of India. DGH has already set about this task and active data collection exercises are being conducted in previously unknown and virgin areas. Establishment of such a data repository is expected to provide a fillip to the E&P activities in the country with more and more international E&P companies also joining in. Increased exploratory efforts increase the probability of a hydrocarbon discovery which again leads to enhanced upstream services potential in India. All this is expected to contribute to a robust upstream services market in India.
- 7.4.4 In order to assess the upstream services potential in India we shall now focus on the work programme commitments made by the E&P operators in pre-NELP and NELP bidding rounds. Till now a total of six rounds have been announced by the Government of India under the NELP regime. A total of 162 PSCs have been signed till date of which 52 were signed under the last round i.e. NELP VI. Another 28 PSCs were signed during the pre-NELP regime.
- 7.4.5 We shall now analyze the work commitments bid under NELP in terms of the 2D and 3D seismic surveys and number of exploratory wells. These are firm commitments and reneging on these commitments attaches financial liability on the defaulting operator. Hence it would not be incorrect to base our estimate of upstream services requirement upon these work commitments. This could be assumed to be the basic upstream services market potential with huge upsides in

case of any hydrocarbon discoveries as a result of added appraisal and development activities.

7.4.6 About 2.8 lakh line km (LKM) of 2D seismic survey was committed in the pre-NELP and the six rounds of NELP. More than 55 percent of such commitment was made in the sixth round of NELP for the 52 blocks awarded to the successful bidders. About 1.2 lakh LKM of 2D seismic has already been shot in these blocks. The actual 2D work undertaken for the blocks awarded under the pre-NELP rounds and the first three rounds under NELP exceeded the minimum work commitment made during the bidding rounds for those blocks. About 59 percent of the total 2D seismic LKM commitment for onland blocks has been completed with another 9,129 LKM of 2D seismic yet to be shot. In case of offshore blocks, about 53 percent of the committed 2D seismic LKM have been shot and another 97,055 LKM of 2D seismic is yet to be surveyed.

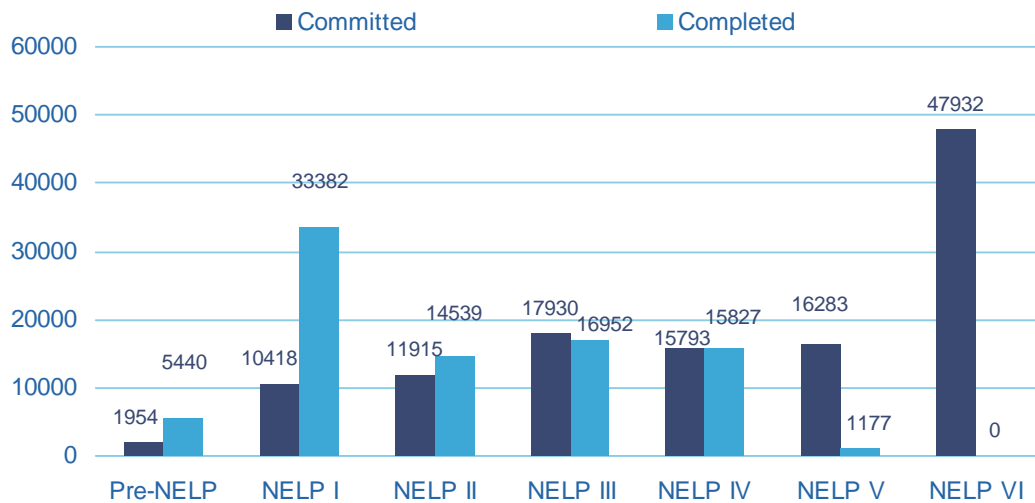


Figure 7: Committed and Completed 2D LKM under Pre-NELP and NELP blocks (Source: DGH)

7.4.7 About 1.2 lakh square km (SKM) of 3D seismic survey was committed under the pre-NELP and the six NELP rounds. Almost 40 percent of such commitment was made in the sixth round of NELP for the 52 blocks awarded. About 0.87 lakh SKM of 3D seismic has already been shot in these blocks. The actual 3D work undertaken for the blocks awarded under the pre-NELP rounds and the first two rounds under NELP exceeded the minimum 3D commitments made during the bidding rounds for those blocks. Actual 3D commitment under NELP I was more than three times the minimum 3D commitment made at the time of bidding by successful bidders.

7.4.8 About 39 percent of the total 3D SKM seismic commitment for onland blocks has been completed with another 9,359 SKM of 3D seismic yet to be shot. In case of offshore blocks, about 61 percent of the committed 3D seismic SKM has been shot and another 50,941 SKM of seismic is yet to be surveyed.

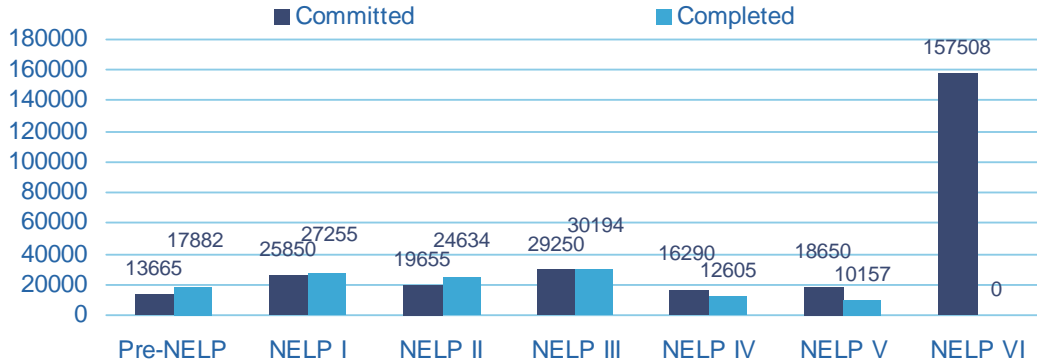
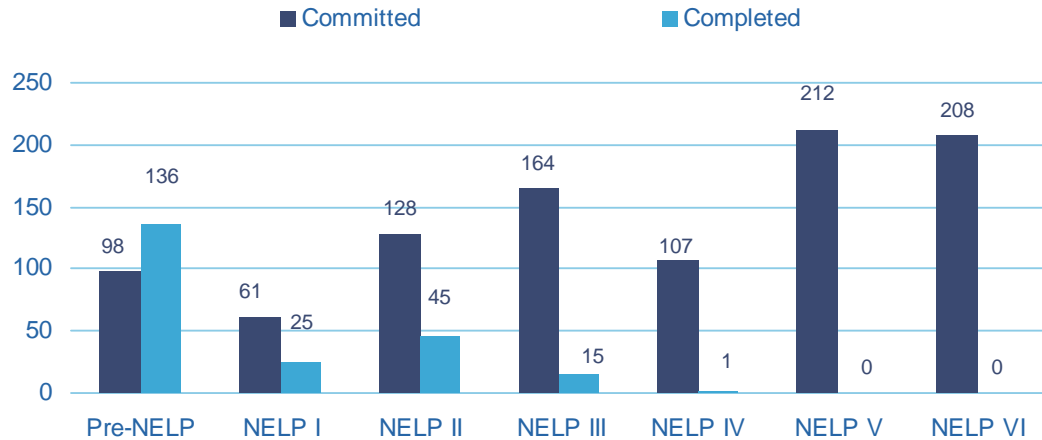


Figure 8: 3D SKM Committed and Completed under Pre-NELP and NELP Rounds (Source: DGH)

7.4.9 A total of 978 wells, both onland and offshore, have been committed to be drilled under the pre-NELP and NELP rounds announced till date. More than 50 percent of these well commitments have been made in the last three rounds under NELP. Of the 978 wells committed to be drilled only 23 percent i.e. 222 wells have been actually drilled with only 1 out of the 527 odd wells committed in the last three NELP



rounds having been drilled so far.

Figure 9: No. of Exploratory Wells Committed to be drilled under Pre-NELP and NELP Rounds (Source: DGH)

7.4.10 In case of onland blocks about 47 percent of the committed number of exploratory wells has been actually drilled with another 126 wells yet to be drilled. In case of offshore blocks only 40 percent of the committed number of exploratory wells has been drilled while another 125 offshore wells are yet to be drilled. Such a poor performance on the part of the operators is mainly due to the global shortage of drilling rigs, specially offshore rigs.

Table 2: Minimum Work to Complete for next 5 years

	2D LKM	3D SKM	No. of Wells
Onland Blocks	9,129	9,359	126
Offshore Blocks	97,055	50,941	125
Expected in NELP VII	72,000	50,000	160

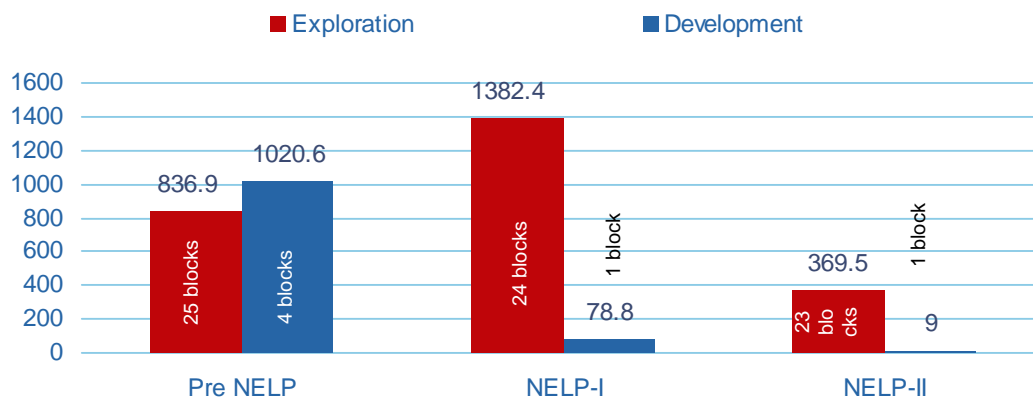
Source: DGH

- 7.4.11 Over the next five years the average annual E&P activity growth in India under the NELP regime is expected to be about 200 percent in geophysical surveys and 500 percent in the drilling and related activities. This quantum jump in E&P activities across the country will increase the demand for E&P equipment and services such as drilling rigs, seismic vessels, cementing services, electro-logging services, and completion and testing services.
- 7.4.12 As on April 1, 2007, a total of 66 significant hydrocarbon discoveries have been reported under various PSCs. Of these 66 discoveries, 26 have been reported in the blocks awarded under pre-NELP regime while the balance 40 has been reported in the blocks awarded under the NELP rounds. A total of 44 discoveries have also been reported by the NOCs in the blocks awarded to them under the nomination scheme. Recent discoveries made in the offshore basins will lead to additional requirement of infrastructure and services such as offshore platforms, sub-sea pipelines, completion equipment and services and work-over rigs.

7.5 E&P Investments in India

- 7.5.1 In terms of E&P investment as on April 1, 2007, a total of US\$ 2.6 billion has been spent on 74 exploration blocks in India. Another US\$ 1.1 billion has been spent on development of 6 blocks awarded under the Pre-NELP and first two NELP Rounds.

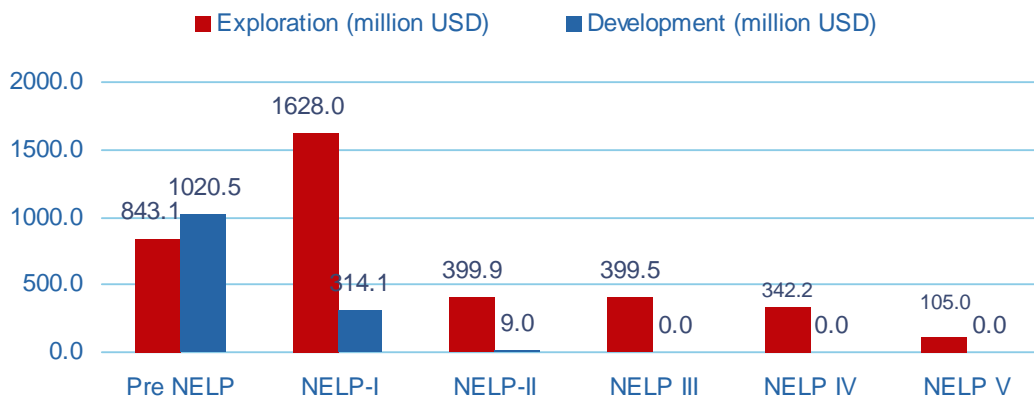
Figure 10: Exploration and Development Expenditure in US\$ million (Source: DGH)



- 7.5.2 Total E&D expenditure, in India, as on April 1, 2007 is accounted to be more than 5 billion USD. This expenditure is spread over a period of 13 years. Since year 1999-

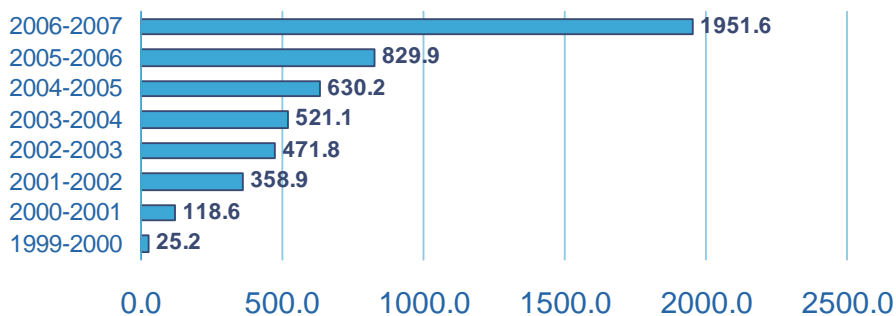
2000 exploration expenditure has gone up fivefold. Development expenditure, though not evenly spread over the years, has also been multiplied.

Figure 11: Exploration and Development Expenditure in India (including Provisional expenditure, source: DGH)



7.5.3 F&D expenditure has grown at a very high rate since 1999-2000. Total F&D expenditure in 1999-2000 was approximately 25 Million USD which has gone up to 2 billion in (approx) 2006-2007.

Figure 12: Year-wise F&D expenditure in million USD(including provisional, Source: DGH)



7.5.4 The committed exploration investments in India has touched the US\$ 10 billion mark with the last offering of 52 blocks by the Government of India. Almost half of this figure has been committed to be spent in the sixth NELP round. This investment figure is besides the investment requirement for development of discovered oil and gas fields.

7.5.5 Major development projects in India include RIL's KG basin and Cairn's Rajasthan fields. Owing to the rising field development costs RIL has revised its development cost estimates from US\$ 2.47 billion to US\$ 8.83 billion. Cairn had submitted a field development plan with US\$ 3.2 billion development cost estimates which will go up

approximately by another US\$ 750 million with the new pipeline being included in the field development plan to evacuate the viscous crude.

- 7.5.6 Other major gas discoveries currently under evaluation include ONGC and GSPC's KG basin gas discoveries for which development plans are yet to be submitted. Other discoveries include RIL's discovery in Orissa offshore. Most of this E&P investment will be towards oilfield services which form a major part of the E&P cost.
- 7.5.7 The prognosticated reserve as projected by DGH is 28-32 billion tones⁷ or approximately 205.24 billion barrel of oil Equivalent. Worldwide F&D cost, as referred by J.S Harold⁸ in terms of dollar per barrel of oil equivalent is around USD 11⁹. To estimate the expense with an assumption that this F&D unit cost is applicable to all type of reserve and irrespective, we may project the current F&D prospect in India is approximately 2257 billion USD. This estimate is expected to be increased as the unit cost will increase manifold in future.

⁷ Source : DGH

⁸ Source : J S Harold in S&P Industry surveys Oil and Gas Equipment and Services August 23 2007.

⁹ Source : J. S Harold, 2005, S&P Industry surveys Oil and Gas Equipment and Services August 23 2007 page 22

8 Upstream Expenditure

8.1 Global Oil and Gas Expenditure

8.1.1 Global capital expenditure by the upstream and downstream oil and gas industry was estimated to be about US\$ 240 billion in 2005, rising to about \$280 billion in 2006. Despite high operational costs the global E&P spending is expected to go up by 13%. Expenditure categories examined in this section include:

1. Drilling expenditure:
 - a) Deepwater exploration drilling
 - b) Deepwater development drilling
 - c) Shallow water exploration drilling
 - d) Shallow water offshore development drilling
2. Onshore drilling
3. Subsea expenditure -
 - a) Wells
 - b) Hardware
 - c) Pipelines
4. Offshore Platforms -
 - a) fixed
 - b) floating

8.2 Exploration Drilling Expenditure

8.2.1 Exploration drilling cost cover rig cost, down-hole, well services and engineering costs, geo-science costs and the cost of support services. Typically, E&P operators spend in excess of 60% of their total E&P expenses on outsourced work to service providers of which drilling cost is a major component.

8.2.2 Global exploration drilling expenditure (shallow and deep) for the five years to 2010 is forecast to be US\$ 112.5 billion, up from US\$ 86.3 billion over the five years to 2005. Expenditure in the short to medium term is forecast to average around \$20 – \$21 billion per annum before rising to \$25.6 billion by 2010.

8.2.3 In 2006, the Americas accounted for 46.7 percent of all exploration drilling expenditure. Africa, the Middle East and Europe accounted for 28.2 percent and

the Asia Pacific 25.1 percent. North America continues to be the largest drilling market, the majority of expenditure being in the Gulf of Mexico.

- 8.2.4 Deepwater exploration drilling is growing at a faster rate than shallow water and is forecast to increase its share of total offshore exploration drilling from 22.6 percent in 2001 to 30.6 percent in 2010.
- 8.2.5 Deepwater exploration drilling expenditure is forecast to increase from an estimated US\$ 5.2 billion in 2005 to US\$ 7.8 billion by 2010. Total deepwater exploration expenditure for the five years to 2010 is forecast to be US\$ 32.3 billion compared with US\$ 20 billion for the five years to 2005.
- 8.2.6 Shallow water exploration expenditure is forecast to increase from US\$ 66.3 billion for the five years to 2005 to US\$ 80.2 billion for the five years to 2010.
- 8.2.7 The main growth areas for deepwater exploration drilling over the next five years are Eastern Europe and the former Soviet Union, albeit from a low base, and Latin America.

Figure 13: Africa, the Middle East and Europe Offshore Exploration Drilling Spend

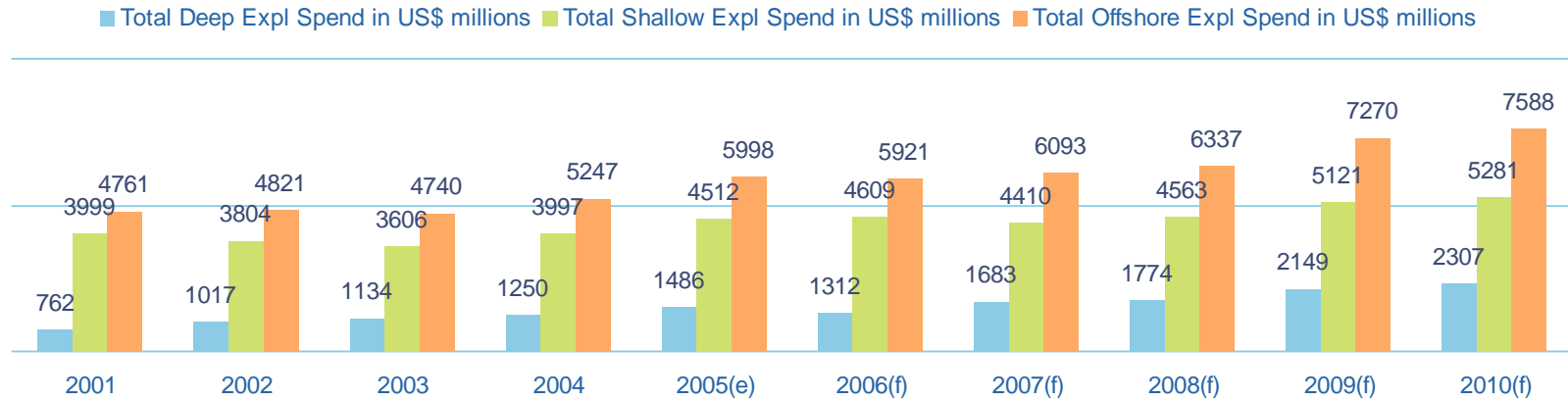


Figure 14: The Americas' Offshore Exploration Drilling Spend

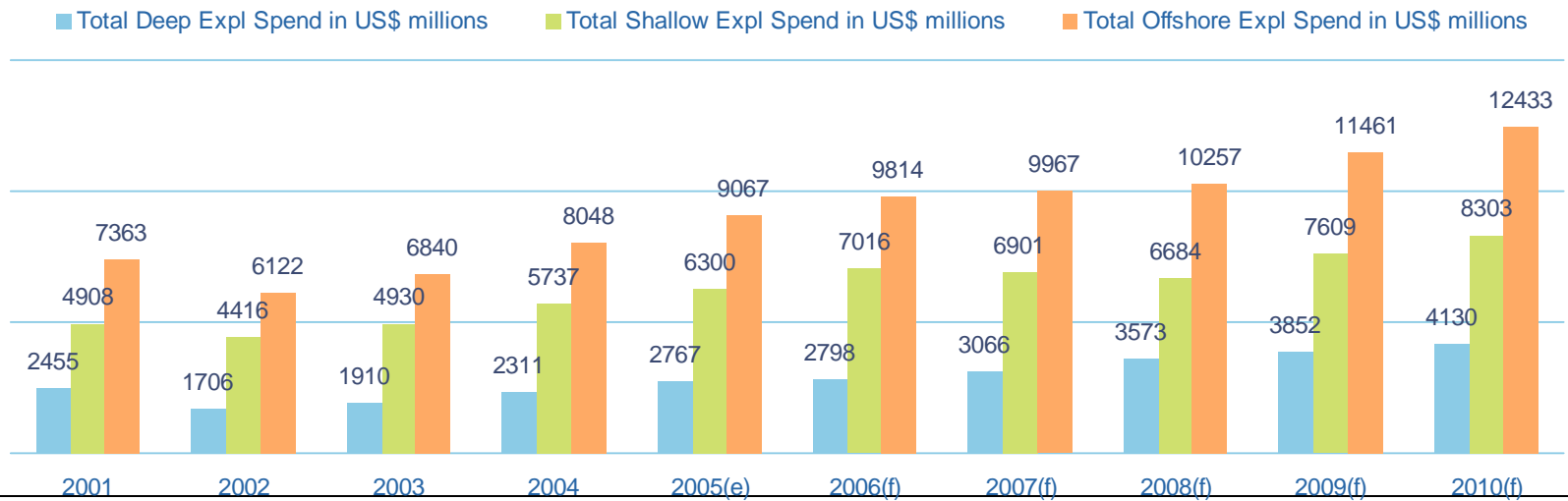


Figure 15: Asia Pacific including Australasia Exploration Drilling Spend

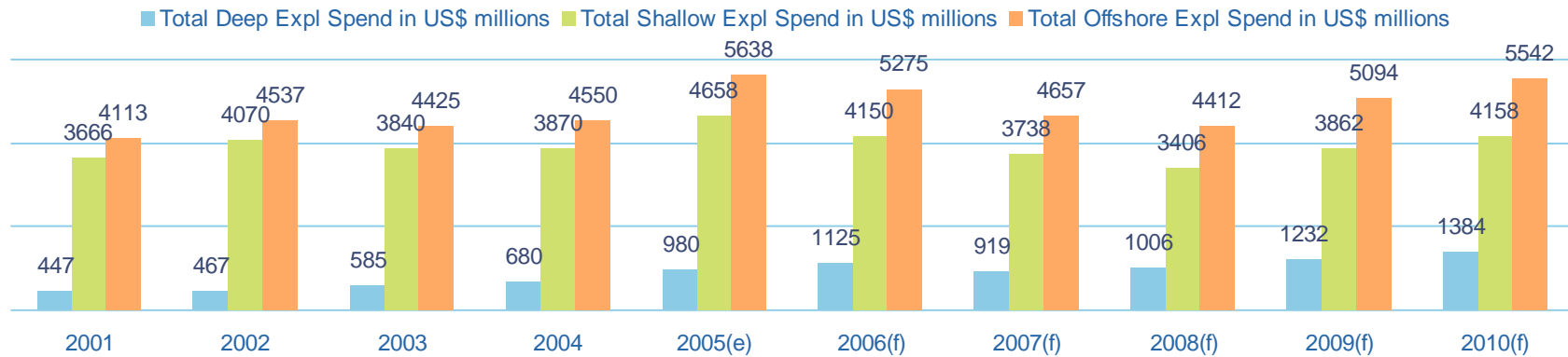
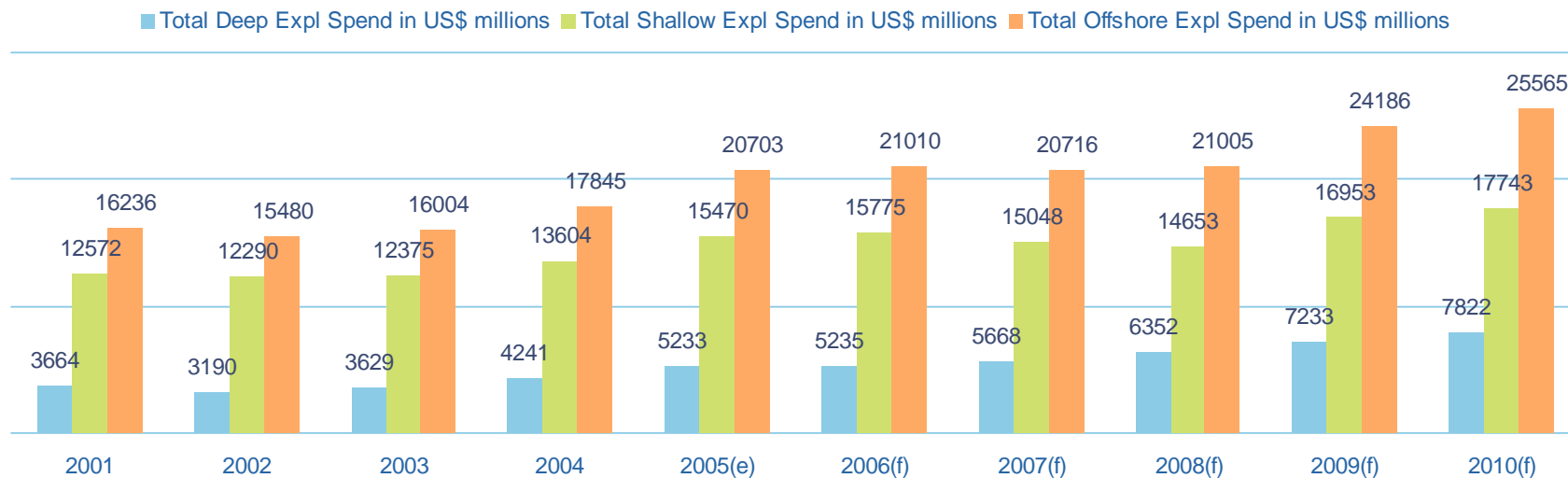


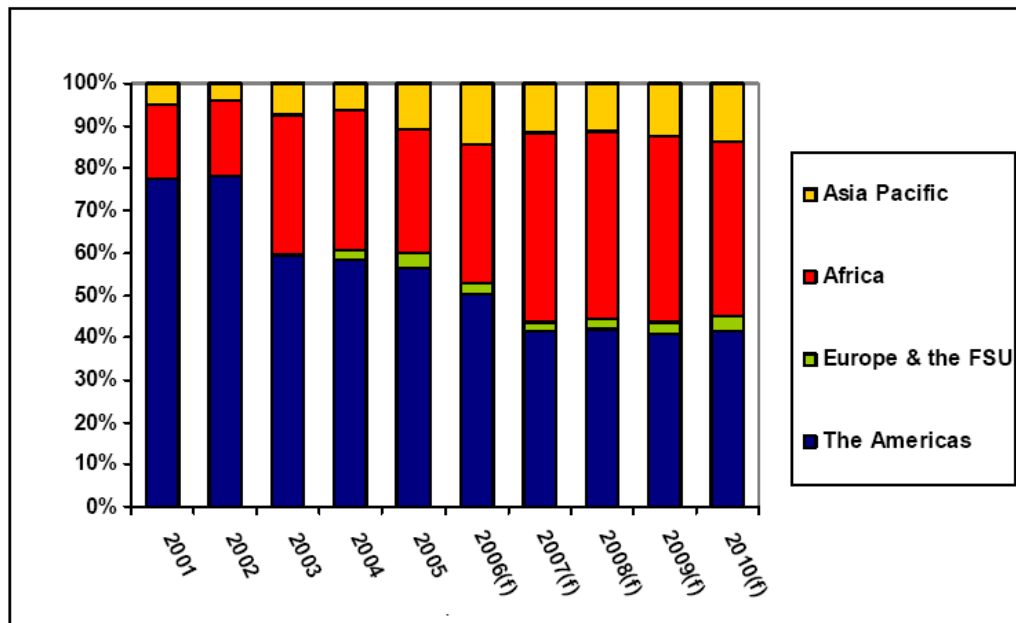
Figure 16: Global Offshore Exploration Drilling Spend



8.3 Offshore Development Drilling Expenditure

- 8.3.1 Development drilling expenditure covers drilling costs associated with developing a field once exploratory drilling has verified the reserves are economically extractable. Development wells account for about 68 percent of all offshore wells drilled by number. Exploratory drilling is more expensive than development drilling.
- 8.3.2 According to Douglas-Westwood, around 2,100 to 2,200 offshore development wells are drilled each year worldwide.
- 8.3.3 Offshore development expenditure is forecast to rise to US\$ 31.2 billion by 2010. Shallow water development drilling expenditure in 2005 was estimated as US\$ 22.3 billion and 87.5 percent of all development drilling expenditure. Deepwater development drilling expenditure in 2005 was estimated at US\$ 3.2 billion and 12.5 percent of all development drilling expenditure.
- 8.3.4 According to the trend, deepwater development drilling expenditure is growing at a faster rate than shallow water drilling expenditure and the deepwater development drilling expenditure is forecast to continue to increase from 12.5 percent of development drilling in 2005 to over 20 percent by 2010.
- 8.3.5 Deepwater investments in the African continent are expected to drive the increase in the deepwater development drilling expenditure followed by the Asia Pacific region. By 2010 the share of the Americas in the total deepwater development drilling expenditure is forecast to decline.

Figure 17: Deepwater Development Drilling - % Spend by Region



Source: Douglas-Westwood World Offshore Drilling Forecast

Figure 18: Africa Middle East and Europe Offshore Development Drilling Expenditure

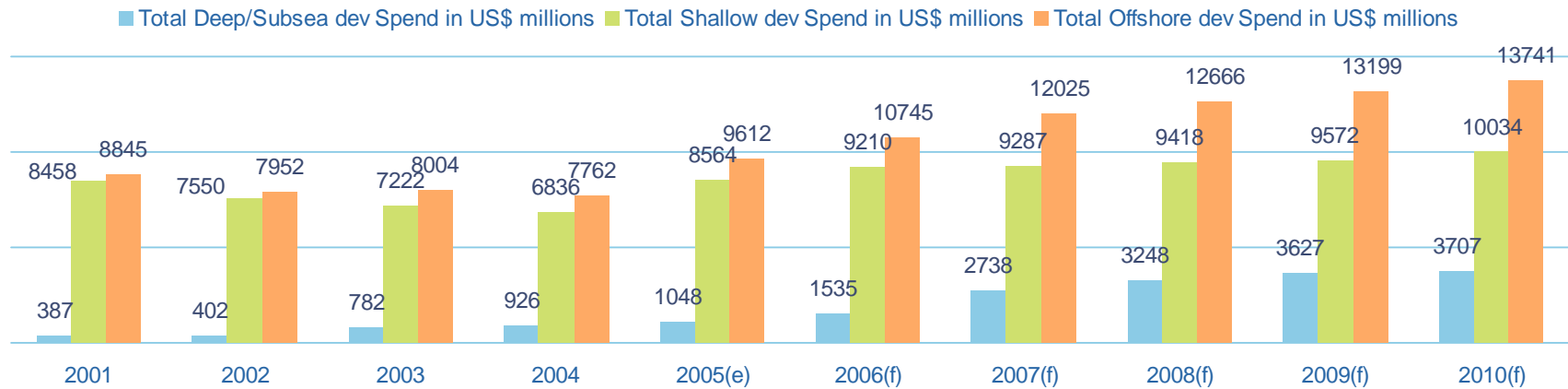


Figure 19: America Offshore Deepwater Development Drilling Spend

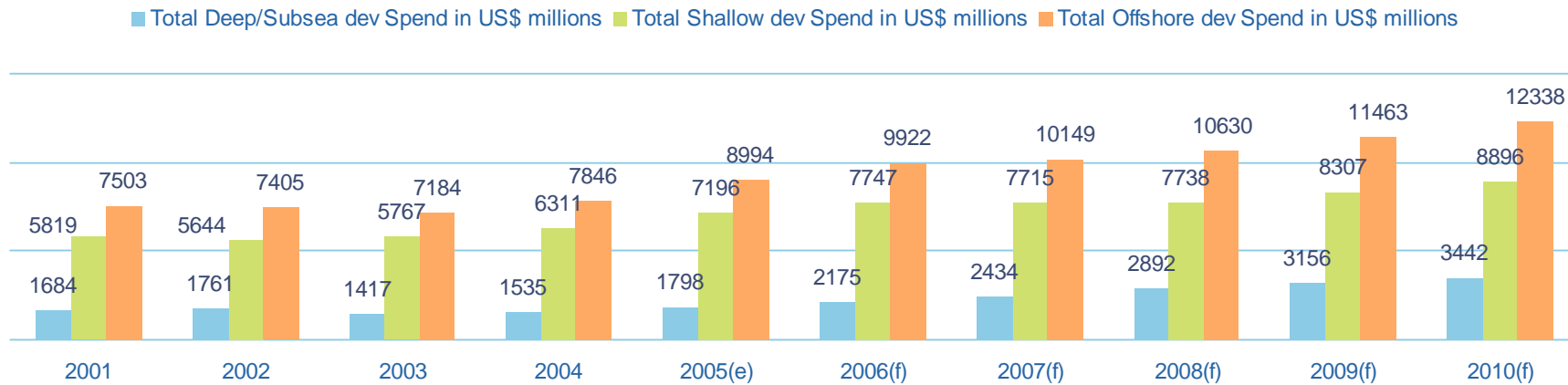


Figure 20: Asia Pacific including Australasia Offshore Deepwater Development Spend

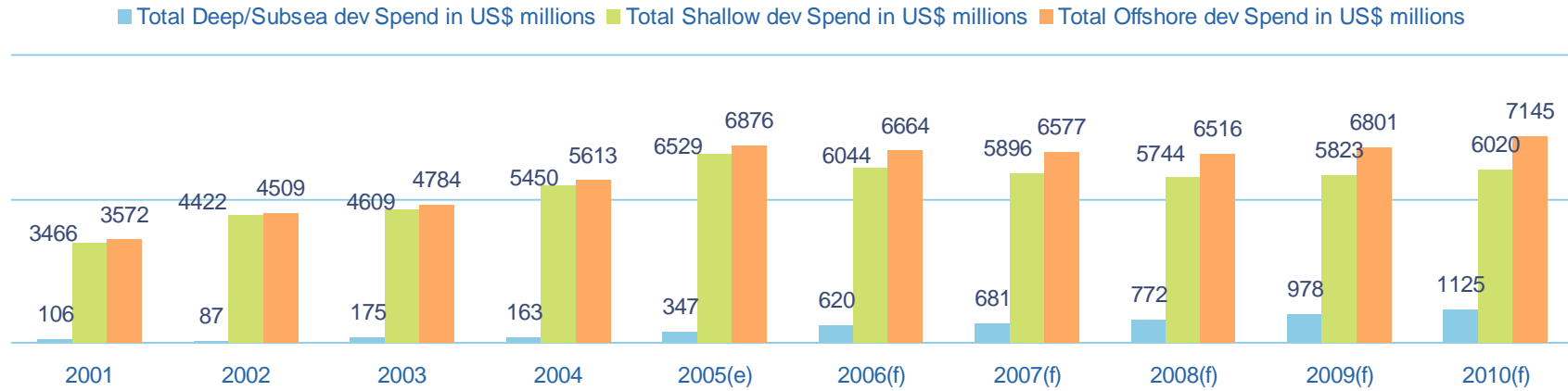
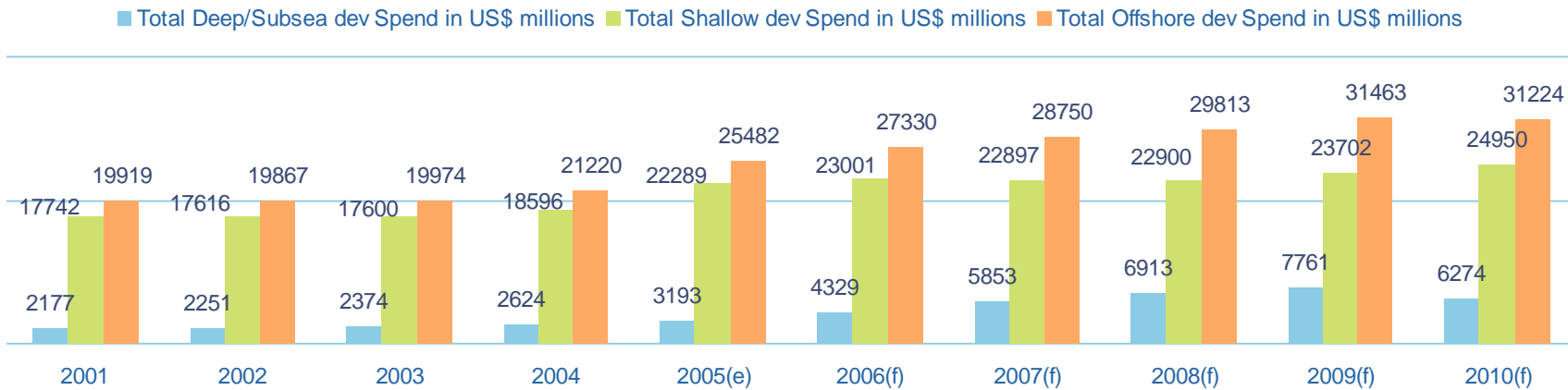


Figure 21: Global Offshore Development Drilling Spend



8.4 Shallow Water Drilling by Sector

8.4.1 Table 3: Shallow Water Spend by Sector shows the composition of shallow water drilling expenditure. Engineering services is the largest cost element accounting for 46 percent of the total shallow water drilling expenditure. Major engineering cost includes well testing, completion and abandonment, drilling bits and fluids and casing and cementing.

Table 3: Shallow Water Spend by Sector

Sector Spends (US\$ millions)	2001	2002	2003	2004	2005(e)	2006(f)	2007(f)	2008(f)	2009(f)	2010(f)
Rigs	7,010	6,674	6,699	7,324	9,053	9,482	9,146	9,079	9,582	10,137
Engineering	13,788	13,879	13,876	14,874	17,187	17,771	17,555	17,405	18,661	19,840
Geosciences	2,099	2,110	2,114	2,273	2,620	2,705	2,657	2,624	2,847	3,022
Support	7,559	7,402	7,426	7,928	9,117	9,370	9,136	9,024	9,769	10,341
Global	30,455	30,065	30,115	32,400	37,977	39,327	38,494	38,133	40,860	43,339

Source: Douglas- Westwood World Offshore Drilling Report 2006

8.5 Deepwater Drilling by Sector

8.5.1 Table 4: Deep Water Drilling Spend by Sectors shows the composition of deepwater drilling expenditure. The major difference between shallow and deepwater drilling is the share of cost of rigs in the total deepwater drilling expenditure. Cost of rigs accounts for 31 percent of the total cost. Engineering costs account for another 38 percent of the total deepwater drilling costs.

Table 4: Deep Water Drilling Spend by Sectors

Sector Spends (US\$ millions)	2001	2002	2003	2004	2005(e)	2006(f)	2007(f)	2008(f)	2009(f)	2010(f)
Rigs	1,913	1,750	1,903	2,188	2,814	3,235	3,837	4,450	4,981	5,353
Engineering	2,227	2,123	2,302	2,629	3,124	3,583	4,311	4,957	5,577	6,054
Geosciences	335	312	343	391	470	521	619	709	809	870
Support	1,495	1,404	1,587	1,785	2,154	2,478	2,973	3,441	3,913	4,196
Global	5,970	5,589	6,134	6,994	8,561	9,817	11,739	13,557	15,280	16,473

Source: Douglas- Westwood World Offshore Drilling Report 2006

9 PEZ – Value Creation for the Nation

9.1 Will Upstream Service Companies come to India?

- 9.1.1 Before we go on to answer the question of whether or not India should go for a PEZ, the moot question would be whether the E&P service provider companies would be ready and willing to set up shop in India. A strong and vibrant E&P market with potential for growth is what will drive the service companies to set up base in India. Fiscal incentives, it is believed, would reinforce their interest in and commitment towards India's E&P market.
- 9.1.2 Recent escalation in finding and development costs due to a tight services market coupled with a new focus on the difficult to operate frontier regions has forced industry experts to revise the estimated growth rate for worldwide oil E&P expenditures (E&P) for 2007 from 9.0% (\$291 billion) at the end of 2006 to 13% (\$308 billion) at the start of June 2007¹⁰. These estimates are based on the investment plans of major oil and gas companies worldwide.
- 9.1.3 How does India fare as compared to such high volumes of global E&P spending? As on April 1, 2007, a total of US\$ 2.6 billion has been spent on 74 exploration blocks in India. Another US\$ 1.1 billion has been spent on development of 6 blocks awarded under the Pre-NELP and first two NELP Rounds. Thus in terms of quantum of E&P investments, India appears to be a fledgling as compared to some of the other oil and gas investment hubs.
- 9.1.4 According to the American Petroleum Institute (API) 2006 Quarterly Well Completion report 49,375 crude oil wells, natural gas wells and dry holes were completed in 2006 in US. In contrast in India the number of wells to be completed as a part of minimum work programme (MWP) in the next five years is only 411; which clearly indicates the comparative volume of activity in E&P sector.
- 9.1.5 Given the volume of E&P activity expected over the next five years and beyond in India, the E&P service company may not find a reason compelling enough to set-up base in India. The situation is not that grim as it may appear today. New discoveries have attracted the attention of companies with big pockets towards India. India now appears as a strong investment option for the oil majors. Case in point being the deepwater bids submitted by BP under NELP VI. India's sedimentary basins remains largely unexplored but hold immense potential to be rich in hydrocarbons.
- 9.1.6 The recent discoveries have opened up a window of opportunity for upstream service providers who believe in India's prospectivity and are convinced about their investments in India. Monetisation of these discoveries would translate into a lot of business for these service companies. The current E&P activity in India is therefore expected to significantly increase over the next decade and would certainly interest upstream service companies desirous of setting up a base in India.

¹⁰ Lehman Brothers Original E&P Spending Survey

9.2 Should India go for PEZ?

- 9.2.1 The current global oil and gas services industry revenue is close to USD 150 billion. This is based on the global revenues of major players in the upstream services market. This industry revenue of major players, however, includes realisations from the sale of equipments used in the prospecting for and exploration, development and production of hydrocarbons.
- 9.2.2 These revenues are expected to increase significantly on the back of a tight upstream services market and the increasing complexity of exploration activities which have now graduated to the next level i.e. frontier regions. These frontier regions include deepwater, ultra-deepwater and other extremely challenging environments.
- 9.2.3 As projected in industry representation by Indian E&P companies it be inferred that approximately 60 percent¹¹ of the total E&P expenditure is spent on E&P services. This 60 percent of the total E&P spend on services is leaving the Indian shore without adding any value to the national economy.
- 9.2.4 We can make three inferences from this fact; **first:** E&P companies are hiring services from outside India as local market of such services is not present or developed so the multiplier effect of this industry segment is absent in the national economy ; **second:** India is missing an opportunity to claim its share in a USD 150 billion market segment; **third:** due to lack of recognizable presence of such an important industry segment in India, the country is being deprived of an opportunity of developing a skill-set within the oil and gas sector which would be essential in the “difficult oil” era.
- 9.2.5 Presence of such a growing market segment in Indian shore will not only add convenience to E&P operators in India but will also act as a multiplier to the oil and gas sector in specific and the economy as a whole. PEZ can be considered as a strategic move to promote a futuristic oil and gas upstream services market segment. A more holistic approach could be promoting manufacturing and production units within the PEZ for products like offshore platforms, well fluid, drill bits etc. Thus, a PEZ can be one stop support system for the E&P sector in the Indian subcontinent.

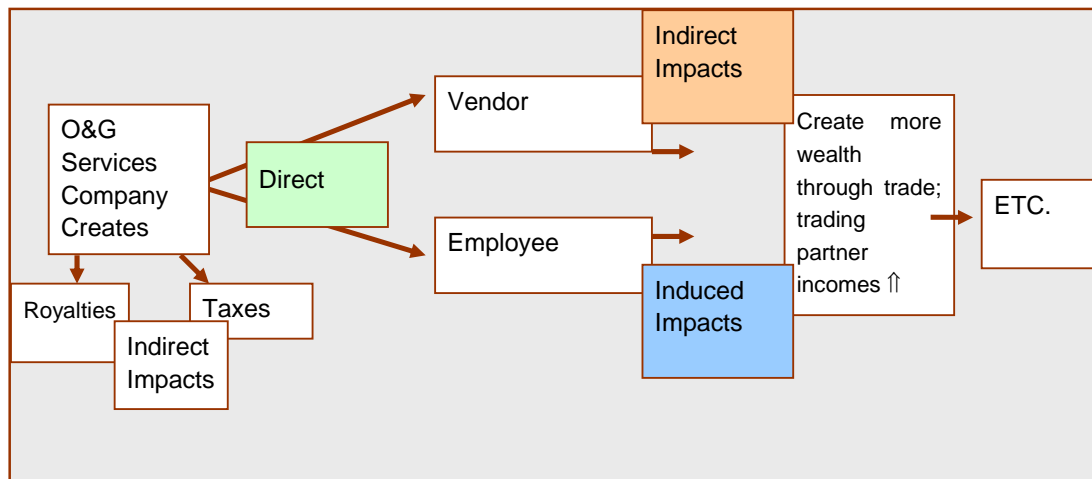
9.3 Multiplier Effect

- 9.3.1 Multiplier effects are used to capture the secondary effects of the spending in a region. There are two basic kinds of secondary effects.
- 9.3.2 **Indirect effects** are the changes in sales or output, income or earnings, and jobs within backward-linked industries in the region i.e. businesses that supply goods and services to the oil and gas industry. For example, a natural gas provider buys

¹¹ Ref: Industry representation in PetroFed

supplies and equipment from a local store. Each business that provides goods and services locally benefits indirectly from natural gas spending.

- 9.3.3 **Induced effects** are the changes in sales or output, income or earnings, and jobs in the region resulting from household spending of income earned either directly or indirectly from natural gas spending. Employees working for natural gas firms, residents receiving royalty checks and backward-linked industries spend their income in the local region, creating additional sales and economic activity. For details see the diagram below.



9.4 Core Economic Multipliers

- 9.4.1 A total of seven core economic multipliers can be identified. These include
1. Generating investment and income through wages, taxes and other royalties to host governments etc.
 2. Creating jobs at all levels of operations and management for local employees.
 3. Investment in human capital by offering employees and business partners access to training, professional development and occupational health services.
 4. Establishment of forward and backward local business linkages along the corporate value-chain, especially with medium, small and micro-enterprises.
 5. Supporting technology transfer through setting up of R&D facilities in host countries etc.
 6. Spreading international best practices in business operations.
 7. Building both physical and institutional infrastructure.

9.5

PEZ: The Multiplier for Indian Economy and O&G sector

Development Phase		Operation Phase	
Direct Impact	Direct Investment	Direct Impact	Direct Investment
	Wages		Wages
	Payment to vendor		Payment to vendor
	Others		Others
Indirect Impact	Tax	Indirect Impact	Tax
	Royalties		Royalties
	Others		Others
Induced Impact	Induced Employment	Induced Impact	Induced Employment
	Others		Ancillary Industry and Others

10 Analysing SEZ Policies of India

10.1 Concept of SEZ

10.1.1 Conceptually, SEZ is a geographical region that has economic laws different from a country's generally applicable economic laws, with the underlying objective being an increase in economic growth and activity through increased foreign investment. SEZs have been established in several countries, including the People's Republic of China, India, Jordan, Poland, Kazakhstan, the Philippines and Russia. North Korea has also attempted this to a degree.

10.1.2 In India, establishment of SEZs have evolved around achieving the following basic objectives:

- Economic growth and development – through exports and backward integration
- Infrastructure development
- Employment generation
- Up-gradation of managerial and technical skills

10.1.3 Achievement of the above objectives through SEZs is typically facilitated through the following -

- Income tax Holidays
- Hassle Free Environment
- Exemption from Indirect duties and taxes
- No currency restrictions
- Relaxed foreign investment norms
- Easy Immigration / recruitment for foreign nationals
- Excellent infrastructure facilities

10.2 Current Framework

10.2.1 In India, SEZ policy was introduced on April 1, 2000 for setting up of SEZs with a view to provide an internationally competitive and hassle- free environment for export of goods and services. The policy provides for setting up of SEZ's in the public, private, joint sector or by State Governments.

10.2.2 Special Economic Zone Act, 2005 ('The Act'), which was partially notified on February 10, 2006, is a self contained legislation encompassing the framework of SEZs. Till date, about 362 SEZs have been formally approved and 135 SEZs have been notified by the Central Government. Formal approval has been granted to 2

petrochemicals & petroleum (sector-specific SEZs) in Gujarat and Karnataka.
(Source: www.sezindia.nic.in as on July 31, 2007)

10.2.3 Salient Features of SEZ Act, 2005 (Annexure 1)

- i. The Act has over-riding effect over all other laws, for the time being in force.
- ii. The Central Government is empowered to direct non / modified applicability of Central Acts (except labour matters) to SEZs and units therein.
- iii. State Governments have been empowered to enact laws / notify policies for grant of fiscal and other concessions.
- iv. SEZ shall be deemed to be a territory outside the customs territory of India.
- v. SEZ shall be deemed to be a port, airport, inland container depot, land station and land customs stations, as the case may be, under the Customs Act, 1962.
- vi. SEZ – “deemed outside customs territory”

10.2.4 Legal provision: Section 53: “A Special Economic Zone shall, on and from the appointed day, be deemed to be a territory outside the customs territory of India for the purposes of undertaking the authorized *operations*.”

10.2.5 Implications

- Sale from SEZ to DTA is considered import for the DTA unit. Applicable import duty on goods cleared payable by the DTA unit.
- Sale from DTA to SEZ is considered deemed export. Subject to fulfilment of FTP conditions, DTA unit can claim applicable export benefits.
- Unless exempted by state, local sales-tax/VAT payable on sale from DTA to SEZ.
- Applicable local Sales tax / VAT payable on sale from SEZ to DTA.

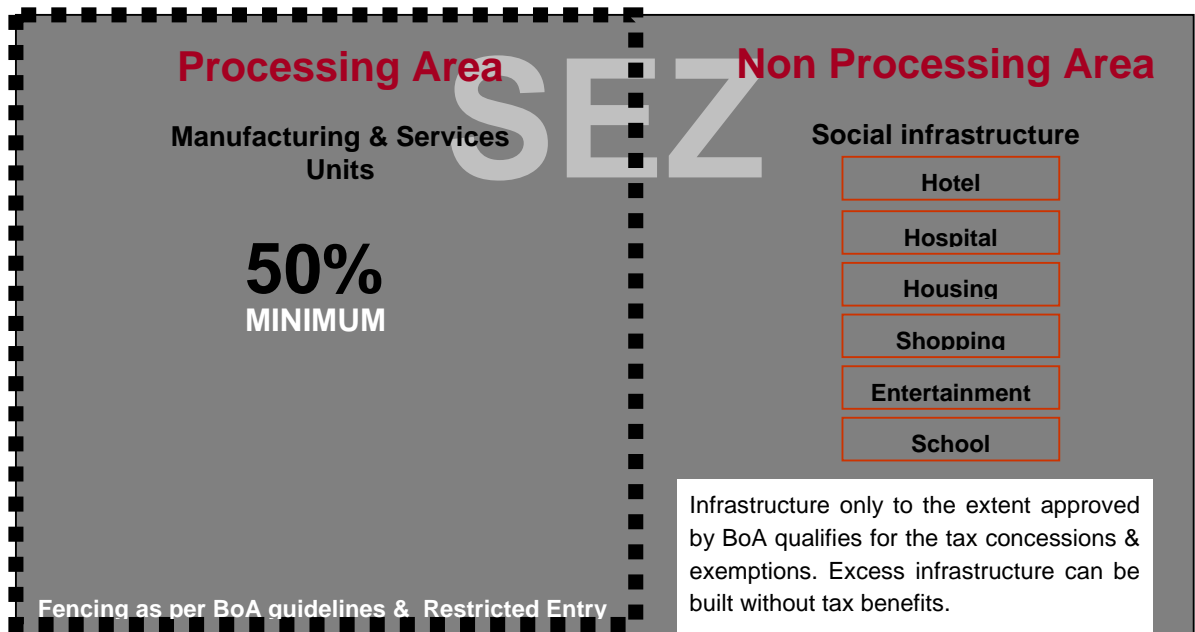
10.2.6 Salient Features of SEZ Rules (Annexure 2):

- i. Land to be contiguous with no public thoroughfare (Rule 7)
- ii. Developer to have either freehold / lease rights (>20 years) on the land (Rule 7)
- iii. For formal approval, land must be in the possession of the developer or group entities
- iv. Units and core infrastructure to be located in the Processing area
- v. Allotment of space/infrastructure in the processing area only to unit holding valid LoA from the DC [Rule 11(5)]
- vi. Processing area and Free Trade and Warehousing Zone shall have specified entry and exit points and be fully secured by taking such measures as approved [Rule 11(2)]

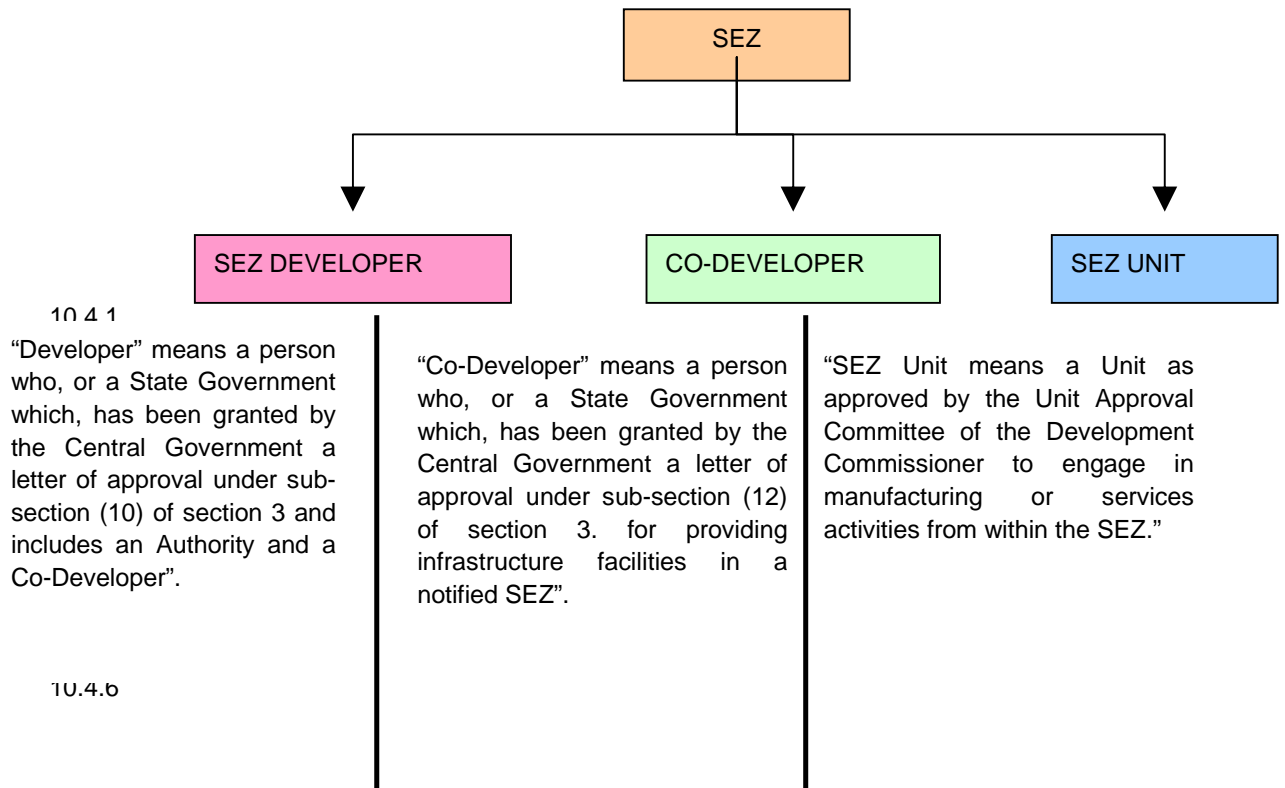
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- vii. DC – the authority for demarcation of processing and non-processing area [Rule 11(3)]
 - viii. Entry to processing area restricted [Rule 11(4)]
 - ix. Lease period shall not be less than 5 years but notwithstanding any other condition in lease deed, the lease rights would cease to exist in case of expiry or cancellation of LoA [Rule 11(5)]
 - x. From the date of notification, SEZ deemed to be a port, airport, inland container depot, land customs station under Section 7 of Customs Act [Rule 11(11)]
 - xi. Non-processing area to house social and other infrastructure (residence, hotel, hospital, recreational, retail, commercial etc.)
 - xii. Authorised operations in the non-processing area (notified on October 17, 2006 attached as Annexure 4) to be eligible for all tax / duty benefits
 - xiii. One of the qualifying criteria for SEZ developer application is Minimum Investment or Net worth criteria. For this purpose, net worth of the Promoter company & all Group companies & Flagship companies is also counted. The developer needs to meet ANY ONE of the following criteria:
 - xiv. Developer is entitled to all the fiscal and other benefits only for the authorized operations approved by the BoA

Type of SEZ	Net worth criteria (Rs. Cr.)	Minimum Investment (Rs. Cr.)
Sector Specific, Multi-Services and others	50	250
Multi-product	250	1000

10.3 Bird's-eye view of a SEZ



10.4 Entities in SEZ



10.5 Tax benefit to Developer and Co-Developer

- i. Corporate tax exemption – Section 80IAB of Income-tax Act: 100% exemption from Income-tax on profits derived from development of the SEZ
- ii. Exemption available for 10 consecutive years out of block of first 15 years starting from the year in which SEZ is notified.
- iii. If the operations and maintenance of SEZ is transferred to another developer (including co-developer), the transferee developer (including co-developer) shall be entitled to deduction under this section for the balance period.
- iv. No exemption on adjustment made to profit on account of Transfer Pricing adjustment
- v. DDT exemption - Section 115-O(6) Income-tax Act : Developer is exempted from payment of DDT. There is no end date specified. Therefore, as of now, the exemption is perpetual.
- vi. MAT exemption - Section 115JB(6) Income-tax Act: Developer is exempted from payment of MAT. There is no end date specified. Therefore, as of now, the exemption is perpetual.
- vii. Indirect-tax benefits on “authorized operations” – Rule 27
- viii. No Customs duty – on import of Capital Goods, consumables, spares etc
- ix. No Excise Duty – on local procurement of Capital Goods, consumable, spares etc
- x. No Service Tax on services “consumed” within SEZ
- xi. No Central Sales Tax on input goods, consumables, spares etc.
- xii. Exemption from local taxes (VAT/Sales Tax, Octroi, Entry-tax, Electricity duty etc. as per State SEZ Act / Policy)
- xiii. Exemption from stamp duty
- xiv. Stamp duty exemption as per State Stamp Duty legislation
- xv. No exemption from stamp duty on acquisition of land for development of SEZ
- xvi. Many states have exempted all transactions in a notified SEZ from stamp duty
- xvii. Some states have exempted only transactions relating to processing area from stamp duty

10.6 Important Provisions related to SEZ units

10.6.1 Important provisions related to SEZ units are:

- i. Single window clearance - Consolidated application to the UAC in Form F

-
- ii. Unit can undertake service activities apart from manufacturing activities. Under FTP, units were allowed to undertake only notified services and even the tax benefit was allowed only on services notified – which were typically computer related IT/ITES services. Services are defined exhaustively under Rule 76. Corporate-tax benefits are also now allowed on profit from export of services.
 - iii. Branch of a foreign company can undertake manufacturing activities in accordance with the provisions of Foreign Exchange Management (Foreign exchange derivatives contracts) Regulations, 2000 [Rule 19(7)]
 - iv. Job work for overseas principal allowed. [Rule 18(6)]
 - v. No minimum export commitment on Units.
 - vi. Units only to be net foreign exchange earner at the end of 5 year period. [Rule 52 & 53]
 - vii. Validity of lease of land/facility by unit from developer to be co-terminus with the validity of LoA. [Rule 11(5)]
 - viii. Net Foreign Exchange Earning (Rule 52 & 53): To sustain existence in the SEZ, units have only one obligation to achieve i.e. to be net foreign exchange (NFE) earner. This requirement is only for the unit and not developer. NFE is calculated cumulatively for a period of 5 years from the date of commencement of manufacture or provision of services. NFE is calculated as per the following formula :

$$\text{Positive Net Foreign Exchange} = A - B > 0$$

Where:

A: is FoB value of Exports and permitted DTA sales

B: is the sum total of

- CIF value of imported inputs (RM, intermediates, components, consumables, parts etc.) and the CIF value of all imported capital goods and the value of all payments made in foreign exchange by way of export commission, royalty, fees, dividends, interest on external commercial borrowings during the first five years
 - Value of goods procured from another SEZ or EOU or EHTP or STP unit or from bonded warehouse etc.
 - Pro-rata CIF value of capital goods, imported duty free or leased from a leasing company, received free of cost and or on loan basis or on transfer for the period they remain with the unit.
- ix. Certain supplies made to the DTA are also counted for the purpose of fulfilment of NFE criteria. Some of them are:
 - x. Supplies against EEFC A/c. or inward remittances
 - xi. Supplies of ITA-1 items (telecom, IT hardware, software etc.)

-
- xii. Supplies to –
 - Power projects & refineries
 - EPCG license holders or against advance licenses
 - Projects financed by international funding agencies
 - Projects notified for zero customs duty
 - Other SEZ / EOU / STP / EHTP unit
 - FTWZ against foreign currency
 - xiii. Performance of the unit is periodically monitored by the UAC. If the UAC finds that the unit has not achieved NFE positive, the unit is liable for penal action by the DC (such as payment of appropriate duties on goods admitted to SEZ along with applicable interest, if any).
 - xiv. UAC can also grant extension of time limit beyond 5 year period if the unit fails to achieve NFE positive status due to genuine difficulties.

10.7 Tax Benefit to SEZ Units

10.7.1 **Corporate tax deduction - Section 10AA of Income-tax Act:** Unit entitled to income tax deduction on profits derived from export of goods / services as under :

- 100% for first 5 years;
- 50% for next 5 years; and
- Up to 50% for further 5 years subject to creation of specified reserve

10.7.2 Tax benefits to Unit:

- i. Exemption available only on “export” profits. Proportionate profit relating to DTA or “Deemed Export” liable to be taxed at applicable tax rate.
- ii. Unit eligible for deduction from the year in which it starts manufacturing / services.
- iii. In case of amalgamation, amalgamating company entitled to claim deduction on the profits of the undertaking.
- iv. No deduction on adjustment made to profit on account of Transfer Pricing adjustment
- v. MAT exemption - Section 115JB(6) Income-tax Act : Unit is exempted from payment of MAT. This benefit is proposed to be limited to the extent of “export profits” and not entire profits of the unit undertaking. Though no formal notification has been issued in this regard as of now, the same is expected soon. There is no end date specified for this exemption. Therefore, as of now, the exemption is perpetual.

-
- vi. Indirect-tax benefits on “authorized operations” – Rule 27
 - vii. No Customs duty – on import of Raw Material, Capital Goods, consumables, spares etc.
 - viii. No Excise Duty – on local procurement of Raw Material, Capital Goods, consumable, spares etc.
 - ix. No Service Tax on services “consumed” within SEZ unit
 - x. No Central Sales Tax on input goods, consumables, spares etc.
 - xi. Exemption from local taxes (VAT/Sales Tax, Octroi, Entry-tax, Electricity duty etc. as per State SEZ Act / Policy)
 - xii. Exemption from stamp duty
 - xiii. Stamp duty exemption as per State Stamp Duty legislation
 - xiv. Most of the states have exempted transactions relating to processing area from stamp duty including transactions by a unit which attracts stamp duty such as mortgage etc.

10.8 “Services” under SEZ Act

- 10.8.1 The definition of services is as under: Under Section 2 (z) “services” means such tradable services which,-
 - are covered under the General Agreement on Trade in Services annexed as IB to the Agreement establishing the World Trade Organisation concluded at Marrakes on the 15th day of April, 1994;
 - may be prescribed by the Central Government for the purposes of this Act; and
 - earn foreign exchange;
- 10.8.2 Services as prescribed by the Central Government under Rule 76 of the SEZ Rules, 2006: The “services” for the purposes of clause (z) of section 2 shall be the following, namely: -
 - i. Trading
 - ii. Warehousing
 - iii. Research and development services
 - iv. Computer software services, including information enabled services such as back-office operations, call centres, content development or animation, data processing, engineering and design, graphic information system services, human resources services, insurance claim processing, legal data bases, medical transcription, payroll, remote maintenance, revenue accounting, support centres and web-site services

-
- v. Off-shore banking services
 - vi. Professional services (excluding legal services and accounting)
 - vii. Rental/leasing services without operators
 - viii. Other business services
 - ix. Courier services
 - x. Audio-visual services
 - xi. Construction and related services
 - xii. Distribution services (excluding retail services)
 - xiii. Educational services,
 - xiv. Environmental services
 - xv. Financial services,
 - xvi. Hospital services
 - xvii. Other human health services
 - xviii. Tourism and travel related services
 - xix. Recreational
 - xx. Cultural and sporting service
 - xxi. Entertainment services
 - xxii. Transport services
 - xxiii. Services auxiliary to all modes of transport
 - xxiv. Pipelines transport

10.8.3 "Explanation- The expression "Trading", for the purposes of the Second Schedule of the Act, shall mean import for the purposes of re-export."

11 Salient Features of Selected State Polices

11.1 Gujarat

11.1.1 Gujarat SEZ Act, 2004 came into force prior to the enactment of central SEZ Act. Subsequently the Gujarat SEZ Rules came into force in 2005 and Gujarat SEZ Regulations in 2007.

11.1.2 The Act provides for operation, maintenance, management and administration of SEZs in the State. The services which can be undertaken in an SEZ has no where been defined in the state act.

11.1.3 Certain fiscal benefits are provided under the state act in the form of exemptions of stamp duty, sales tax, purchase tax, motor spirit tax, luxury tax, entertainment tax and other taxes and cess levied by the state and payable on sales and transactions within the processing area of SEZ.

No. of formal approvals	29
No. of notified SEZs	11

11.1.4 Formal approval has been granted to Reliance Infrastructure Limited for sector specific petrochemicals SEZ (440 hectares) in Jamnagar.

11.2 Maharashtra

11.2.1 The Maharashtra SEZ policy was introduced in the year 2001 and it applies to all SEZs proposed to be set up in the state subject to the framework for SEZs determined by Government of India from time to time.

11.2.2 The services which can be undertaken in an SEZ has no where been defined in the state policy.

11.2.3 A number of Incentives are provided by the state which includes:

- 100 % exemption from Stamp Duty and Registration Fees
- Permission for Captive Power Generation.
- All 100% EOUs will be given status of "Public Utility Service" with Labour Laws relaxation

No. of formal approvals	75
No. of notified SEZs	16

11.3 Tamil Nadu

11.3.1 In the context of Government of India guidelines for the establishment of SEZs, the Government of Tamil Nadu has adopted the Tamil Nadu SEZ policy in the year 2003 that will be applicable to all SEZs in the State of Tamil Nadu, subject to the framework for SEZs determined by the Government of India from time to time. The services which can be undertaken in an SEZ has no where been defined in the state policy.

11.3.2 The Policy offers Exemption from all local levies and taxes including stamp duty, sales tax, turnover tax, VAT, purchase tax, mandi tax, octroi, electricity cess and other taxes and cess levied by the state and payable on sales and transactions made between units and establishments within the SEZ.

No. of formal approvals	53
No. of notified SEZs	17

11.4 Andhra Pradesh

11.4.1 With the background of Government of India guidelines for SEZs, the State has formulated its SEZ Policy in the year 2004 to provide a comprehensive framework for establishment, operations and sustainability of the Special Economic Zones. The services which can be undertaken in an SEZ has no where been defined in the state policy.

11.4.2 The basic features of the policy are single-window clearance for investors, simplified business working environment, exemptions from stamp duty, registration fee and other local taxes.

No. of formal approvals	59
No. of notified SEZs	42

11.5 Goa

11.5.1 The Goa SEZ policy came into force in 2006. The services which can be undertaken in an SEZ has no where been defined in the state policy. The salient features of the policy are:

- Exemption from electricity duty to SEZ units;
- Exemption from all local levies and taxes including stamp duty, sales tax, VAT, octroi, entry tax and other taxes and cess levied by the state and payable on sales and transactions made between units and establishments within the SEZ.

No. of formal approvals	29
No. of notified SEZs	2

11.6 Karnataka

- 11.6.1 In order to boost investor's confidence in the SEZ scheme and to highlight the State Govt.'s stand on issues relating to state levies, generation and distribution of power, environmental clearances, etc. a State Level Policy for Special Economic Zone has been formulated in 2002.
- 11.6.2 The services which can be undertaken in an SEZ has no where been defined in the state policy.
- 11.6.3 Developers of SEZs and industrial units and other establishments within the SEZs are exempted from all State and local taxes and levies, including Sales Tax, Purchase Tax, Entry Tax, Cess, etc, in respect of all transactions made between units/ establishments within the SEZs and in respect of the supply of goods and services from the Domestic Tariff Area to units/ establishments within the SEZ.
- 11.6.4 Further, industrial units within the SEZ will be eligible for all other incentives and concessions as per general policies of the Government.

No. of formal approvals	36
No. of notified SEZs	16

- 11.6.5 Formal approval has been granted to Mangalore SEZ Limited for sector specific petrochemicals & petroleum SEZ (588 hectares) in Dakshin Kannada.

11.7 Orissa

- 11.7.1 The SEZ policy was introduced in Orissa in the year 2003. The SEZs in Orissa will be primarily led by private sector developers and investors who will plan, develop, finance, manage, market and maintain the Zones.
- 11.7.2 The Government's role will be to facilitate creation of external linkages & social infrastructure and also to provide a legal and policy framework for the SEZ Developer and the Enterprises to come therein.
- 11.7.3 The services which can be undertaken in an SEZ has no where been defined in the state policy.
- 11.7.4 Exemptions from all state and local taxes and levies, including Sales Tax, Purchase Tax, Entry Tax, entertainment tax, contracts tax, Cess, etc, in respect of all transactions made between units/ establishments within the SEZs and in respect of the supply of goods and services from the Domestic Tariff Area to units/ establishments within the SEZ.

No. of formal approvals	7
No. of notified SEZs	1

11.8 West Bengal

- 11.8.1 The West Bengal SEZ Act has been passed in the year 2003 to facilitate the development, operation, maintenance, administration and regulation of SEZs in the state.
- 11.8.2 The services which can be undertaken in an SEZ has no where been defined in the state act.
- 11.8.3 Exemptions have been provided under the Act for all local taxes, duties, fee, cess or any other levies payable under the State laws by the developer or units in the SEZs.

No. of formal approvals	11
No. of notified SEZs	1

11.9 Kerala

- 11.9.1 The services which can be undertaken in an SEZ has no where been defined in the state policy.
- 11.9.2 The Kerala SEZ policy also provides exemptions from local taxes and levies, including Sales Tax, Purchase Tax, Entry Tax, Cess, etc, in respect of all transactions made between units/ establishments within the SEZs and in respect of the supply of goods and services from the Domestic Tariff Area to units/ establishments within the SEZ.
- 11.9.3 Facility of single window clearance is provided in order to obtain all fast track clearances.

No. of formal approvals	11
No. of notified SEZs	8

12 PEZ in other countries

12.1 Onne Oil and Gas Free Zone

- 12.1.1 Onne Oil and Gas Free Zone, managed by DMS International Ltd, is the only Free Zone in the world dedicated solely to the oil and gas industry. This bold initiative is a major success story for Nigeria. It is also very important for the local community, where it supports numerous jobs and has helped to drive forward infrastructural development.
- 12.1.2 Nigeria has invested heavily in the development of Onne Port, upgrading both the Federal Lighter Terminal and the Federal Ocean Terminal and continues to improve quayside facilities, communication links and other services. At the same time the Private Sector has been heavily investing in the Free Zone. Over \$300 million has been invested to-date. More than 30 international oil and gas companies, including many of the world's largest corporations, are now registered as Free Zone users and cargo throughput has increased rapidly.
- 12.1.3 The Onne Oil and Gas Free Zone will help to strengthen Nigeria's position as sub-Saharan Africa's leading oil producer. It will also place Nigeria at the heart of the current West African oil boom. Ideally located in the Gulf of Guinea it is the perfect location to serve this rapidly growing market.
- 12.1.4 Investing in the Onne Oil and Gas Free Zone makes sound commercial sense. Many of the incentives available to investors are comparable to other successful Free Zones throughout the world. The combined facilities at Onne provide an excellent base for international companies to conduct their business operations in the dynamic West African oil and gas industry. We believe that and as more companies enter the Free Zone this will further stimulate local and regional industrial and economic growth.
- 12.1.5 A Brief History of Free Zone Legislation in Nigeria
- 1992 Nigerian Export Processing Zone Decree promulgated. Covering manufacturing industries at designated zones throughout Nigeria, i.e. Calabar
 - 1996 Oil and Gas Export Free Zone Decree promulgated. Covering oil and gas related activities only and based at the Onne/ Ikpokiri area of Rivers State, Nigeria
 - 2003 Oil and Gas Free Zone Regulations promulgated.
- 12.1.6 Standard Free Zone Incentives
- i. 100% Import and Export Tax Exemption
 - ii. 100% Exemption from Commercial Levies
 - iii. 100% Repatriation of Capital and Profits
 - iv. 100% Foreign Company Ownership

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- v. Leases available from 5 to 21 years
 - vi. No Quotas for Expatriate Employees
- 12.1.7 Taxation
- i. No Corporate Taxes
 - ii. No V.A.T.
 - iii. No With–Holding taxes
 - iv. No Levies
- 12.1.8 Specific Onne Advantages
- i. Customs privileges for goods consigned to Onne Oil and Gas Free Zone, including Goods in Transit to other West African Territories.
 - ii. No pre-shipment inspection – Goods are not consigned to Nigeria
 - iii. Duty Free Stock, Equipment, Spare Parts, Pipes
 - iv. No double handling in and out of Nigeria
 - v. Access to major projects On-shore, Off-shore and Regionally
 - vi. Cost Efficient Operations
 - vii. Sophisticated Oil Service Centre Support
 - viii. Logistics Centre For West Africa
 - ix. Easy Clearing Process
 - x. Duty Free Status for Imports
 - xi. Pre-shipment Inspection in the Free Zone
 - xii. Duties paid on Goods Exported to Nigeria
 - xiii. Sea - Air Logistics
 - xiv. No red tape - faster services
 - xv. Minimal Bureaucracy
 - xvi. Easy Registration
- 12.1.9 Services Provided and key investors in the Zone
- i. Terminal Operators: (Brawal, AMS, WACT, INTELS)

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- ii. Drilling Chemicals And Mud: (Baroid, Baker Hughes, MI Drilling Fluids, Star AP, Best Land and Sea)
 - iii. Cement And Additives: (Halliburton, BJ Services, Schlumberger)
 - iv. Drilling Contractors: (Global Marine, Saipem, Transocean, Sedco Forex, Mallard Bay, Noble Drilling, R&B Falcon)
 - v. Project Companies: (JB, B & B, Nuova Cimi Montubi, Soimi, Saipem , Daewoo, Dresser Kellogs, Brown & Root)
 - vi. Civil Engineering & Construction: (Murray & Roberts, Prodeco, Ascot Oil),
 - vii. Cement Factory And Distributor: (Rock Cement, Atlas Cement,)
 - viii. Pipe Coating: (Socotherm, Bredero Price)
 - ix. Supply Boat Services (Seacor, Maersk, Tidex, Surf, Interoil, Sea Bulk, Edison Chouest, Walvis, Smith, Lamnalco, Adnan, Adamac)
 - x. Service & Tool (Anadrill, FMC, Baker Oil Tools, Geoservices, Cooper Cameron, Weatherford, BJ Tubulars, Wasco, Frank's)
 - xi. Environmental Services (Delta, ITS, CNA)
 - xii. Well-Head Services (Cooper Cameron, ABB, FMC, Kvaerner)
 - xiii. Driving (Oceaneering, Sea Weld, Nigerian Submarine Divers, Hydrodive)
 - xiv. Dredging (JB)
 - xv. Inventory Equipment Supplier (Wasco, McJunkin, Pressure Valve, Unistockists)
 - xvi. Catering (Sodexho/Universal Catering, Pellegrini, West Africa Catering Services)
 - xvii. Shipping Lines (Maersk- Sealand, Torm, HMT/UAL, Saima, Safmarine, Baco Liner, OTAL & ASB)
 - xviii. Airfreight Carriers - Air France, DAS, Panalpina
 - xix. Airfreight Services - ASB, Panalpina & SDV
 - xx. Shipping Agents - Maersk, SDV, Murphy, Comet, Interserve Gulf Agency & PWT
 - xxi. Clearing & Forwarding Agents - SDV, PWT, Joe-Eboje & Murphy

12.2 Panama PEZs

- 12.2.1 Panama' economy is primarily a services based economy. Services account for over 70% of GDP. The most important services include the Panama Canal, banking, the Colon Free Trade Zone, insurance, maritime and port services, and flagship registry. Panama has one of the most open economies in Latin America.

Because of the well- developed services sector and the open nature of its economy, Panama is also a highly competitive market.

12.2.2 The Government of Panama enacted Decree No. 29 (Executive Decree) dated July 14, 1992, allowing the establishment of Petroleum Export Zones (PEZ) in specially designated areas in Panama. Decree No. 29 allows any foreign or national company to establish operations in a PEZ to produce, refine and export petroleum products. It also permits direct sales to foreign vessels transiting the Panama Canal, and to foreign airlines.

12.2.3 There presently exists in the country 7 Petroleum Free Zones. Within any Petroleum Free Zone, individuals or corporations, national or foreign, may perform multiple operations under a special tax free regime, as follows:

- i. Introduce, storage, manufacture, bottle, refine, purify, mix, market, transport, transfer, pump, process, transform, sell or in any other way dispose in the domestic market, export, re-export, provide and, in general, operate and manage crude oil, semi processed or any of its by-products;
- ii. Build, install and operate petroleum refineries and other transformation or processing means of crude oil or semi-processed, storage tanks, oil pipelines, gas pipelines and poly-pipelines, pumping installations and pipes, buildings for offices, warehouses, or workshops and any other installations; introduce machinery, equipment, spare parts, containers, bottles, vehicles, furniture, equipment for fire or spill prevention, construct buildings for offices, warehouses, workshops for the use of the beneficiaries of the contracts to operate in the Petroleum Free Zones in any of the activities mentioned in subsection (a) hereinbefore;
- iii. Lease, acquire or in any other manner use lands, easements, right of way and other real or personal rights in regard to bona mobilia located in the areas designated as Petroleum Free Zones;
- iv. Establish water services, electrical power, gas, energy, heat, refrigeration or any other kind of services, upon previous coordination and approval with the respective public entities;
- v. Build ports, piers, dry docks, shipping and unloading places for ship and airplanes, railroad stations for loading and unloading on land or granting contracts for the construction and exploitation of such works; and
- vi. In general, all kinds of operations or activities proper or incidental to the establishment and operation of the Petroleum Free Zones for the introduction, storage, pumping, transference, distribution, marketing and crude refining and petroleum by products.

12.3 **Iran: Special Petrochemical Export Zone**

12.3.1 The Special Petrochemical Economic Zone is located, in a 2000-hectare land in the port area of Imam Khomeini Port in Mahshahr Township, on the coasts of the

Persian Gulf. Investment in this special economic zone will enjoy many advantages and special legal facilities including the following:

- Any form of investment in the industrial section will enjoy a tax holiday of four to eight years. The foreign commodities that are produced and or receive certain services in the region are exempted from the general import and export tax regulations of the country.
- The entry into the country of products manufactured in the economic zone will have no limit in proportion to the percentage of the added value, and there shall be no need for order registration and opening letters of Credit for imports , and maintenance of goods such as raw materials, machinery, manufacturing tools and equipment are handled on trust-basis in the region and, goods that enter the zone for the purpose of export action may be sent out of the zone with the minimum amount of legal procedures.

12.3.2 The Special Petrochemical Economic Zone Organization, aside from the said advantages, transfers the lots of land and provides utilities such as water, sewage, electricity, telecommunication and gas for the investors in the shortest time possible. Also, the organization receives the price of the lots in instalments in order to render another sort of assistance to investors and making it easier for them to pay the price.

12.3.3 It is also worth mentioning that the conclusion of land transfer contract with investors will be in the form of a definite legally credited title and, it will be granted to investors within a maximum of six months. Meanwhile, in the case of joint investment, since such cases are registered in Iran, domestic investors too are supported given the lots of land they ask for. Also, in the case of direct foreign investment, the land will be leased out on a long-term basis to the contracting parties.

12.4 Persian Gulf: Special Petrochemical Export Zone

12.4.1 Pars Special Economic Energy Zone (PSEEZ) was established in 1998 for the utilization of South Pars oil and gas resources and encouraging commercial activities in the field of oil, gas and petrochemical industries.

12.4.2 **Objectives:** Facilitating for the on-time execution of various oil and gas projects, providing the appropriate foundation to attract local and foreign partnership with the aim of developing oil, gas and petrochemical industries as well as inter-related and downstream industries, creating local job opportunities and attracting skilled and semi-skilled workforce from neighboring provinces with regards to its positive effects on economic prosperity in the provinces of Bushehr, Fars and Hormozgan.

12.4.3 **Location:** This zone is located the Persian Gulf coast and 300 Km. East of Port of Bushehr and 570 Km. West of the Port of Bandar Abbas and approximately 100 Km. away from the South Pars Gas Field (Continuation of the Qatar's Northern Dome).

12.4.4 Macro Grouping of Facilities and Services

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- i. Central administrative and support: Central Local office, Industrial affairs, Infrastructural services, Customs. Employment office, Social Welfare office, Visa
 - ii. Office and service centres: Banks head office, Post office, Police station, Driving & Vehicle licensing office, Property registrar office
 - iii. Sports and recreational centres: Multi-Purpose gymnasium, enclosed swimming pools, Open grounds sports, Water sports, sailors club
 - iv. Hygiene and medical centres: First aids emergency services, Polyclinic, General Hospital for daily operations, Drugstore
 - v. Technical and vocational training centres: Special oil, Gas & Petrochemical institute, Research centre, Applied university faculty, Library & Documents centre
 - vi. Religion, arts and cultural centres: Multi-Functional assembly halls, Exposition hall, chapel (Praying house)
 - vii. Fair and commercial centres: Central & Specialty fair complex, Trade centre & Stock exchange, Satellite information centre
 - viii. Residential / Guest house centre: Guest House, First & Second class & International hotels, Hotel apartment
 - ix. Welfare centre: Restaurants, Central kitchen, Coffee shop, supermarket, Bakery, Sanitary services
 - x. Technical services: Consulting engineering & Contracting services, support & procurement affairs, Transportation companies
 - xi. Landscaping and parks: Public parks, Coastal & Roadside green spaces, Forestation, Plant nursery, Environmental Protection
 - xii. Transport : Terminals, Car parks, Coastal & Roadside green spaces, Forestation, Plant nursery, Environmental protection
 - xiii. Infrastructural facilities: Port complex, Power plant, Electrical main & sub station, Desalination plant, Water & Fuel tanks, Gas station, Telecommunications, Sewage treatment plant
 - xiv. Mobilization workshop: Consultants & Contractors camps, construction period sites, Construction period warehouses, Construction period workshop, Construction material depots
 - xv. Warehousing: Transit and industrial warehouses (Enclosed, Covered, Open) for bulks & Pallets, Liquids tanks, Cold storage
 - xvi. Urban furniture: Propylaeum, Street lights, Traffic & Advertising signs, Telephone kiosks, Transport stations, Site beautification

12.4.5 Legal Facilities for Investments

- i. Transit and export of goods through governing by special economic zones

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- ii. Tax exemption for all Manufacturing and Industrial Investments
 - iii. Foreign investment and ownership (except for the land) up to 100 percent
 - iv. Exemption from any customs duties and tariff for importing raw materials, machinery and spare parts
 - v. Importing the goods produced in the zone to the main land equal to the amount of its generated added value
 - vi. Sale and lease-Purchase of land to domestic investors and lease only to foreign investors
 - vii. Easy issuance of entry visa for foreigners
 - viii. Full guarantee of the foreign investment and its profits
 - ix. Full freedom of entry and exit of capital
 - x. Allocation from the Oil Stabilization Fund

12.4.6 Banking Facilities

- i. Banking regulations at zone conform to international standard.
- ii. Banking transactions with the main land shall be in either Rial or foreign currency of choice and overseas transactions will be in the respected foreign currency.
- iii. Foreign currencies shall not be controlled and the exchange of Rial to any foreign currency is permitted.

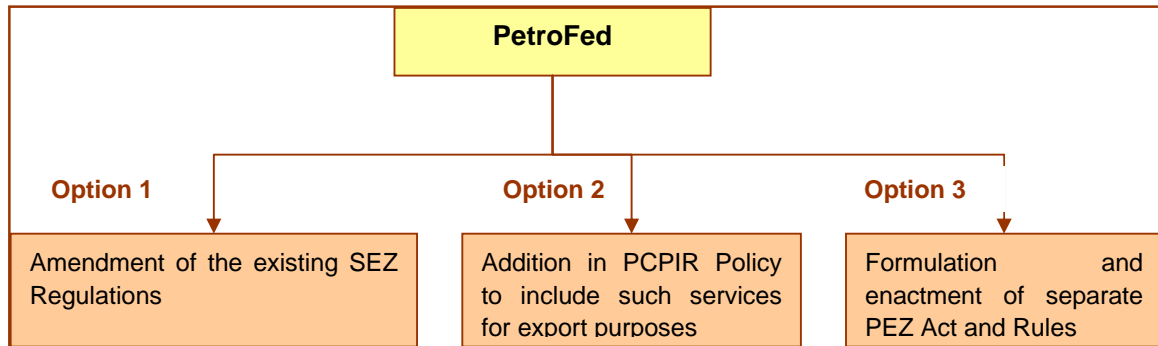
12.4.7 The Zone Potential Investors :

- i. Major oil, gas and petrochemical companies
- ii. Major financial Institutions (including banks and investment companies)
- iii. Service related companies (including the drilling and exploration equipment manufacturers)
- iv. Academic and educational institutions especially technician and vocational training
- v. Non-Oil and gas companies engaged in the downstream and mixed industries
- vi. Service sector including banks, insurance companies, warehousing, and transport companies, etc.

13 Way Forward for PEZ

13.1 Way forward

13.1.1 Under the present circumstances, the following diagrammatic representation highlights the options that can be considered in order to evolve policies and regulations relevant to them:



13.2 Option 1

13.2.1 Under the present SEZ regulations: Represent to concerned ministries and departments of the Central Government for the appropriate Amendment of SEZ Rules:

- To expand the definition of services
- To include and suitably amend other operational provisions to facilitate the movement of goods and people for undertaking these services outside the Zone in DTA and off-shore.
- To Amend the tax legislation to include these services for tax benefits

13.3 Option 2

13.3.1 Revision in PCPIR Policy to include such services for export purposes.

- As the government is in advanced stages of notifying the PCPIR Policy in order to give a fillip to the petroleum and petrochemicals industry in India.
- PetroFed can represent the concerned ministry and department to include the desired services in the ambit of the PCPIR Policy. This would ensure that a unit providing such services from within a PCPIR is able to provide such services not only to other units located within that or other PCPIR's in India but is also able to export such services as and when desired.

13.4 Option 3

13.4.1 Formulation and enactment of PEZ Act and Rules

- Represent to the concerned ministries of Central Government to formulate a comprehensive, self sufficient Act duly passed by the parliament and the Rules there under and provide for necessary fiscal benefits as part of the PEZ Act akin to SEZ Act.
- The Central Government has already shown its inclination towards boosting the petroleum and petrochemicals sector with the formulation of PCPIR policy. With the representation by a reputed federation such as PetroFed the government may give this proposal a serious thought