

**“POWER AND OIL SECTOR IN INDIA: AN ESTIMATION AND ANALYSIS OF THE KEY INFLUENCERS IMPACTING ENERGY, PRODUCTION, AND DISTRIBUTION PARAMETERS WITH RESPECT TO SOCIO ECONOMIC PROGRESS AND CHANGES IN INDIA.”**

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For a developing country like India, the energy security task is gigantic.

India would need to sustain an economic growth rate of 8-10% over the next 25 years, in order to eradicate poverty and meet its human development needs. India is a hugely energy deficit country where half the population does not have access to commercial energy. Presently, India depends to the extent of 75% or more on imported crude oil.

Energy security addresses not merely economic growth but also more basic human needs of sustenance and poverty eradication. India needs energy to fight poverty. Needless to mention that India's energy consumption on per capita terms is amongst the lowest vis-à-vis other fellow developing countries, not to mention developed countries.

As infrastructure growth remains the overriding priority for India, the power sector has a pivotal role to play. Thus growth in the power sector has to keep pace at least with the annual GDP growth rate, if sustained socioeconomic development is to be made a reality.

In the electricity sector alone, India face a peaking shortage of almost 12 per cent and an energy shortage of 9 to 10 per cent.

The principle issue in oil area is the means by which, where from and at what cost can satisfy India's vitality needs in a supportable way. The functioning of international oil and gas markets in a transparent manner is most important from India's point of view. Unfortunately, the global energy market is far from perfect and has in recent years been hugely susceptible to non-market considerations. No one can forget the rollercoaster ride of last year which took the prices to a skyrocketing high of \$ 147 per barrel. Such high prices were clearly unsustainable. The recent trend of rising oil prices is again threatening a renewed volatility, which is neither in interest of producing nor of consuming countries.

Developing and emerging economies are particularly hard hit by this volatility, which adversely impacts on their developmental activities and national economic plans.

With these we can very well understand that energy sector is very vital for India to sustain the GDP growth and power and oil sector are key sector in energy field.

Government of India focusing reform in both sectors to increase the private sector participation. This gives me opportunity to analyze theses sector.

## POWER SECTOR OVERVIEW: - GENERATION

The power generation industry in India is poised for a major structural change due to increased private ownership and greater diversification in the fuel mix. Investor interest in generation is quite significant with investments flowing for manufacturing, advanced technology and merchant power. Further, the decision of the Nuclear Suppliers Group (NSG) to allow its members to engage in civilian nuclear technology trade with India might lead to an exponential increase in the share of nuclear fuel in the fuel mix.

India's installed capacity (excluding captive plants) as of March 2009 was 147,965 MW. Thermal continues to have a dominant share, at 63.34 per cent or 93,725 MW, followed by hydro (24.92 per cent), renewable (8.94 per cent) and nuclear (2.78 per cent). Sector-wise, the state sector has a majority 51.44 per cent share or 76,115.67 MW in capacity, followed by the central (33.09 per cent) and private (15.46 per cent) sectors.

- Capacity addition slows down during the year and Twelfth Plan targets finalized:-

The key concern in generation has been the sector's inability to add capacity commensurate with the increase in power demand. Despite poor past achievements, yet another ambitious target of 78,700 MW of conventional capacity has been set for the Eleventh Plan period. The trend of underperformance, however, continued during the first two years of the Eleventh Plan period. The key reasons for underachievement include inadequate equipment capacity and shortages in fuel and manpower.

The good news, however, is that orders for the remaining capacity for the plan period (65,983 MW) have already been placed and these are at various stages of processing. Further, equipment manufacturers, both of main plant and balance of plant, are fast ramping up their capacity. All of this may not be available for the current plan period as some of these plans are expected to fructify only in the Twelfth Plan period. Nevertheless, this would secure future capacity addition plans from the equipment standpoint. The technical thrust is to move to supercritical and other efficient technologies.

Meanwhile, the Central Electricity Authority (CEA) has started working on Twelfth Plan targets. It has already prepared the Twelfth Plan hydro document identifying projects totaling 30,000 MW. It is now finalising a report on Twelfth Plan thermal projects for which it has already selected projects with capacity aggregating around 70,000-80,000 MW.

- Rising private sector contribution: -

The private sector contribution to the total installed capacity has been rising consistently since the passage of the Electricity Act, 2003 from 8.66 per cent in March 2003 to 15.46 per cent in March 2009. This share is expected to rise further, given that independent power producers (IPPs) / private projects aggregating over 100,000 MW are under various stages of development. Of the 26,000 MW of Twelfth Plan thermal capacity, which is under execution, 15,000 MW is in the private sector.

The ultra mega power projects (UMPPs) are expected to bring in huge private investment. The first two out of the four awarded have achieved financial closure and involve a total

investment of Rs 364 billion. However, the current financial downturn may adversely impact several IPPs, which are awaiting financial closure of their projects. Based on the progress of projects which have already initiated construction work, the private sector target for the Eleventh Plan was revised upwards to 15,000 MW at the end of 2007-08 from 10,500 MW initially. The CEA expects an addition of over 21,000 MW by the private sector by 2012. This is a tenfold increase compared to around 2,000 MW contributed by the private sector during the Tenth Plan period. The trend in the private sector is to reserve a part of the installed capacity for merchant transactions in the market.

- Much more desired in productivity improvement: -

Although the productivity of power plants has been improving, serious efforts are required to accelerate and sustain improvements in productivity. The plant load factor (PLF) of thermal plants has improved from 72 per cent in 2003 to over 77 per cent in 2008-09. However, PLFs recorded a marginal decline in 2008-09 (77.22 per cent) compared to 2007-08 (78.62 per cent). In 2008-09, the central and private sectors, which have been consistent performers, had average PLFs of 84.3 per cent and 91 per cent respectively, while the state sector had 71.8 per cent. The state sector has been recording lower PLFs mainly due to the operation of many old plants, which require renovation and modernization (R&M) or retirement

In terms of power generation, the sector recorded a mere 2.68 per cent growth in 2008-09 to reach 717,894.52 MUs from 699,191 MUs in 2007-08. In comparison, generation recorded a growth of over 6 per cent during the previous two years. Of the total generation in 2008-09, thermal sources contributed the maximum share at 82.17 per cent followed by hydro (15.74 per cent) and nuclear (2.04 per cent).

- UMPP progress:-

The concept of UMPPs, mooted by the government in 2005 to add huge coal-based projects (4,000 MW each) quickly and cost effectively through private investment, made significant progress during the year. In February 2009, the fourth UMPP, Tilaiya in Jharkhand, was awarded to Reliance Power Limited (RPL), which had already won two UMPPs earlier. The project is expected to come online by 2015. In April 2009, RPL achieved financial closure for the Sasan UMPP in Madhya Pradesh. The units of this project are expected to be commissioned between December 2011 and April 2013. For the imported coal-based Krishnapatnam UMPP in Andhra Pradesh, RPL acquired three coal mines in Indonesia and currently is in talks with equipment manufacturers. Meanwhile, Tata Power's Mundra UMPP in Gujarat, the first UMPP off the block, is on track and is scheduled for commissioning in 2012.

In 2008, the power ministry approved the next four UMPPs in line - Kudgi in Karnataka, Bedabahal in Orissa, Cheyyur in Tamil Nadu and Munge in Maharashtra. The financial meltdown does not seem to have affected the power sector; the successful award of the Tilaiya UMPP and financial closure of the Sasan UMPP are positive indications. Nevertheless, there remain issues such as delays in securing clearances and commitments from state utilities for power purchase, resistance from environmentalists or demand for

free power by states that need to be appropriately addressed with respect to all projects, and not only UMPPs.

- **Tariff benchmarks discovered through competitive bidding:-**  
Long-term tariffs, discovered through competitive bidding during the past year, have been in the range of Rs 1.77 to Rs 2.97 per unit. For instance, the lowest levelled tariff quoted by RPL for the Tilaiya UMPP was Rs 1.77 per unit. Among the other projects, which have been awarded through competitive bidding during the past year, the lowest tariff discovered was Rs 2.45 per unit for supply of 1,241 MW (under Case I bidding) in Madhya Pradesh (RPL), Rs 2.84 per unit for the 1,980 MW Talwandi Sabo project (under Case II bidding) in Punjab (Sterlite Industries), Rs 2.86 for supply of 500 MW (under Case I bidding) in Haryana (GMR), Rs 2.94 per unit for supply of 1,424 MW (under Case I bidding) in Haryana (Adani) and Rs 2.97 per unit for the 1,320 MW Karchana project (under Case II bidding) in Uttar Pradesh
- **Nuclear capacity set to increase significantly:-**  
The marking of the Indo-US atomic arrangement in October 2008 after a waiver from the NSG opened up plenty of chances for India to take part in universal regular citizen atomic trade. India has entered into similar agreements with France, Russia, Kazakhstan and Canada. The Indian atomic power showcase is evaluated to be worth \$100 billion. It is evaluated that 40,000 MW of atomic limit may come up by 2020. The legislature has set an objective to build the offer of atomic power from around 3 for each penny as of now to 25 for every penny by 2050. Cynics contend that these objectives may not be sensible given that the Indian atomic industry is beginning sans preparation.
- **KG basin gas to boost generation:-**  
The accessibility of gas from Reliance Industries Limited's (RIL) D6 hinder in the Krishna Godavari (KG) bowl will positively affect the power area. For 2009-10, the power sector has been allocated 18 mmscmd of gas. This is expected to lead to an additional generation from stranded capacity of 3,800-4,000 MW during the year. This may increase further in case the fertilizer sector (which gets first priority) does not use all the gas allocated to it as it would then automatically come to the power sector (which gets second priority for existing assets). The availability of spot gas at a cheaper price of \$5-6 per mmbtu will also boost gas-based generation from both utility/IPP plants and captive plants. The power ministry and the CEA, however, are taking a cautious approach in planning new gas-based capacity. This is because new power projects would get the last priority for gas allocation as per the government's gas allocation policy.
- **Hydro continues to account for about a quarter of the Installed capacity:-**  
The central planners have acknowledged that the share of hydro will remain at around 25 per cent in the long run. Truth be told, by 2030-31, when the introduced limit is relied upon to increment to more than 800,000 MW, the offer of hydro limit is required to fall somewhat underneath the 25 for each penny level regardless of whether the area can completely misuse the capability of 150,000 MW. During the first two years of the Eleventh Plan period, 3,392 MW was commissioned against the target of 3,848 MW. The

remaining projects aggregating 12,235 MW planned during the current plan period are under construction. By the end of the current plan period, the share of hydro is expected to fall marginally to around 22 per cent if all capacity is commissioned as planned.

- Growth in captive generation:-

There has been a dramatic increase in the number of captive plants since the passage of the Electricity Act, 2003. Today, captive power contributes around 55,000 MW of capacity which is over a quarter of the installed base. The key reason has been the steep growth in industrial production coupled with rising shortages in many states. The slowdown in industrial growth in some segments in recent months may have given rise to surplus captive capacities. While the concept of open access and trading promises captives opportunities for disposing of surplus power, there are implementation issues which need to be addressed. A key development which is expected to result in increased gas-based captive production is the availability of gas from RIL's KG basin block. With the expanding city gas distribution networks across cities and with greater assurance of gas supply to these networks, the potential for several captive plants within city limits to switch from liquid fuels to natural gas is much higher

## **POWER SECTOR OVERVIEW: - TRANSMISSION**

Power transmission is taken more seriously by planners and investors (both the public and private sector) after the passage of the Electricity Act, 2003 and particularly during the last year or so. It has been recognized that a strong and adequate transmission infrastructure is a prerequisite for ensuring free flow of power where it is required, either through short term or long-term contracts

The introduction of modern concepts like open access, trading and merchant power, and the growing importance of captive power, renewable sources of energy and nuclear power in the overall power mix have led to new requirements in transmission investments, planning and operations.

Further, to handle the growing complexity in market operation involving multiple players and to provide fair access to the network to all these players, system operators must be adequately empowered. Thus, there is a move towards separating load despatch functions from transmission utilities to ensure a level playing field for new entrants as recommended by the Gireesh Pradhan Committee.

As of March 2009, the state transmission utilities (STUs) and the central transmission utility (CTU), which are responsible for intrastate and interstate transmission networks respectively, together owned and operated a complex transmission system comprising around 220,800 ct. km lines and over 288,600 MVA and 14,000 MW of substation capacity at voltages above 220 kV.

During 2008-09, transmission lines total ling 12,742 ct. km and transformation a capacity totaling 19,229 MVA were added at voltages above 220 kV, both in the central and state sectors. The rate of growth of the transmission network (at 220 kV and above voltages) during

the past decade has been only about 6-7 per cent. The government has set a target of 10 per cent growth in network length and 14 per cent growth in capacity for the Eleventh Plan period, which should go a long way in addressing capacity constraints.

While the current financial scenario may marginally impact investments in the power sector, raising resources for transmission projects should not be difficult as such because these are usually debt market customers whose debt needs are met largely by public sector financial institutions.

For instance, Power Grid Corporation of India Limited (PGCIL), the country's CTU, spent Rs 147.1 billion during 2007-08 (Rs 66.15 billion) and 2008-09 (Rs 80.95 billion) and is confident of achieving its capital expenditure target of Rs 120 billion during 2009-10. Of the Rs 550 billion it has planned for the Eleventh Plan period, it proposes to spend Rs 200 billion in the development of transmission systems associated with the ultra mega power projects.

At the state level, the STUs spent around Rs 68.17 billion during 2007-08 alone. This amount comprises 33 per cent of the total utility spending during the year. The STUs target a spending of Rs 650 billion for the Eleventh Plan period. The momentum in spending both at the central and state levels needs to be accelerated and sustained to ensure that transmission bottlenecks do not stall growth.

The development of the national grid by PGCIL is an effort to ease transmission constraints. Progress on the national grid project has resulted in interregional transfer capacity increasing to 19,800 MW in March 2009 compared to 16,200 MW in March 2008. The target is to take this to over 37,700 MW by 2011-12 and to 58,700 MW by 2014-15.

Another significant development has been the operationalisation of the long-awaited National Load Despatch Centre (NLDC), the apex body in the hierarchy of the national grid system, in February 2009. NLDC's full fledged operation had become imperative with the emergence of two power exchanges for which it is mandated to act as the nodal agency, according to the Central Electricity Regulatory Commission's (CERC) latest open access regulations. In fact, the launch of the NLDC has set the stage for synchronous operation of the national grid on a real-time basis and for smooth power transfers across regions.

With the national grid plan and new concepts being adopted, the use of state-of the-art technology has become imperative. The national grid is being implemented with a flexible 765 kV AC transmission system with series compensation, convertible static compensators and static VAR compensators

To cut losses, PGCIL is adopting higher voltages such as 765 kV, +/- 800 kV and 1,200 kV. The development on this front remained relatively slow with most 765 kV lines still being charged at 400 kV (except for the Sipat-Seoni line). However, other technologies like gas-insulated substations and supervisory control and data acquisition for substation automation are witnessing faster adoption. The future envisages development of smart grids.

Continuous changes in technological standards have raised concerns of obsolescence, impelling transcos to undertake massive renovation and modernization work.

One area where some activity has started taking place in the past year and a half is private sector investment in transmission. Attracting stand-alone private investment in the power

transmission segment has been tough despite its opening up way back in 1998. The only public-private partnership project - the Tala transmission system has been operational since May 2007.

Awarded in October 2007 and being implemented by Reliance Power Transmission Limited, the first independent power transmission company project has made some progress since and is expected to be completed by 2010. There are a handful of transmission systems associated with private generation projects that are being developed by private players either independently, or in joint venture with PGCIL or an STU.

Meanwhile, the much-awaited 14 transmission projects identified by the power ministry for 100 per cent private investment have also made some headway with the approval of all the standard bidding documents in 2008. The bidding process for the first three projects has already been initiated and nodal agencies - the Power Finance Corporation and the Rural Electrification Corporation - have received between 13 and 16 requests for qualification for these projects.

With respect to tariffs, the central regulator, CERC, has the mandate to determine a national transmission tariff framework. Rationalisation of transmission tariffs continues to be a long-standing concern, and is crucial for attracting investments in the sector. Prospective investors clearly look for competitive bidding and distance- and direction-based transmission tariffs as envisaged by the National Tariff Policy, 2006. The CERC is currently working on these regulations and is expected to come up with draft regulations shortly.

Meanwhile, in March 2009, it issued draft regulations for differentiated and non-discriminatory medium- and long-term access to the interstate grid. The objective is to make the terms of long-term grid access more flexible and allow medium-term transmission system usage (3 months to 3 years).

The rapid transformation of the segment has thrown up many issues and challenges before policy-makers. These include inadequate equipment manufacturing capacity, fast changing technology leading to obsolescence, problems in right-of-way, delays in clearances, inadequate margins in the system, grid indiscipline, lack of basic infrastructure and uncoordinated planning.

Despite additions, interregional power transfer capacity continues to be limited in comparison with the requirement. The transmission corridors are always chock-a-block, leaving little or no free capacity for trading. The emergence of the two power exchanges and more traders is expected to put greater pressure to create redundant transmission capacities.

The synchronisation of four regional grids has increased grid indiscipline, particularly in the northern region states, which have been overdrawing despite the CERC's stringent measures. A key tool for maintaining grid discipline at the interstate level has been the availability-based tariff mechanism. However, the sustained success of the mechanism would depend on regular payment of unscheduled interchange charges, which some states are not paying.

There are concerns about the slow progress made by state transcos in strengthening and augmenting networks. While some unbundled utilities are making an effort to upgrade their

transmission infrastructure and improve their efficiency by moving towards higher voltage levels, others need to catch up to ensure that a lack of adequate transmission networks does not become a bottleneck. This uneven development is also a hindrance to implementing modern concepts like open access, and developing power markets.

Net, net, greater attention is being paid to the transmission system in recent times as reflected in the huge investment plans of the CTU and STUs, the government's intent to attract private investment and the regulator's efforts to rationalise transmission tariffs.

## **POWER SECTOR OVERVIEW: - DISTRIBUTION**

Power distribution is the final and most crucial link in the electricity value chain as it directly affects the consumer who pays for the supply. Distribution starts at the 33 kV substation and ends at the consumer's doorstep and involves navigating a maze comprising distribution lines, transformers, switchgears, capacitors and other equipment.

India's distribution infrastructure includes more than 6.76 million ct. km of lines and over 282,000 MVA of distribution transformer capacity as of March 2008, and it is assumed to be growing at an annual average growth rate of around 3 per cent and 7.5 per cent respectively.

On an average, India loses about 32 per cent of electricity as its aggregate technical and commercial (AT&C) losses, which is a more accurate measure than simple transmission and distribution (T&D) losses. The target is to reduce AT&C losses to 15 per cent by 2012 under the Restructured Accelerated Power Development and Reform Programme (R-APDRP). Even though AT&C losses continue to remain high (ranging from 12 per cent to 68 per cent), there has been a decline in AT&C losses in almost all discoms. On the other hand, T&D losses registered a decline from 32.54 per cent in 2002-03 to an estimated 26.91 per cent in 2007-08.

There are an estimated 160 million electricity consumers today, growing at an annual rate of 4.5 per cent. The average per capita consumption was about 704 units in 2007-08 and is expected to cross 1,000 units by 2011-12. Electricity supply has not been able to keep pace with growth in demand.

Power shortages have risen on an average basis from 9.8 per cent in 2007-08 to 11.1 per cent in 2008-09 indicating that demand has grown much faster than supply.

However, peak power shortage has come down from 16.6 per cent in 2007-08 to 11.9 per cent in 2008-09 primarily due to better grid synchronisation and power trading market development. The distribution system is plagued by deep-rooted legacy problems of high AT&C losses triggered by rampant power thefts and technical issues, corruption, subsidised or free power, dilapidated networks, inadequate metering, poor recovery of dues, lack of consumer orientation and poor operational and financial management.

This is partly due to the fact that distribution was a neglected area until the late 1990s when the thrust on privatization of generation failed to take off due to the lack of creditworthy buyers. This resulted in greater focus on the revenue end of the power chain and government-instituted distribution reforms.



Distribution reforms: Union government assistance:-

The union government launched the APDRP in 2002-03, with the objective of encouraging reforms and reduction in AT&C losses, and improving power supply quality and consumer satisfaction. Under the APDRP, reform-driven projects were given assistance. System up-gradation, metering, energy audits and consumer services were the key areas covered. The Rs. 400 billion APDRP under the Tenth Plan comprised two components, an investment component and an incentive component, each with an allocation of Rs. 200 billion.

As of March 2008, a total of 571 projects were sanctioned under the APDRP involving an investment of Rs 170.34 billion. Of the total investments, the Government of India component was around Rs. 87.2 billion, of which around Rs 74.7 billion was released. The total utilisation until March 2008 was Rs 119.02 billion, well short of the targeted Rs. 200 billion. Under the incentive component, the government has so far approved around Rs 29 billion and released the entire amount. This is also well short of the Rs 200 billion targeted level of grants.

The maximum number of projects were undertaken in Andhra Pradesh (100 projects), followed by Kerala (52) and Madhya Pradesh (48). Further, around 74 per cent of the works were completed under the APDRP as of November 2008.

The programme so far has created islands of excellence, which most utilities were not able to replicate in non-APDRP circles. The programme met with moderate success but succeeded in bringing a focus to badly needed distribution reforms. Subsequently, the power ministry has released the R-APDRP, which is larger in scale than the original programme at Rs 515 billion. As of February 2009, Rs 19.47 billion has been sanctioned by the Power Finance Corporation to 25 discoms covering 598 towns under the R-APDRP.

The Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), aimed at rural electrification, is also providing focus and funds to the rural distribution system. As of April 16, 2009, 562 projects under the RGGVY have been sanctioned with a total cost of Rs 262.06 billion, of which Rs 135.56 billion has been released. So far, 6.34 million rural households have been provided with electricity connections and over 59,000 villages have been electrified under the RGGVY.

Privatization of distribution -A preference for franchisee models:-

Privatization of distribution has been slow to take off. Orissa, the first state to privatise distribution, was unable to reap the entire benefits of privatisation initially. The discoms suffered due to lack of government support and absence of transitional subsidy to absorb the financial losses. However, the privatisation experience in Delhi has been better as discoms have been able to bring down AT&C losses and generally improve customer services.

The franchisee model holds promise for the future as it is perceived as a "softer" approach in involving private players in distribution. It seems to be politically more acceptable, since it is not an out and-out sale.

The first franchisee operation was launched in Maharashtra (Bhiwandi circle to Torrent Power in October 2007) with the state utility transferring the rights to supply, maintain and recover electricity dues in certain circles to private players. The success of the Bhiwandi franchisee

model has served as a benchmark for other states to follow. In recent months, the Uttar Pradesh government has moved ahead to introduce input-based franchisees in urban areas for power distribution. Torrent Power Limited has been awarded the letter of intent for the Agra and Kanpur franchisee in Uttar Pradesh for a period of 20 years. Other states such as Haryana and Orissa are also planning to take the franchisee route.

#### Role of reforms and regulation:-

Reforms and regulation have played a key Role in the distribution turnaround. The formation of 25 state electricity regulatory commissions (SERCs) in 28 states has led to tariff rationalisation as industrial tariffs are being progressively reduced, while tariffs for agricultural and other categories are being increased to levels closer to the cost of supply.

Besides, most SERCs have also passed the final regulations on performance standards for distribution licensees, which specify the overall and guaranteed standards with respect to complaint handling, quality of power supply and system reliability, safety, restoration of power supply, existing and new connections, metering and billing issues, among other things.

Open access, a catalyst to help the captive segment and energise power trading, has taken off for bulk consumers in some states. Other consumer categories would gain access in a phased manner. Almost all SERCs have passed the final regulations. As of March 2009, 116 approvals have been awarded in 10 states.

The splitting and unbundling of state electricity boards (SEBs) has also helped a great deal. So far, 14 SEBs have unbundled and statistics show that unbundled SEBs have a lower cost of supply than vertically integrated utilities. A few states are still unwilling to take the political decision to un-bundle.

The level of metering has shown improvement. This is partly due to the APDRP. At the 11 kV feeder level, 100 per cent metering has been achieved in 23 states and 100 per cent consumer metering has been achieved in 9 states. While metering at the feeder and consumer levels has shown considerable improvement, DT metering needs attention.

Another positive development is that both sales of power and state utility revenues are showing a steady increase every year. Revenue from the sale of power increased from Rs. 982.86 billion in 2004-05 to Rs. 1,217.91 billion in 2006-07 registering an annual growth of 11.32 per cent. There was a higher growth in revenue from sale of power vis-a-vis energy sold, indicating improved realisation by utilities through higher tariffs. Cash collections are improving particularly in states implementing APDRP works, receiving subsidies in time, and where anti-theft laws have been passed. A few utilities/SEBs have registered an improvement in cash profits like Maharashtra, Kerala, Karnataka, Jharkhand, Bihar, Orissa, Rajasthan, Haryana, Delhi and Chhattisgarh. However, states like West Bengal, Punjab, Uttar Pradesh, Madhya Pradesh and Tamil Nadu, have shown deterioration on the financial front.

#### Growing focus on IT and consumer-centric approach:-

IT is increasingly playing a prominent role in the transition. More and more distribution companies are adopting sophisticated IT systems to improve operations and customer service.

Spot billing, call centres, remote meter reading, automated billing and energy accounting are among the IT mechanisms incorporated. HVDS, SCADA systems, distribution management system software, DT monitoring systems and GIS are some of the new technologies in use today. However, the budgets for new investments are still inadequate and the utilisation of existing investments is still poor. Some distribution companies continue to display a lack of strategic approach to systematic development.

A turnaround in the distribution segment is critical to make the power sector commercially viable and to deliver reliable power supply at reasonable cost. The government's thrust on reforms and implementation of policy objectives through regulatory efforts has started to bring an increased focus on profitability and efficiency. However, sustained long-term efforts will be required to lead to permanent changes.

### **POWER SECTOR: - FROM 2003 TO 2030**

India is projected to have power generation capacity of ~ 750 GW by 2030 i.e. ~5X the current capacity, which is expected to be the third highest globally. This implies annual capacity addition of 20-25 GW against the average annual capacity addition of 5-6 GW in the eleventh plan so far.

The macro story of the sector implies high growth, long term visibility and sustainable returns. This, together with the demand –supply gap (~16% peak deficit), has been attracting investment into the power sector. The sector growth has been posted CASR of 50%, highest in the infrastructure sector over FY00-09.

Game changers for the sector from 2003

Since FY03, Govt. of India has undertaken many initiatives to correct structural faults that had developed in the sector over the years. These measures are described below, clearly had long-term impact on the power sector

#### **Power for all by 2012**

In 2001, the central government introduced 'Power for all by 2012- a comprehensive blueprint for all power sector development projects. It aimed at adding at least 100 GW by 2012 and increasing the per-capita availability of electricity to over 1000 units by 2012. This blue print formed the core of various power reforms that were introduced in the sector in ensuing years under the tenth and eleventh plans

The target acted as a guiding force, ensuring later in the form of Electricity Act, 2003, which opened up the generation sector by encouraging private sector participation. The transmission and distribution legs were provided fillip through distribution up-gradation and rural electrification programmes like APDRP, RGGVY. To achieve targets across various legs of the power sector, reform agenda were put in place in each aspect:

1. Generation focus was on low cost power, optimization of fuel mix, technology up gradation ( like supercritical) and harnessing renewable potential

2. Transmission reforms targeted creation of national grid with focus on reducing cost of transporting power with minimal line losses.
3. Distribution focused on the system up gradation, theft/loss reduction and improving power quality.

### **The Electricity act 2003**

Amongst some of the most covenants of the Electricity Act 2003 were freeing of power generation from the licensing requirements and elimination of the single buyer model for generation companies. This essentially dealt directly with one of the most important problem of credit security that was plaguing generation capacity addition by the private sector. These two important measures amongst others, resulted in higher incentives for the private sector to set up generation capacities. The Electricity Act 2003 proposed unbundling of SEBs into generation, transmission and distribution entities. This move resulted in cleaning up the act of SEBs by isolating the loss making units and enabling the generation SEBs to be credit worthy and hence take up generation capacity.

Addition of generation capacities resulted in significant growth opportunities for the generation equipment and project companies. Further the shoring up of generation capacities had a positive impact on transmission and distribution value chains.

### **One –time settlement 2003**

To ensure the financial health of SEBs , GoI introduces a financial restructuring package that entailed writing off ~ 25% of outstanding dues (principal +interest) and issuing 15yrs bonds bearing coupon of 8.5% (tax free) by securities the balance dues. The scheme also set a landmark by forcing various states to sign MoUs with GoI, entailing reform-based performance milestones, failing which GoI would deduct allocation/ assistance to the respective defaulting state.

### **National tariff policy 2006**

The objective of National Electricity Policy 2006 (NEP) was to ensure competitive tariff, financial turnaround and commercial viability of state utilities and providing electricity to India's poor. The policy has set targets under each segment of power such as:

- (1) adding 100 GW in 2002-12, ensuring at least one 33/11 KV substation in every block, so that at least one distribution transformer is installed in every village
- (2) encourage renewable energy and renovate and modernization (R&M) programme
- (3) opening the sector for private participation
- (4) Set the benchmark for cross subsidy level.

Taking cues from NEP, the national tariff policy introduced competitive bidding as basis for all future projects (except for govt. owned projects). It also directed the regulatory commission to promote transparency, consistency, efficiency in operation and improvement in quality of supply, enforcing adoption of multiyear tariff by all regulatory commissions from April1, 2006

was a turning point for the Indian power reform. The tariff policy also recommended limiting cross subsidization up to 20% of the average cost of supply by FY11.

### **Reducing inefficiencies through APDRP**

GOI introduced Power Development and reforms Programme (APDRP) in FY01 with outlay of INR 400 bn, to reduce T&D losses from 32% to 10% by FY07. Even as the scheme achieved limited success in terms of reducing T&D losses ( currently as 26.9%), funding through the scheme resulted in capital availability for the distribution utilities; the utilities , therefore , undertake distribution up-gradation projects, which enhanced their revenue visibility. As per APDRP, the central govt. was required to fund 50% of the total spending on T&D up-gradation (1:1 ratio of grant and loan), while SEBs were supposed to finance the balance through financial institutions or through their own funds.

In the second half of the Tenth plan period, the aforementioned policy actions brought about changes that had far reaching impact on the Indian power sector. Most importantly, they have driven capital into area like power generation and transmission, and opened up growth opportunities across the value chain.

## **POWER SECTOR: - OPPORTUNITIES**

### **I. Opportunities for generation equipment**

Assuming INR 50 mn/MW capex for a power plant, the BTG opportunity is likely be ~INR 4.25 tn (50% of the overall spend), which can be broadly split into 50:50 for boilers and turbine generators. Going ahead, during the Eleventh and Twelfth plans, India targets to add ~170 GW of generation capacity, thereby, creating huge market for equipment vendors. This implies growth of ~2x over FY97- 07. BHEL and Thermax have been key boiler manufacturers in India; BHEL, along with Siemens, has been a key player in turbine generators. BHEL, the largest equipment vendor in the country, has 10 GW annual BTG capacity. However according to the Eleventh Plan capacity addition targets, the BTG industry required to have an annual capacity of ~15 GW. Given this gap in demand and supply, imports will play a vital role in meeting this demand. Among the fore players, Chinese and Korean (Shanghai, Doosan, and Dong Fang) manufacturer have been particularly active in India due to their ability of executing standard 300 and 600 MW plants on lower time schedules and lower initial capex.

Order backlog to sales, a growth indicator for BTG companies, is at an all-t high, implying huge growth in the BTG space, driven by capacity additional consequently, we are likely to see high margins and profitability for BTG companies at least over the Eleventh Plan period, until capacities continue to demand.

### **ORDER SECURED BY BHEL**

Orders Secured	2004-05	2005-06	2006-07	2007-08	2008-09
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(in Rs. crore)	18230	18938	35643	50270	59678
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## II. Opportunities for Contracting: Generation ( BOP and civil construction)

Apart from the main plant equipment (BTG), balance-of-plants (BoP) and civil contractors play an important role in execution of a power plant. In a typical power plant of INR 50 mn capex per MW, ~INR 17-18 mn is spent across various BoP packages. As detailed below, BoP mainly comprises the following six packages:-

**Table 6: Key vendors for various BoP packages**

BoP package	Key vendors
Coal handling plant	Techpro Systems, BGR Energy, Elecon Engineering, L&T
Ash handling plant	Indure, Mecawber Beekay
Demineralised plant	Driplex, Thermax, BGR , Doshi Ion Exchange
Cooling towers	Paharpur Cooling Towers, Gammon India
Chimney	NBCC, Gammon India, Simplex
Fuel oil system	BHEL, Techno Electric

During the Eleventh and Twelfth plans, India targets to add ~170 GW, entailing BoP opportunity worth INR 2.9 tn (INR 17 mn per MW). Given the huge opportunity and limited number of players eyeing it, we are likely to see rapid revenue growth with stable margins over the medium term for BoP players. Across the seven packages, there are capacity constraints, most aggravated in the 'ash handling' package.

As per current dynamics of the BoP industry offers existing players an opportunity to scale up capacities. However, even as the opportunity exists, there is little capacity addition by various BoP vendors. This can be attributed to the low-end nature of BoP contractors, which results in higher bargaining power of core contractors. However, one of the trends observed in the BoP industry has been emergence of contractors, who take up all the six BoP packages and then further sub-contract them to various specialized BoP contractors like Punj Lloyd and BGR Energy. In the absence of specialised players like Techno Electric (specialised in fuel oil package) increasing capacities, we are likely to see full service BoP contractors benefitting from growth opportunities in the BoP segment.

## III. Opportunities for Transmission equipment

As most generation capacities are concentrated in eastern regions (near coal supplies), power has to be transmitted to other regions at high voltage (as it is cheaper to transmit power rather than fuel). Transfer of power has increased tremendously over past 4-5 years, as the West and

North India have started drawing/consuming more power.

In India, power transmission comprises inter-regional grids (high voltage), state grids (medium voltage) and distribution grids (low voltage). The inter-regional grid is operated by PGCIL, while state and distribution grids are operated by their respective state transmission utilities or SEBs.

India has five regional grids. State grids are interconnected through high voltage transmission lines to form a regional grid, which facilitates power transfer between neighboring states. By FY12, regional grids are expected to be integrated to form a national grid, which is likely to result in transfer of power from power surplus regions to power deficit regions. The current inter-regional transmission capacity stands at 20,750 MW, and is expected to reach 37,150 MW by the end of the Eleventh Plan.

The requirement for inter-regional evacuation of power is likely to lead to the- setting up of a high-voltage circuit-based transmission grid. We believe the same is likely to be effective for lowering transmission losses and providing opportunity for the power transmission equipment suppliers. The total capital expenditure planned by PGCIL, state transmission utilities and the private sector is detailed in the table below:

Capital expenditure planned in power transmission sector	Total INR bn	
	10th Plan	11th Plan
Northern region	59.1	135.3
Western region	30.8	163.6
Southern region	82.4	151.1
Eastern region	74.7	160.8
North Eastern region	5.9	39.2
Central Sector	194.5	561.8
Private Sector	-	190.0
Total	447.4	1,401.8

As detailed in Table, capacity expansion in the Eleventh Plan is likely to be in excess of 2.5X of the capacity expansion in the Tenth Plan. Thus, there is high growth opportunity for companies catering to the power transmission capacity build out. Investment in the power transmission system is equally divided amongst transmission lines and sub-stations. Based on Central Electricity Authority's (CEA) projections for the Eleventh Plan, the estimate for investment in each vertical of the power transmission space is shown below:

#### Power transmission spending across various components (INR bn)

Transmission lines	FY08	FY09	FY10E	FY11E	FY12E
Transmission line towers	34.1	51.9	60.0	52.0	47.3

Conductors	43.8	66.7	77.1	66.9	60.8
Others	19.5	29.7	34.3	29.7	27.0
<b>Substations</b>					
Transformers	29.2	44.5	51.4	44.6	40.6
Others	68.2	103.8	119.9	104.0	94.6
Total	194.9	296.7	342.7	297.2	270.4

In addition, there is significant investment in the power distribution sector, which will benefit companies in distribution of transformer, power cables and meters. The electricity distribution sector has been a laggard in terms of attracting investments, primarily due to poor financial health of the state distribution utilities and higher inefficiencies in the system. Outdated distribution network and lower automation level continue to result in high technical and commercial losses. The accumulated financial losses of most state distribution utilities have increased to INR 550 bn in FY05 from ~INR 300 bn in FY03. Though some states have gradually reduced their T&D losses, nationwide T&D losses stood at ~26.9% against 10-15% in developed countries. High AT&C losses and auxiliary consumption has resulted in only ~65% of the power bill recovered from consumers.

#### IV. Opportunities for distribution equipment and contracting

Distribution, due to its last mile connectivity and largely being under the control of state governments, has often been neglected. Moreover, since the tariff is regulated with an inherent subsidy component for the poorer section and agricultural customers, this power vertical has been a politically sensitive subject. Underinvestment in the space over the years has weakened the infrastructure, which, in turn, has resulted in high AT&C losses. To encourage state utilities in undertaking capex in this space, GoI introduced APDRP and Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) programmes. APDRP has been further modified to RAPDRP in the Eleventh Plan.

##### R-APDRP

APDRP was modified and renamed Restructured APDRP (R-APDRP) in 2007-08. R-APDRP is linked to actual demonstrable performance in terms of AT&C loss reduction to 15% or less by the end of the Eleventh Plan. Establishment of reliable automated systems for collection of accurate baseline data and adoption of information technology in the areas of energy accounting are necessary preconditions for sanctioning of projects for strengthening and upgrading sub-transmission and distribution networks. It also includes adoption of IT applications for meter reading, billing and collection, energy accounting and auditing, management information systems, redressal of consumer grievances and establishment of IT-enabled consumer service centres, besides asset mapping of the distribution network. Since its launch, R-APDRP has made rapid headway; by February 2009, it had sanctioned 599 projects in various towns and cities at a cost of INR 19.5 bn. Andhra Pradesh, Karnataka and Rajasthan



together account for over 55% of the total amount sanctioned so far.

### Rural electrification

As per CEA, over 82% villages have been electrified as on date. GoI launched RGGVY in April 2005, with the goal of electrifying all (around 125,000) un-electrified villages and hamlets and providing electricity to all households in next five years. Under RGGVY, 59,882 villages have already been electrified and electricity connections had been provided to 5.4 mn below poverty line (BPL) households as on March 2009. Both RAPDRP and RGGVY schemes are aimed at upgrading the distribution infrastructure across rural and urban India. Capex for the same is likely to be undertaken by the state and private distribution utilities with assistance from GoI through these schemes. Consequently, there is likelihood of huge opportunity for the equipment and project companies targeting distribution.

## POWER SECTOR: - CHALLENGES

Opportunities in the power sector across various segments are immense and are likely to remain so over the Eleventh and Twelfth plan periods. However, since 2003, a few challenges have emerged for the sector, compelling us to analyze opportunities in view of these hassles. Even as the fundamental story of the power sector has been on a strong wicket over the past three years, it is time to ascertain if there are any roadblocks for the sector over the medium-to-long term.

While the macro outlook for power looks robust, the following factors could hinder growth:-

### a) Concurrent nature of power, entailing huge political will for success:

Power is a concurrent subject. Though policy formulation may happen at the central level, its implementation lies with states. Unlike the telecom sector, in power, the success or failure of implementation depends largely on the will of the ruling government at the state level to bring about reforms. Power is a highly politicized subject and often has a bearing on the outcome of elections. More often than not, reforms take a backseat, given the political nature of the sector. Most, importantly, in most cases state utilities control distribution assets along with access to end customers. Tariff for different consumer categories is determined by the respective state electricity regulator based on fixed RoE norms. Since the hike in tariff has not kept pace with the cost of supplying power, losses have been rising for distribution utilities.

### Year wise cost and realization of supplied power

Year	Cost of supply paise/ KWh	Realisation paise/ KWh	Only agri paise/ KWh	Loss paise/ KWh
FY02	246	181	59	65
FY03	238	195	77	43
FY04	239	203	72	36
FY05	254	209	76	45

FY06	258	221	79	37
FY07	276	227	71	49
FY08	290	232	71	58

One of the main reasons why state governments have been hesitant in hiking the agriculture/domestic tariff is that this segment forms the largest part of their vote banks. Consequently, tariffs are far higher for industrial users, forcing them to set-up captive power plants. If this trend continues, it could damage state financials further as industrial customers, who bore the brunt of high tariff, are going away (captive), leading to higher subsidy funding by state governments.

By analysis of results of the assembly elections in recent times. It shows that states that have done reforms and have brought down T&D losses, have a higher chance of being voted back to power.

This is contrary to the common belief that by giving free/subsidised power to agricultural and domestic segments, the ruling government has a higher chance of being voted back to power.

The increased awareness on access to electricity being an important need of poor should help garnering political will. Along with capacity additions, higher spend on T&D infrastructure and benchmarking distribution losses will help sustaining growth in the power sector.

#### **b) Financial health of SEBs:**

Historically, the power sector has been plagued by de payments by SEBs - the largest and sole entities having access to end consumers one-time settlement scheme of 2003 ensured that all historic debts are convert deferred loans, which helped in financially restructuring SEBs. However, fiscal discipline continues to be an issue, as depicted by the aggregate losses of SEBs (without subsidy) of ~INR 275 bn and outstanding receivables of INR 474 bn (36% of revenues).

Lack of fiscal discipline at distribution utilities' end, which essentially have access to end consumers, could derail the entire power reform process, rendering current growth and returns expectations for the sector unsustainable.

#### **d) Access to fuel, land and water:**

Most projects, going forward, are likely to be on competitive basis. Access to fuel, land and water are critical to complete projects on time, remaining competitive at the same time. These three elements are available at nominal costs today. Our interactions with industry sources, however, highlighted that their requirement is likely to significantly increase in the Twelfth Plan period. Sourcing them at reasonable prices could be a key hurdle. Any delay in execution may not only result in higher project costs, but could also risk penalty payments; since tariffs are predetermined, returns could be significantly hit.

#### **Requirements for 1 MW thermal power plant**

	Land	Water	Fuel
Coal	0.8 - 1.4 acres	29 mn Itrs p.a.	3 - 5,000 tonnes p.a.
Gas	~0.1 acres	10 mn Itrs p.a	0.005 mmscmd p.a.

Coal supplies from Coal India is expected to increase from ~400 MT to 520 MT by FY12E, resulting in a shortfall of ~82 MT for coal-fired power plants; the deficit is expected to be met through imports. Looking at the potential shortfall of coal in the coming years, many companies have started looking for coal in countries like Indonesia to meet their requirements. Even companies like NTPC have started importing coal (imports in FY09 - 2.5 mn tonnes; FY10E - 12.5 mn tonnes) to meet coal requirement at their existing plants. GoI, taking cognizance of the gravity of the situation, has started allotting coal mines to the private sector so that mining of the crucial mineral can happen at a faster pace.

Based on gas utilization policy announced by the government, the power sector is expected to get ~70 mmscmd of the incremental ~147 mmscmd (253 less 107). India's natural gas production is expected to increase from ~107 mmscmd to ~253 mmscmd by 2015, with bulk of the incremental supplies coming from RIL's KG D6 block.

Until last year, the entire gas-based capacity (14.77 GW) was operating at 57.6% plant load factor (PLF) due to inadequate gas supplies. Post commencement of gas production from KG basin, their PLF has improved to ~70%. While this PLF is expected to rise in future, new capacities can be set up only to the extent of ~13 GW, which could take India's total gas-based capacity to ~31 GW. Hence, the government needs to work on a comprehensive fuel plan to ensure that utilities are able to meet their capacity addition targets.

#### **d) Regulatory risks:**

CERC is the regulatory body that sets benchmark norms, which various states could adopt with minor changes post approval. Since most of the existing power projects are regulated and it is expected that T&D utilities to continue to be regulated over the foreseeable future, any change in norms that would impact returns (15.5% RoE currently) could impact earnings if the same is not offset through scope for efficiency gains.

#### **e) Equipment supplies:**

In recent times, quite a few projects have got delayed due to delayed equipment delivery across BTG and BoP segments. Select equipment suppliers like transformers manufacturers have increased capacity, but most of the other equipment suppliers (BTG and BoP) are yet to increase their manufacturing capacity. While in the interim, developers are resorting to imports, equipment supply is expected to be a cause for concern for developers across the vertical.

#### **f) Intellectual property rights:**

India is adopting superior technology for its pipeline generation capacity addition program. The objective is two-fold - lower land / MW and lower carbon emissions. However, since most suppliers of this equipment are overseas players, we have seen in recent times some of these

companies have raised the issue of intellectual property rights violation. Though the same is at an early stage, concerns over it could impact capacity addition program.

**g) Carbon emissions:**

India is amongst the top polluters of CO<sub>2</sub> in the world on an absolute basis due to emissions from its ~ 90 GW coal-based power generation plants. Going forward, with majority of the incremental capacity addition of 170 GW also being coal based, the emissions are going to increase significantly. With increasing pressure on countries like India and China to control emissions and take precautionary measures, any form of stricture or charge could impact power generation companies

## **FINANCE - SELECTIVE INVESTMENT IN GOOD PROJECTS**

The current financial crisis has had a wide-ranging impact on the Indian economy. The liquidity crunch has hurt capital-constrained companies which are finding it tough to raise long-term capital. Although the government has initiated a number of steps such as a cut in key interest rates to ease capital, investors continue to be cautious. Experts believe that such steps will gradually have a positive impact on the economy. Funding trends in the power sector along with the impact of the financial crisis is analyzed as below:-

**a) Debt**

- Domestic commercial banks continue to be the biggest financiers. The enabling policy framework for investments, focus on moving towards competitively bid projects and the economic growth, have led banks to take higher exposure in infrastructure, especially in the power sector.
- As of March 2008, the gross bank credit to the power sector stood at Rs. 938.99 billion, accounting for the highest share at 46.4 per cent of the total outstanding to the infrastructure sector. The gross credit outstanding to the power sector has grown at an annual rate of about 29.1 percent since 2003-04 to reach Rs 938.99 billion at the end of March 2008. During the same period, bank out standings to the industry also grew by around 29.2 per cent.
- Most of the lending by banks and non-banking finance companies (NBFCs) has been skewed towards generation projects. However, with the opening up of the transmission and distribution segment, commercial lending is expected to improve in such segments particularly as private sector players come in.
- Another reason for large exposure by commercial banks is the fact that a number of smaller banks, which do not have sufficient experience in project financing, also enter through loan syndications and thereby share the credit risk with other lenders. Commercial banks no longer insist on government guarantees and counter guarantees. Security mechanisms followed today typically include creation of escrow/trust and retention

accounts and charge over cash flows from the project.

- The lending rates are linked to prime lending rates (PLRs) and are in the range of 12-13 per cent with interest rates resets after one to three years and average maturities of 13-14 years. In a few hydro projects, commercial banks have extended tenors to about 20 years as well. In the recent past, PLRs reached as high as 14-15 per cent making private investment in infrastructure projects less profitable. Although, interest rates are steadily coming down, banks have been reluctant to bring down interest rates in line with the cut in key rates by the Reserve Bank of India (RBI) as banks continue to adopt a cautious stance.
- Commercial banks' exposure to the power sector is restricted by RBI's sectoral caps, group exposure norms, etc. and by issues of asset-liability mismatch.
- Specialised NBFCs such as the Power Finance Corporation (PFC) and Rural Electrification Corporation (REC) are also active in funding power projects. However, their disbursements have been skewed towards state utilities. Disbursements by PFC have grown at an annual rate of 19 per cent since 2004-05 to reach Rs 210.54 billion in 2008-09. REC's disbursements have registered an annual growth of 27 per cent to reach Rs 163.03 billion as of 2007-08.
- The bond market for funding has been primarily resorted to by central sector undertakings such as NTPC Limited, PFC and REC. The bonds are generally subscribed by provident and pension funds, gratuity trusts, insurance companies, mutual funds, individuals, etc. Interest rates on such bonds have ranged between 6 and 7 per cent with tenors of 7-8 years.
- The underdeveloped bond market is characterised by lack of liquidity. The limited appetite for long-term issues hampers the ability of private sector companies to raise funds. Typically, there is an absence of investment grade paper resulting in high cost of funds. Moreover, funds mobilised have to be utilised immediately in order to optimise costs and no flexibility is allowed in prepayment.
- As per Prime Database, there were seven bond issues in the power sector raising about Rs 34.7 billion during 2007-08. This accounted for about 19 per cent of the total amount mobilised through the bond route in the infrastructure sector.
- Insurance and pension funds have been investors in the sector. Their investments are governed by their respective regulatory bodies - the Insurance Regulatory and Development Authority and Pension Fund Regulatory Development Authority. The long-term nature of such funds generally fits the requirement of longer-tenor funds for power projects.
- The biggest life insurer investor has been the Life Insurance Corporation of India. During 2007-08, it invested Rs 70.22 billion by way of loans and debentures to the power sector, which decreased from Rs 96.15 billion in 2006-07.
- It is generally felt that in order to increase long-term funds to the sector, insurance and pension funds should come into the sector in a more robust manner and take exposure through take-out financing and other measures.
- Overseas financing in the form of external commercial borrowings (ECBs) has come under stress following the current financial crisis and failure of banks in the US emerged as a

preferred route. Although RBI has undertaken policy reforms for infrastructure companies raising funds through the ECB route, the amount raised through ECBs/foreign currency convertible bonds (FCCBs) in the power sector declined in 2008-09 to \$2.27 billion against \$2.7 billion raised in 2007-08.

- However, the amount raised through ECBs has grown at an annual rate of 17 per cent during the period 2004-05 to 2008-09. This is due to the fact that ECBs have been a relatively cheaper source of finance in comparison to domestic bank credit as overseas loans are usually linked to Libor.
- Multilateral institutions such as the World Bank, Asian Development Bank (ADB), International Finance Corporation, etc. have provided assistance in the form of loans, grants and technical assistance to aid reforms. For instance, the World Bank has funded state reforms in Orissa, Haryana, Uttar Pradesh, Rajasthan and Madhya Pradesh. In March 2008, both the World Bank and ADB provided \$600 million loan to Power Grid Corporation of India Limited for its expansion projects. .
- Export credit agencies (ECAs) provide financial assistance to power companies for acquiring equipment and supporting expansion. The ECAs normally provide cover up to 85 per cent of the value of imported equipment. ECAs normally finance import of equipment from their home country. For instance, in April 2008, the Export Import Bank of Korea agreed to lend \$500 million for the Mundra ultra mega power project (UMPP). Further, Chinese Exim Banks have also committed to lend up to \$1 billion for the Sasan UMPP. In addition, the US Exim Bank has extended a \$2.45 billion credit line to India for import of capital equipment from the US for infrastructure projects including power.

#### **b) Equity**

- Private equity (PE) investors have shown active interest, particularly in the generation and equipment segments. According to India Infrastructure Research, over the period January 2004-May 2008, the sector witnessed over 25 private equity deals, which were over Rs 100 million each in value terms. Some of the key deals were 3i Group's stake in Adani Power where the former acquired 8 per cent stake in the latter for Rs 9 billion, and the investment of LN Mittal Ventures and Farallon Capital in India bulls Power where LN Mittal Ventures acquired 28.6 per cent stake for Rs 15.79 billion.
- The current downturn has impacted valuations adversely. According to industry experts, valuations have come down from about Rs 40 million per MW to about Rs 10-20 million per MW. Further, falling valuations have resulted in a gap between promoters' and investors' expectations. Expectations of both parties need to align for deal flow.
- With hindsight, the fall in valuations also presents an opportunity for private/project equity investors to invest at lower valuations as demonstrated by rising PE investments. PE investments in the power sector have risen from Rs 1.87 billion in 2006, to reach Rs 17.55 billion in 2007 and further to Rs 39.52 billion in 2008.
- The booming stock markets of the past few years have led to a number of companies across all segments of the power sector to raise funds through initial public offerings

(IPOs). According to India Infrastructure Research, during the period January 2004-July 2008, 19 power companies raised a total of Rs 270.2 billion. Of the total amount raised, 69 per cent was in the generation segment, 11 per cent in the transmission segment and about 20 per cent in the equipment and financing sector.

- In the present scenario, raising funds through IPOs has become a remote possibility as investors have become risk-averse and the fall in valuations has impacted the fund-raising potential through stake dilution. Not surprisingly, companies such as NHPC Limited, Adani Power and Jaiprakash Power Ventures have put their IPO plans on hold due to adverse market conditions.
- Power companies have also raised funds through qualified institutional placement (QIP) issues. QIP is a faster mechanism as it involves less disclosures and does not involve a pre-issue filing with the regulator. Companies which raised funds through QIPs include PTC India Limited, GMR Infrastructure Limited, CESC Limited and Suzlon Energy Limited. Together these companies raised about Rs 79.39 billion during 2007-08. Raising funds through QIPs is primarily dependent on market conditions. A revival in the equity markets will help.

On the whole, the crisis has led investors to adopt a cautious approach. But well-structured projects backed by promoters with a strong background continue to attract funding as demonstrated by the financial closure of the Sasan UMPP. However, investors such as insurance and pension funds need to enter in a larger way for the availability of long-tenor funds along with the development of domestic bond markets and take-out financing structures. This will bring in much more funding options for project developers and liquidity for project equity investors

## FINANCIAL ANALYSIS OF MAJOR PLAYER IN POWER SECTOR

Power sector can be classified in different ways.

One way is to classify the use of energy source to generate power i.e. conventional (thermal, Hydro and nuclear) and non conventional (i.e. solar, wind and geothermal etc..) source of energy. In thermal power generation may further classified as coal based or gas based power generation.

My study to analyze the financial aspect of the power sector so accordingly I have classified power sector based on business model available in power sector that are

1. Power utility business i.e. power generation, transmission and distribution
2. Power plant equipment manufacturing business
3. Engineering, Procurement and Construction (EPC) business for installing new power plant.

I have selected few companies in each sector. For sector 1 i.e. Power utility business selected companies are Tata Power, NTPC, NPCL, JP power, Reliance Infrastructure, Torrent Power,

GVK etc..Companies selected in equipment manufacturing companies are BHEL, Thermax and siemens India.

Companies selected for EPC business are BGR and Lanco etc.

All the companies who are in equipment manufacturing are also involved in EPC business. The Idea is to provide the total solution to the customer instead of supply only equipment for the power plant. Very few are available who is in sole business of EPC.

Here we compare the different financial ratio of different groups of companies.

#### A) Profitability Ratios:-

##### Gross Profit margin (GPM):-

An indication of the total margin available to cover the operating expenses and yield a profit.

Gross Profit margin (GPM) = (Sales – cost of goods sold) / sales

A high GPM helps to cover business's operating expenses and invest in areas that create even greater business growth, such as marketing and research and development. A low GPM shows that little of the sales revenue is available to cover operating expenses.

GPM as an early sign that an increase in COGS is eroding your ability to remain profitable.

To increase your business's GPM, you can use a combination of approaches:

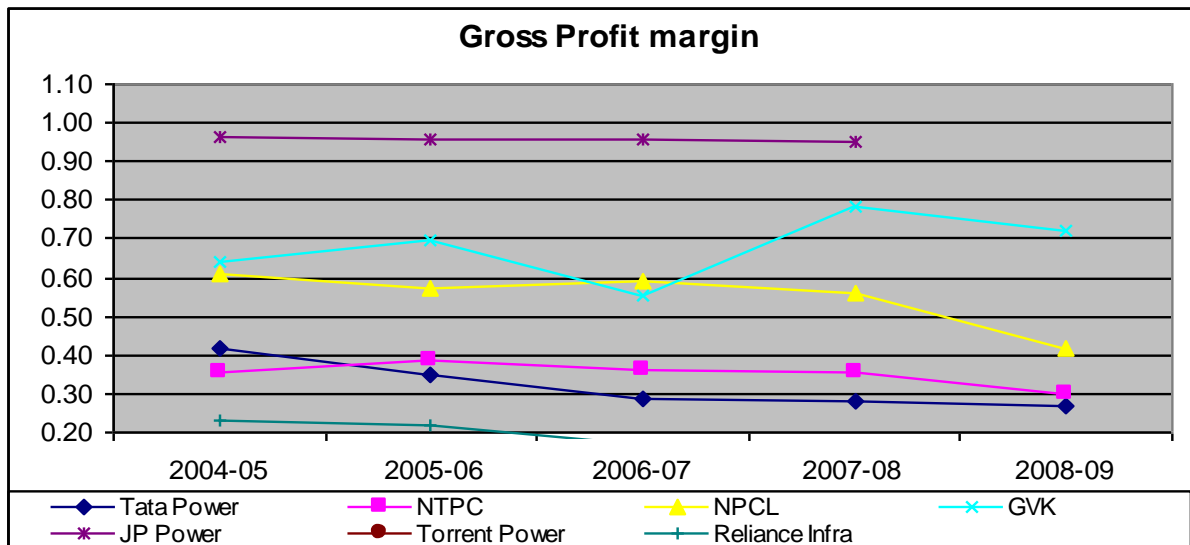
- Increase the number of units sold (sales volume).
- Reduce elements of COGS. To do this, substitute cheaper materials, use less labor, and so on.
- Raise prices. Divide COGS by GPM to find the current markup. Try different markups in the equation until GPM reaches the desired level

#### Power utility companies

Gross Profit margin (GPM):-						
	2004-05	2005-06	2006-07	2007-08	2008-09	AVERAGE
TATA POWER	0.42	0.35	0.28	0.28	0.27	0.32
NTPC	0.36	0.38	0.36	0.36	0.30	0.35
NPCL	0.61	0.57	0.59	0.56	0.42	0.55
GVK	0.64	0.69	0.56	0.78	0.72	0.68
JP	0.96	0.96	0.96	0.95		0.96
Torrent Power		0.16	0.11	0.13	0.15	0.13
Reliance Infra	0.23	0.22	0.17	0.17	0.16	0.19
					AVERAGE	<b>0.45</b>

Gross profit of JP power is much better than any other power utility companies. The reasons of the same are that JP power is in hydro power and cost of power generation in hydro is very less

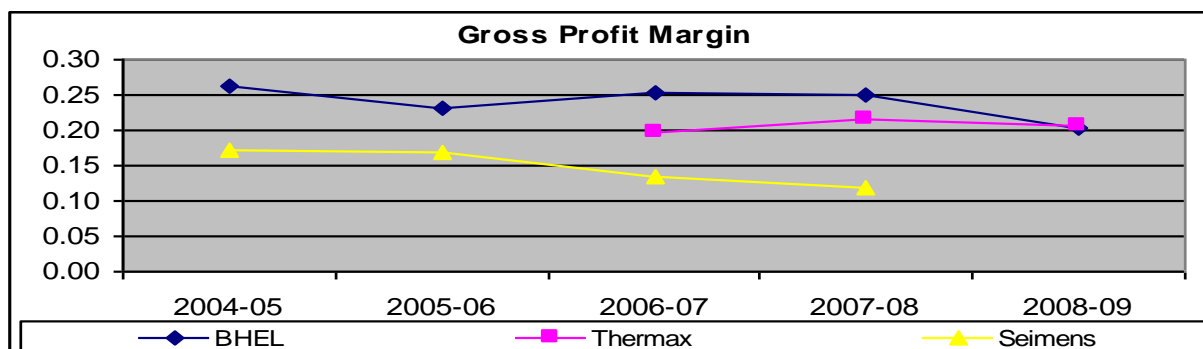




**Power plant equipment manufacturing companies**

Gross Profit margin (GPM):-						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
BHEL	0.26	0.23	0.25	0.25	0.20	0.24
Thermax			0.20	0.21	0.21	0.21
Siemens	0.17	0.17	0.14	0.12		0.15
					AVERAGE	<b>0.20</b>

Gross profit of BHEL is better than any other power plant equipment manufacturing companies.

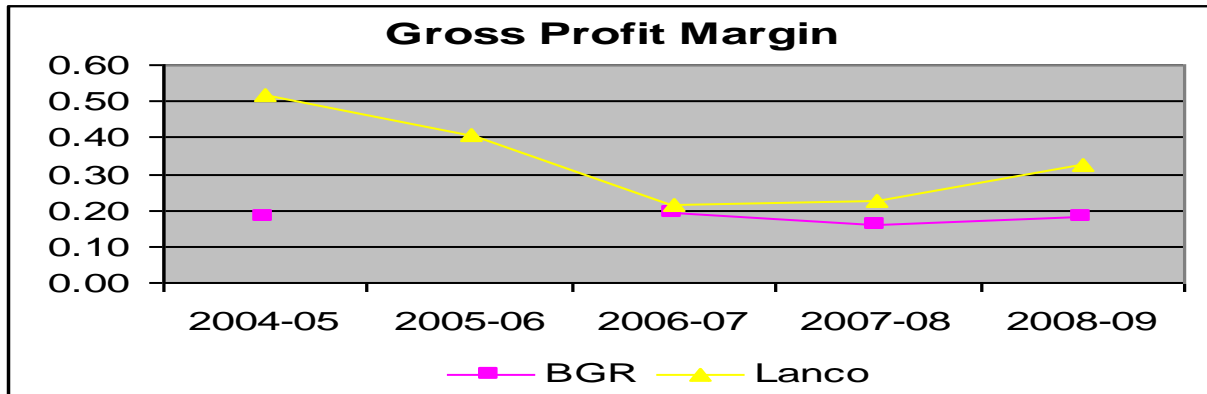


**Power Plant EPC - Companies**

Gross Profit margin (GPM):-						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	

BGR	0.18		0.20	0.16	0.18	0.18
Lanco	0.52	0.41	0.22	0.22	0.33	0.34
				<b>AVERAGE</b>		<b>0.26</b>

Gross profit of Lanco is better than BGR



If we compare GPM of these three groups of companies we find that GPM of power utilities companies is much better than other group of companies.

#### Operating Profit margin (OPM):-

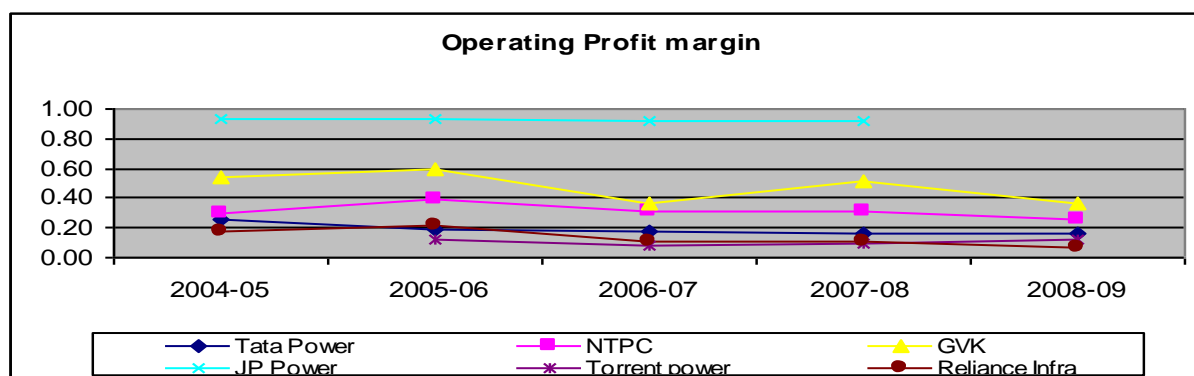
An indication of the firm's profitability from the current operation without regard to the interest charges accruing from the capital structure.

Operating Profit margin (OPM) = (Profit before taxes and before interest) / sales

#### Power utility companies

Operating Profit margin (OPM)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
TATA POWER	0.25	0.19	0.17	0.16	0.16	0.19
NTPC	0.30	0.39	0.31	0.31	0.26	0.32
NPCL	0.60	0.56	0.51	0.54	0.40	0.52
GVK	0.54	0.59	0.36	0.51	0.37	0.47
JP	0.94	0.93	0.93	0.92		0.93
Torrent Power		0.12	0.07	0.09	0.12	0.10
Reliance Infra	0.17	0.21	0.11	0.11	0.07	0.13
				<b>AVERAGE</b>		<b>0.38</b>

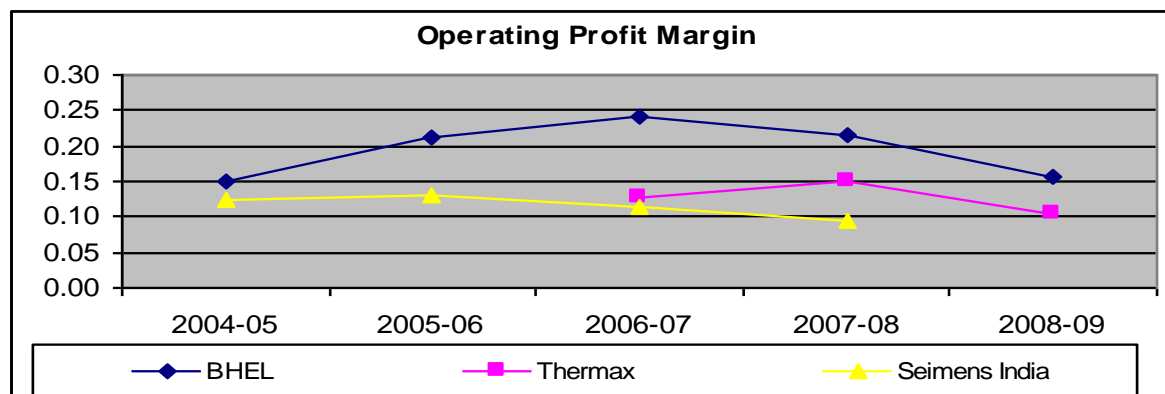
Operating profit of JP power is much better than any other power utility companies. The reasons of the same are that JP power is in hydro power and cost of power generation in hydro is very less.



**Power plant equipment manufacturing companies**

Operating Profit margin (OPM)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
BHEL	0.15	0.21	0.24	0.21	0.16	0.20
Thermax			0.13	0.15	0.11	0.13
Siemens	0.12	0.13	0.11	0.10		0.12
				AVERAGE		<b>0.15</b>

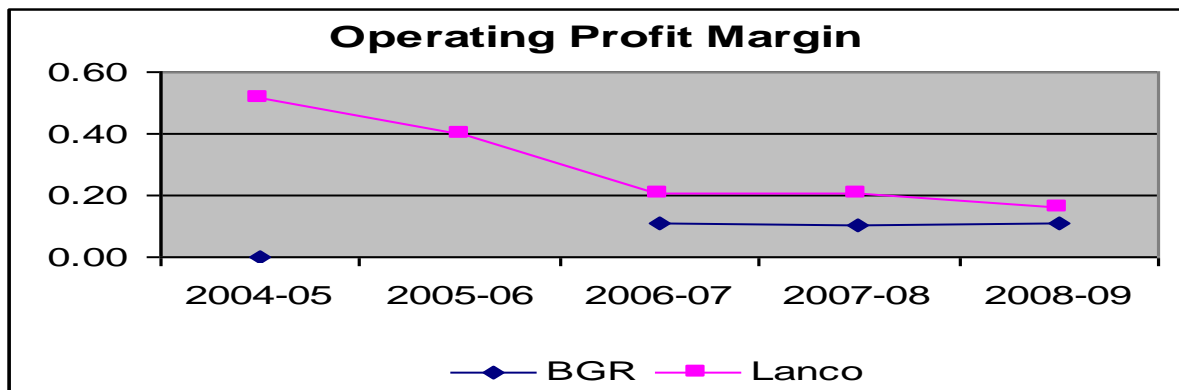
Operating profit of BHEL is better than any other power plant equipment manufacturing companies.



**Power Plant EPC - Companies**

Operating Profit margin (OPM)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
BGR	0.00		0.11	0.10	0.11	0.08
Lanco	0.51	0.40	0.21	0.21	0.16	0.30
				AVERAGE		<b>0.19</b>

Operating profit of Lanco is better than BGR.



If we compare OPM of these three groups of companies we find that OPM of power utilities companies is much better than other group of companies.

### Net profit Margin (NPM)

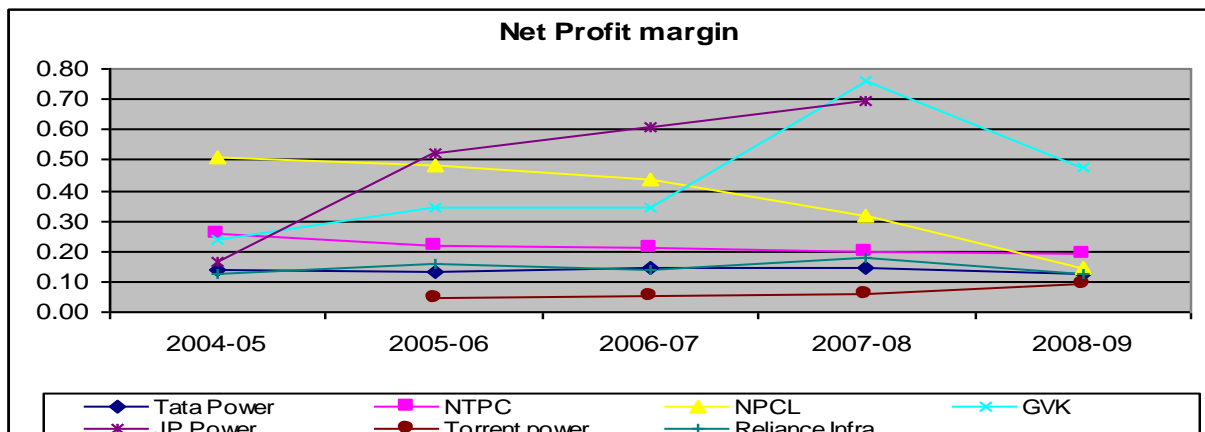
It shows after tax profits per Rupees of sales

Net Profit margin (NPM) = (Profit after taxes) / sales

### Power utility companies

Net profit Margin (NPM)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
TATA POWER	0.14	0.13	0.15	0.15	0.13	0.14
NTPC	0.26	0.22	0.21	0.20	0.19	0.22
NPCL	0.51	0.48	0.44	0.31	0.15	0.38
GVK	0.24	0.34	0.35	0.76	0.47	0.43
JP	0.17	0.52	0.61	0.69		0.50
Torrent Power		0.05	0.05	0.06	0.09	0.06
Reliance Infra	0.13	0.16	0.14	0.18	0.12	0.15
				AVERAGE		<b>0.27</b>

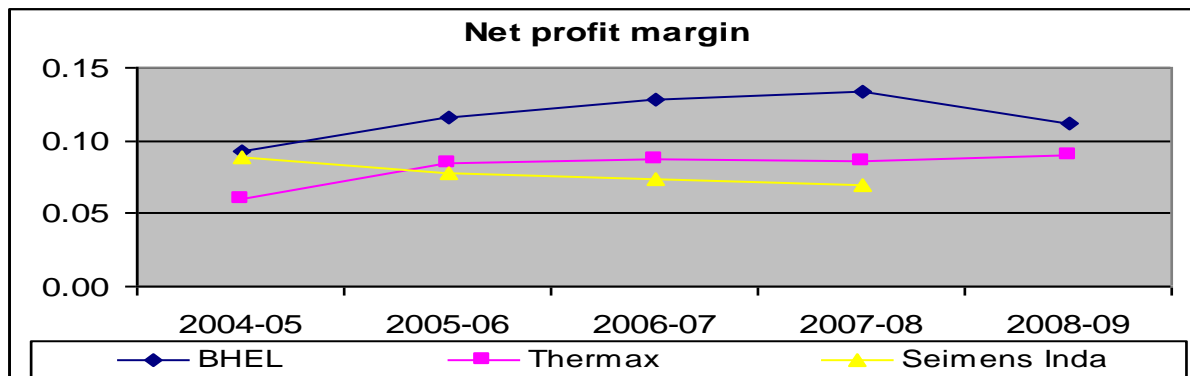
Net profit of JP power and NPCL is much better than any other power utility companies.



**Power plant equipment manufacturing companies**

Net profit Margin (NPM)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
BHEL	0.09	0.12	0.13	0.13	0.11	0.12
Thermax	0.06	0.08	0.09	0.09	0.09	0.08
Siemens	0.09	0.08	0.07	0.07		0.08
				AVERAGE		<b>0.09</b>

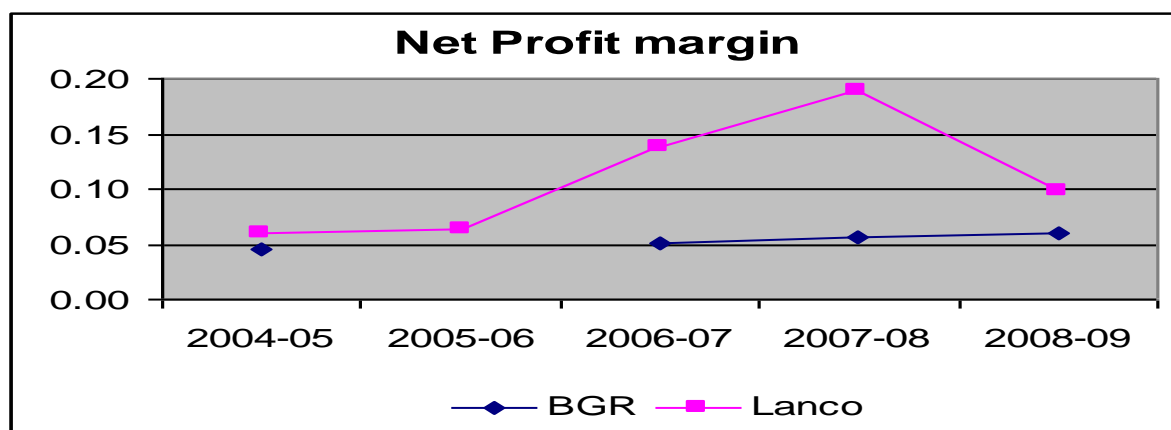
Net profit of BHEL is better than any other power plant equipment manufacturing companies.



**Power Plant EPC - Companies**

Net profit Margin (NPM)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
BGR	0.05		0.05	0.06	0.06	0.05
Lanco	0.06	0.06	0.14	0.19	0.10	0.11
				AVERAGE		<b>0.08</b>

Net Profit of Lanco is better than BGR



If we compare NPM of these three groups of companies we find that NPM of power utilities companies is much better than other group of companies.

### Return on Total Asset (ROTA)

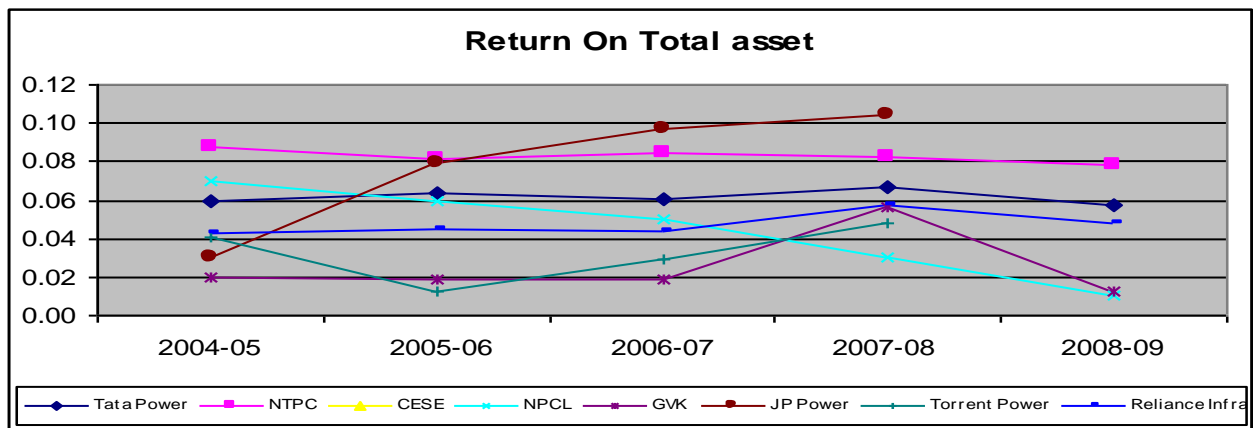
A measure of the return on the total investment in the enterprise.

Return on Total Asset (ROTA) = (Profit after taxes) / Total Assets

### Power utility companies

Return on Total Asset (ROTA)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
TATA POWER	0.06	0.06	0.06	0.07	0.06	0.06
NTPC	0.09	0.08	0.08	0.08	0.08	0.08
NPCL	0.07	0.06	0.05	0.03	0.01	0.04
GVK	0.02	0.02	0.02	0.06	0.01	0.03
JP	0.03	0.08	0.10	0.10		0.08
Torrent Power		0.04	0.01	0.03	0.05	0.03
Reliance Infra	0.04	0.04	0.04	0.06	0.05	0.05
				AVERAGE		<b>0.05</b>

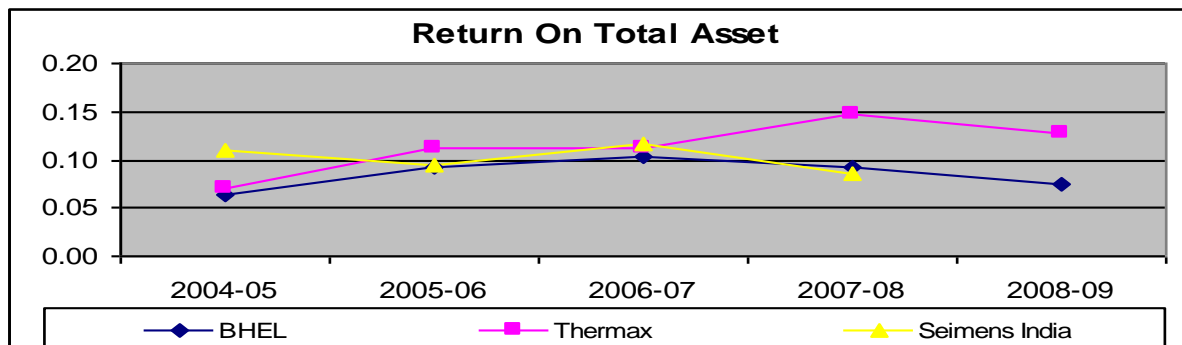
Return on Total Asset is of single digit in % for power utilities companies. ROTA for NTPC is consistent of 8%.



**Power plant equipment manufacturing companies**

Return on Total Asset (ROTA)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
BHEL	0.06	0.09	0.10	0.09	0.08	0.09
Thermax	0.07	0.11	0.11	0.15	0.13	0.11
Siemens	0.11	0.09	0.12	0.08		0.10
				AVERAGE		<b>0.10</b>

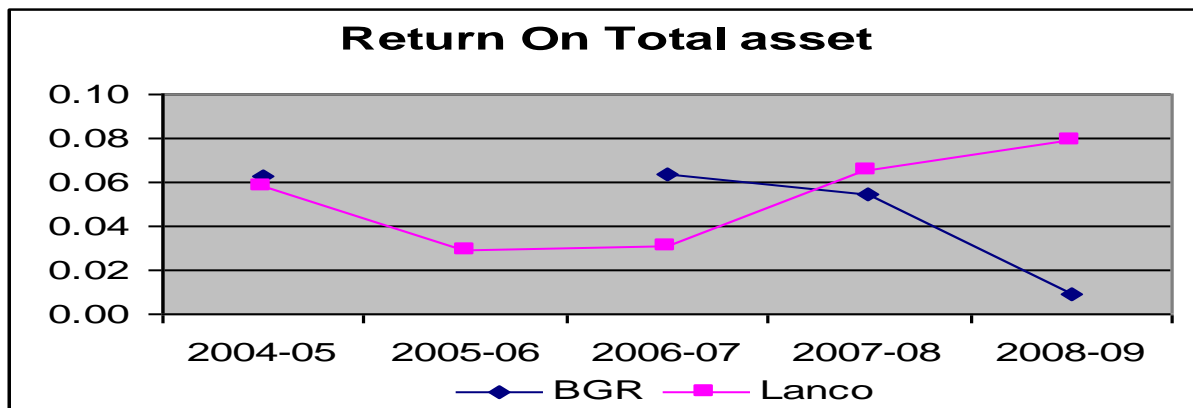
Return on Total Asset is almost same for power plant equipment manufacturing companies.



**Power Plant EPC - Companies**

Return on Total Asset (ROTA)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
BGR	0.06		0.06	0.05	0.01	0.05
Lanco	0.06	0.03	0.03	0.07	0.08	0.05
				AVERAGE		<b>0.05</b>

Return on Total Asset is almost same for power plant EPC companies.



If we compare ROTA of these three groups of companies we find that ROTA of power utilities companies is much better than other group of companies.

**Return on Stock holders' equity (or return on net worth) (RONW):-** A measure of the rate of return on stockholders investment in the enterprise

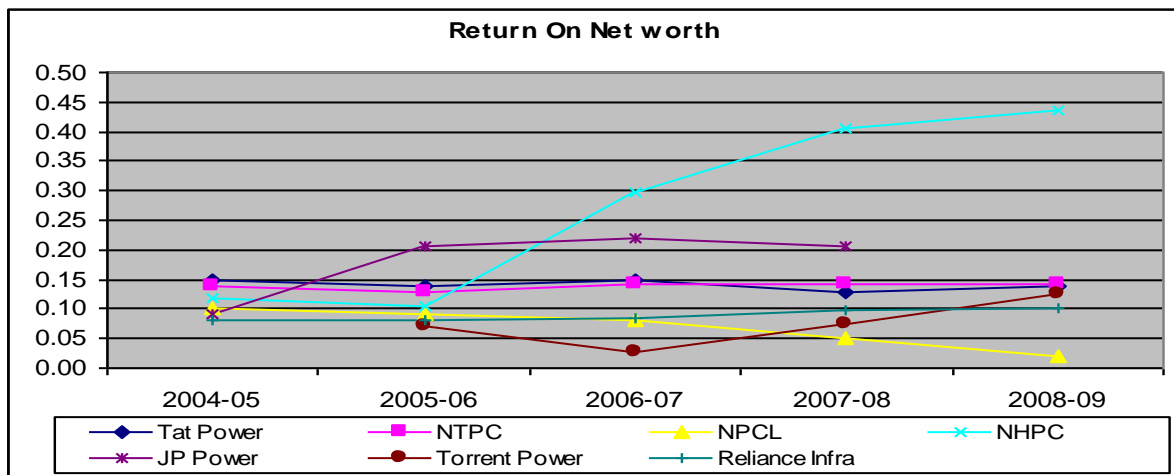
Return on net worth) (RONW) = (Profit after taxes) / Total Stockholders' equity

**Power utility companies**

Return on net worth (RONW)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
TATA POWER	0.15	0.14	0.15	0.13	0.14	0.14
NTPC	0.14	0.13	0.14	0.14	0.14	0.14
NPCL	0.1	0.09	0.08	0.05	0.02	0.07
GVK	0.33	0.02	0.05	0.05	0.01	0.09
JP	0.09	0.21	0.22	0.21		0.18
Torrent Power		0.07	0.03	0.07	0.13	0.07
Rel Infra	0.08	0.08	0.09	0.10	0.10	0.09
NHPC	0.12	0.10	0.30	0.41	0.43	0.27
				AVERAGE		<b>0.13</b>

Return on Net worth for NHPC & JP (Hydro power plant) are better than other in power utilities companies. And highest if for NHPC.

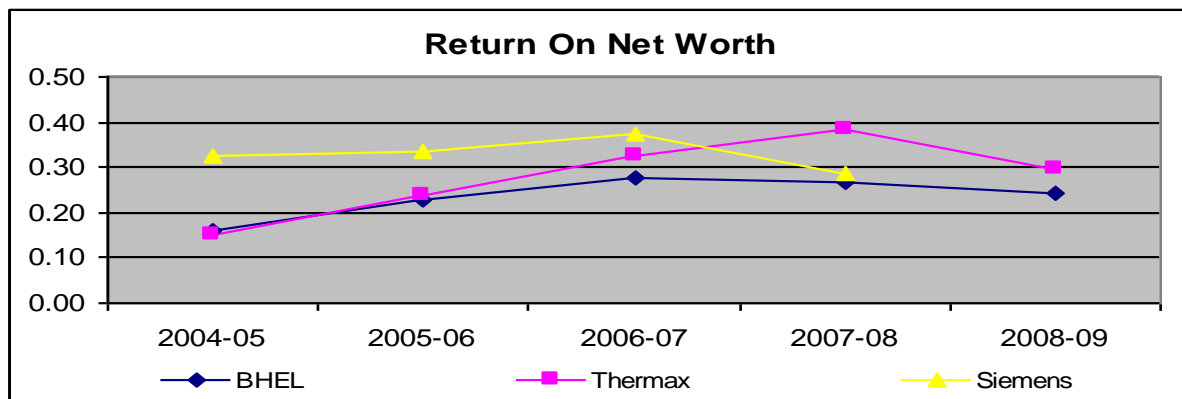




**Power plant equipment manufacturing companies**

Return on net worth (RONW)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
BHEL	0.16	0.23	0.27	0.27	0.24	0.23
Thermax	0.15	0.24	0.32	0.38	0.30	0.28
Siemens	0.33	0.34	0.37	0.29		0.33
				AVERAGE		<b>0.28</b>

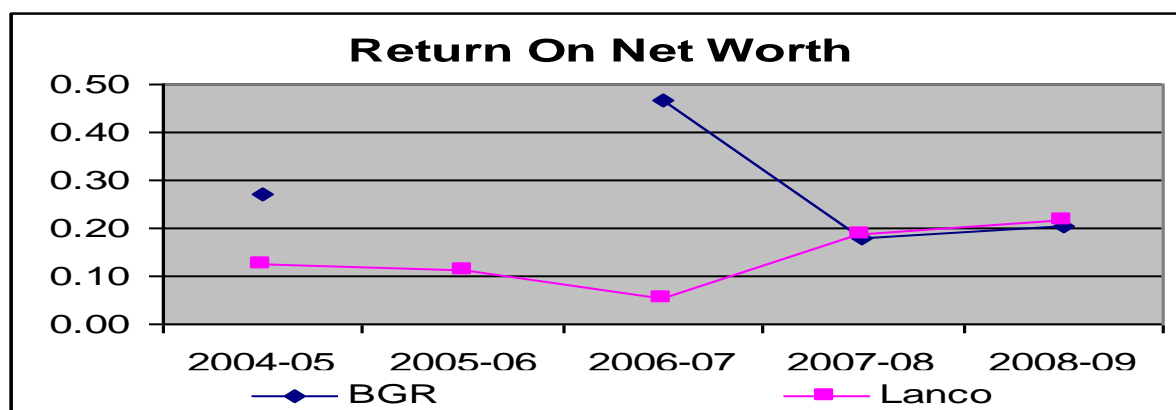
Return on Net worth is almost same for power plant equipment manufacturing companies.



**Power Plant EPC - Companies**

Return on net worth (RONW)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
BGR	0.27		0.47	0.18	0.21	0.28
Lanco	0.13	0.11	0.05	0.19	0.22	0.14
				AVERAGE		<b>0.21</b>

Return on Net worth for BGR is better than Lanco.



If we compare RONW of these three groups of companies we find that RONW of power plant equipment manufacturing companies is much better than other group of companies.

## B. Liquidity Ratios

### Current Ratio (CR)

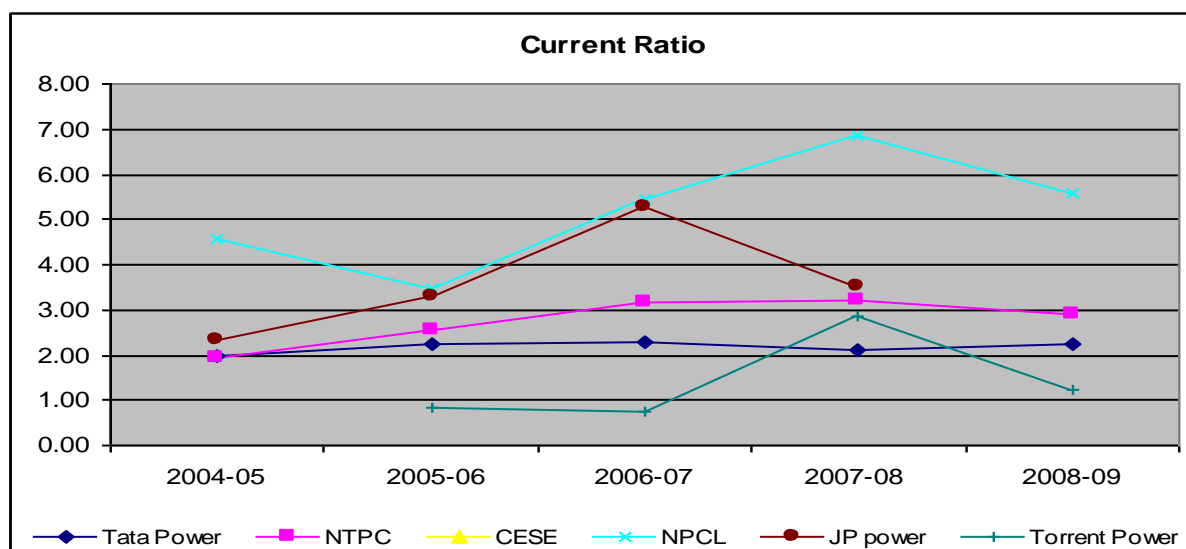
Indicates the extent to which the claims of the short term creditors are covered by asset that are expected to be converted to cash in a period roughly corresponding to the maturity of the liabilities.

Current Ratio (CR) = current asset / current liabilities

### Power utility companies

Current Ratio (CR)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
TATA POWER	1.96	2.25	2.30	2.11	2.26	2.18
NTPC	1.91	2.56	3.16	3.22	2.89	2.75
NPCL	4.55	3.47	5.44	6.86	5.58	5.18
GVK	1.88	9.20	2.97	266.93	223.34	100.86
JP	2.32	3.29	5.26	3.52		3.60
Torrent Power		0.84	0.73	2.84	1.21	1.41
Rel Infra	4.58	4.75	4.30	2.82	1.62	3.61
				AVERAGE		<b>17.08</b>

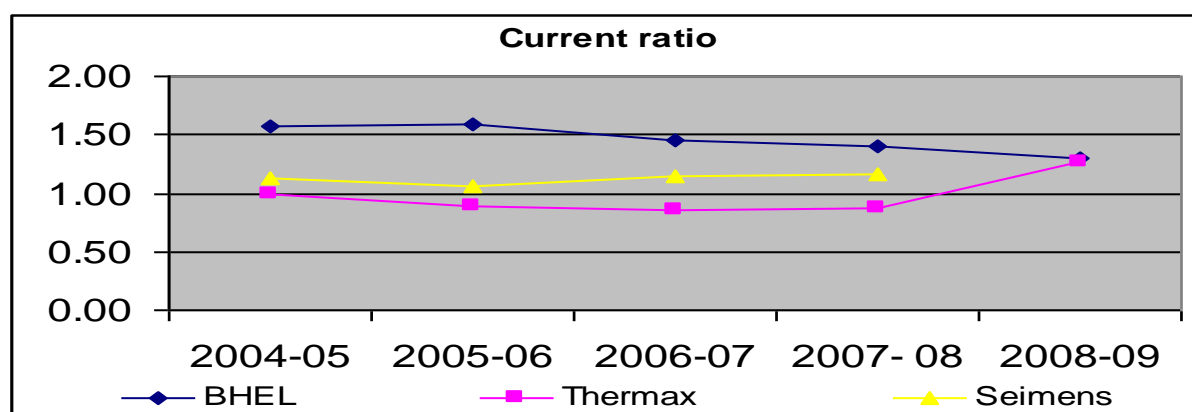
Current ratio of power utilities is more than one



**Power plant equipment manufacturing companies**

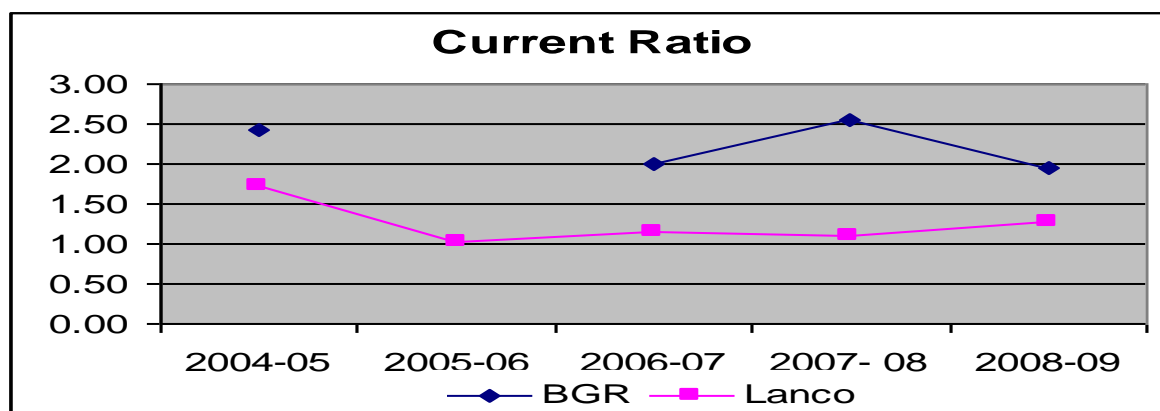
Current Ratio						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BHEL	1.58	1.58	1.46	1.39	1.30	1.46
Thermax	1.00	0.89	0.85	0.87	1.27	0.98
Siemens	1.13	1.07	1.15	1.17		1.13
					AVERAGE	1.19

Current ratio of power plant manufacturing companies is almost 1.



**Power Plant EPC - Companies**

Current Ratio (CR)						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BGR	2.43		2.01	2.54	1.94	2.23
Lanco	1.72	1.03	1.15	1.11	1.28	1.26
				AVERAGE		1.74



If we compare Current Ratio of these three groups of companies we find that CR of power utilities companies is much better than other group of companies.

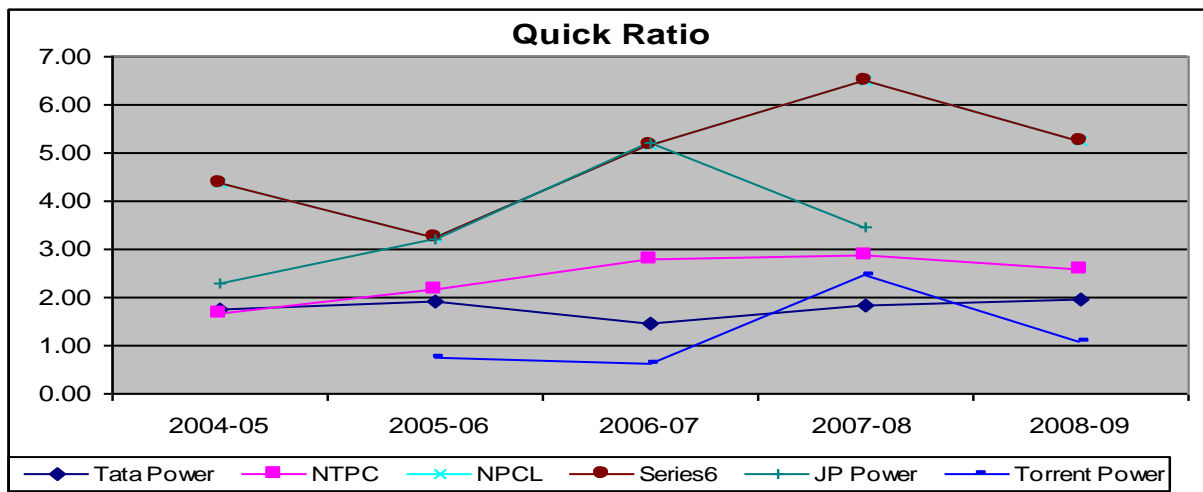
### Quick Ratio (QR)

A measure of the firm's ability to pay all short term obligations without relying on the sales of its inventories

Quick Ratio (QR) = (current asset- Inventories) / current liabilities

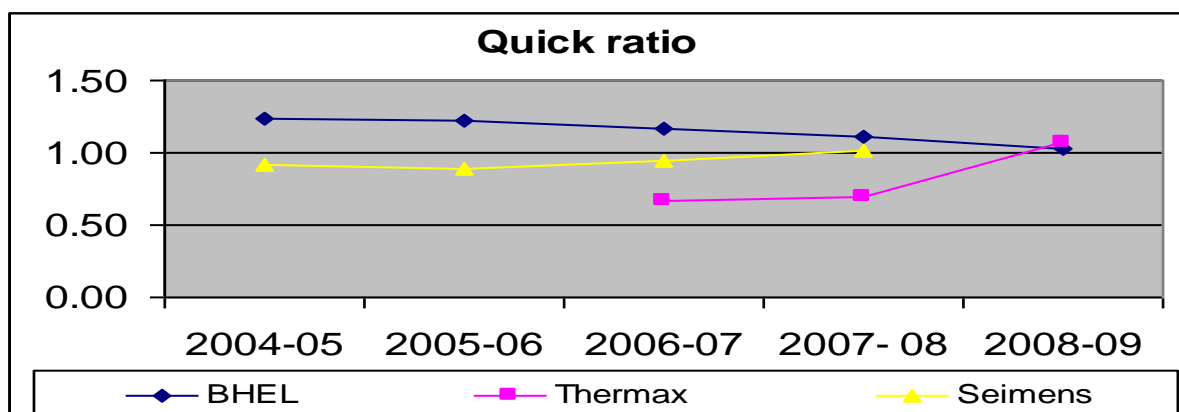
### Power utility companies

Quick Ratio						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
TATA POWER	1.73	1.92	1.46	1.85	1.95	1.78
NTPC	1.65	2.18	2.80	2.88	2.59	2.42
NPCL	4.38	3.26	5.18	6.51	5.27	4.92
GVK	1.88	9.19	2.96	266.75	222.90	100.74
JP	2.29	3.21	5.23	3.48		3.55
Torrent Power		0.75	0.61	2.47	1.10	1.23
Rel Infra	4.39	4.61	4.21	2.72	1.54	3.49
				AVERAGE		<b>16.88</b>



**Power plant equipment manufacturing companies**

Quick Ratio						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BHEL	1.23	1.22	1.17	1.11	1.03	1.15
Thermax			0.67	0.70	1.06	0.81
Siemens	0.92	0.89	0.94	1.01		0.94
				AVERAGE		0.97



**Power Plant EPC - Companies**

Quick Ratio						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BGR	1.80		1.92	2.52	1.94	2.04
Lanco	1.51	0.96	1.09	1.04	1.12	1.15
				AVERAGE		1.59

If we compare Quick Ratio of these three groups of companies we find that QR of power utilities companies is much better than other group of companies.

**C. Leverage Ratio****Debt-to-asset ratio (DAR)**

Measures the extent to which borrowed funds have been used to finance the firms' operation.

Debt includes both long term and short term debt.

Debt-to-asset ratio = Total debt / Total asset

**Power utility companies**

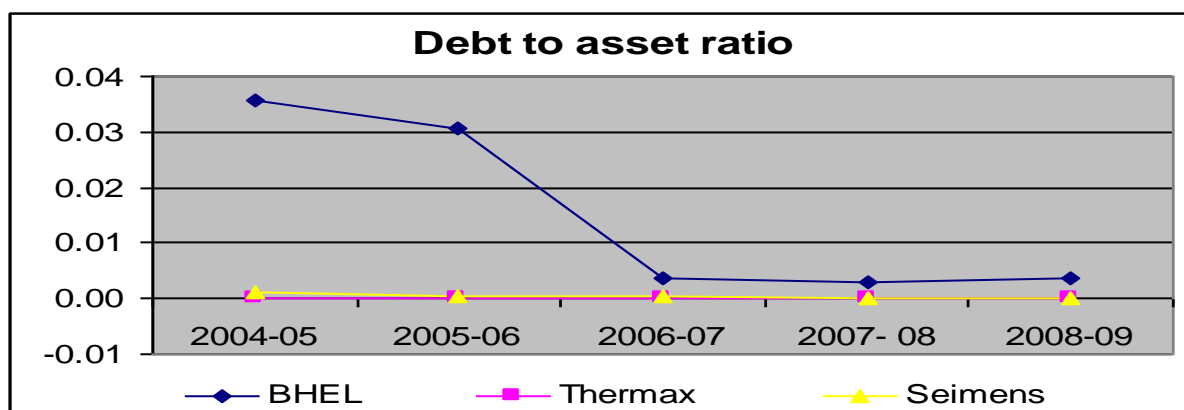
Debt Asset Ratio( DAR)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
TATA POWER	0.37	0.34	0.39	0.38	0.47	0.39
NTPC	0.26	0.28	0.30	0.30	0.33	0.30
NPCL	0.26	0.28	0.35	0.35	0.38	0.32
GVK	0.94	0.00	0.44	0.00	0.00	0.27
JP	0.64	0.58	0.40	0.40		0.51
Torrent Power		0.14	0.28	0.35	0.39	0.29
Rel Infra	0.31	0.29	0.32	0.25	0.29	0.29
				AVERAGE		0.34

Debt to asset ratio of power utilities companies are around 0.3

**Power plant equipment manufacturing companies**

Debt to asset ratio						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
BHEL	0.04	0.03	0.00	0.00	0.00	0.02
Thermax	0.00	0.00	0.00	0.00	0.00	0.00
Siemens	0.00	0.00	0.00	0.00	0.00	0.00
					AVERAGE	0.01

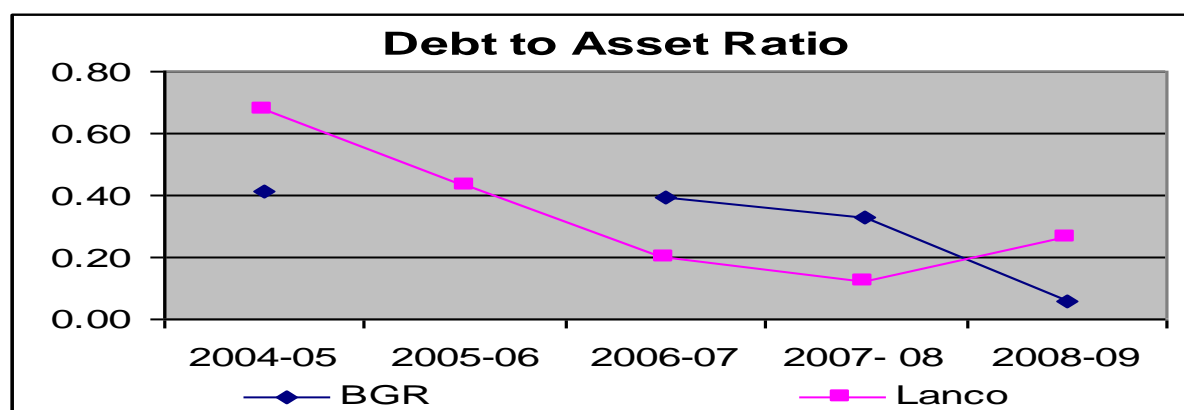
Debt to asset ratio of power plant equipment manufacturing companies is around zero.



Power Plant EPC - Companies

Debt-to-asset ratio (DAR)						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BGR	0.41		0.39	0.33	0.06	0.30
Lanco	0.68	0.43	0.20	0.12	0.26	0.34
				<b>AVERAGE</b>		0.32

Debt to asset ratio of power EPC companies are around 0.3



If we compare Debt to asset Ratio of these three groups of companies we find that DAR of power plant equipment manufacturing companies is much better than other group of companies

**Debt-to-equity ratio (DER)**

Provides another measure of the funds provided by the creditors versus the fund provided by owners

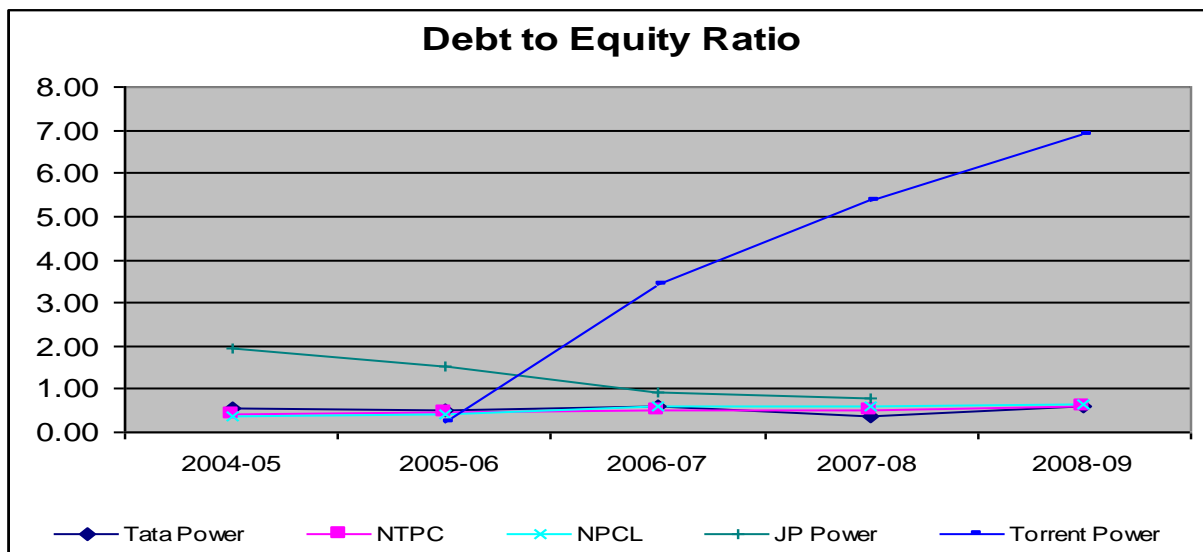
Debt-to-equity ratio = Total debt/ Total stockholders' equity

**Power utility companies**

Debt Equity Ratio						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
TATA POWER	0.56	0.50	0.60	0.38	0.60	0.53

NTPC	0.41	0.45	0.50	0.52	0.60	0.50
NPCL	0.38	0.41	0.59	0.58	0.67	0.53
GVK	15.86	0.00	1.07	0.00	0.00	3.39
JP	1.95	1.51	0.92	0.81		1.30
Torrent Power		0.24	3.44	5.37	6.88	3.98
Rel Infra	0.59	0.54	0.63	0.43	0.62	0.56
				<b>AVERAGE</b>		1.54

Debt to equity ratio of Torrent power, GVK and JP are above 1 while for others it is less than one.

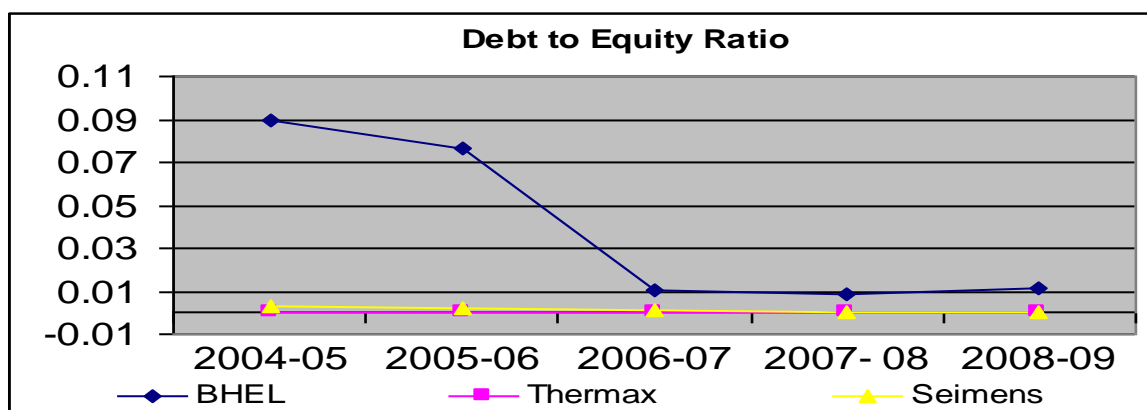


**Power plant equipment manufacturing companies**

Debt to equity ratio						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BHEL	0.09	0.08	0.01	0.01	0.01	0.04
Thermax	0.00	0.00	0.00	0.00	0.00	0.00
Siemens	0.00	0.00	0.00	0.00	0.00	0.00
				<b>AVERAGE</b>		0.01

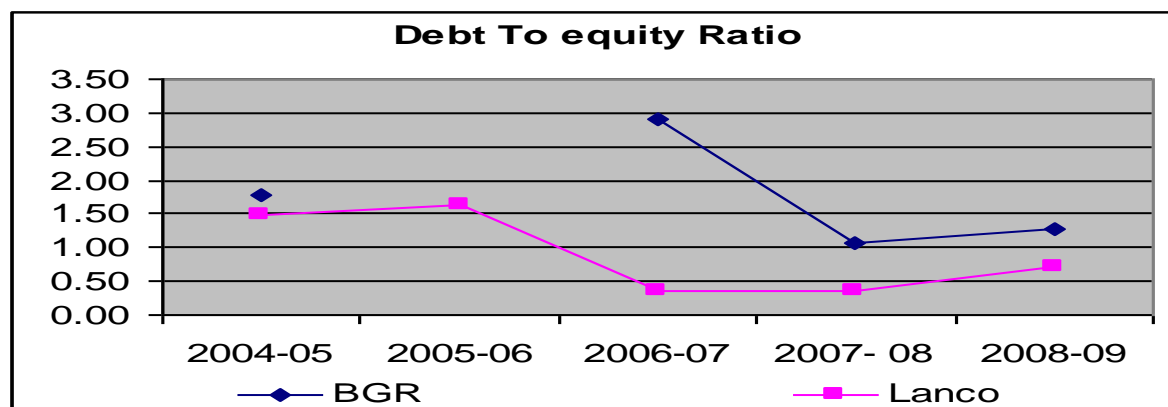
Debts to equity ratio of power plant equipment manufacturing companies are almost zero.





Power Plant EPC - Companies

Debt-to-equity ratio (DER)						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BGR	1.77		2.90	1.06	1.26	1.75
Lanco	1.48	1.64	0.34	0.35	0.72	0.91
				<b>AVERAGE</b>		1.33



If we compare Debt to equity Ratio of these three groups of companies we find that DER of power plant equipment manufacturing companies is much better than other group of companies

D. Activity Ratio

Fixed asset Turn over

A measure of the sales productivity and utilization of plant and equipment

Fixed asset Turn over (FAT) = sales/ Fixed asset

Power utility companies

Fixed Asset Turnover						
	2004-05	2005-06	2006-07	2007-08	2008-09	
TATA POWER	1.21	1.42	1.01	1.26	1.22	1.22

NTPC	0.62	0.73	0.77	0.77	0.71	0.72
NPCL	0.22	0.19	0.19	0.17	0.14	0.18
GVK	732.00	1136.00	1115.00	84.28	84.79	630.41
JP	0.20	0.18	0.21	0.19		0.20
Torrent Power		1.10	0.29	0.60	0.65	0.66
Rel Infra	1.42	1.40	1.84	1.75	2.48	1.78
						90.74

Fixed asset turnover for power utilities companies are varying significantly with average around 1.0 excluding GVK.

#### Power plant equipment manufacturing companies

Fixed Asset Turnover						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BHEL	9.07	12.45	14.51	13.06	10.67	11.95
Thermax	8.98	10.62	12.73	10.07	6.95	9.87
Siemens	12.26	11.41	14.45	13.36		12.87
				AVERAGE		<b>11.56</b>

#### Power Plant EPC - Companies

Fixed Asset Turnover						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BGR	11.65		23.06	32.75	20.03	21.87
Lanco	12.69	12.30	1.96	6.11	10.51	8.71
				AVERAGE		<b>15.29</b>

If we compare fixed asset turnover of these three groups of companies we find that FAT of power plant equipment manufacturing companies & Power plant EPC are much better than power utilities companies.

#### Total asset turn over (TAT)

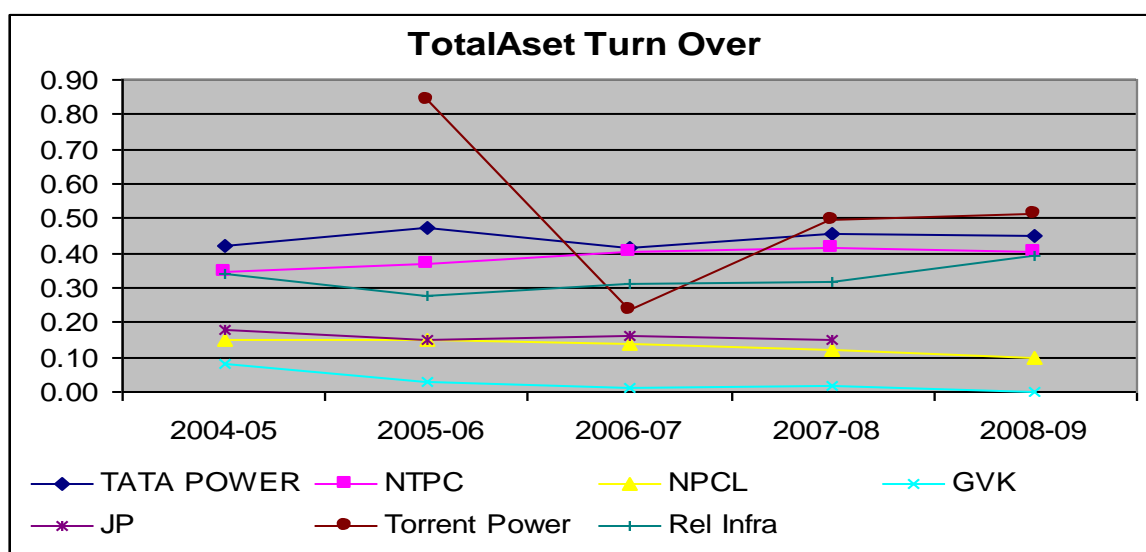
A measure of the utilization of all the firm's asset, a ratio below the industry average indicates the company is not generating a sufficient volume of business given the size of its asset investment

Total asset turn over (TAT) = sales/ Total asset

#### Power utility companies

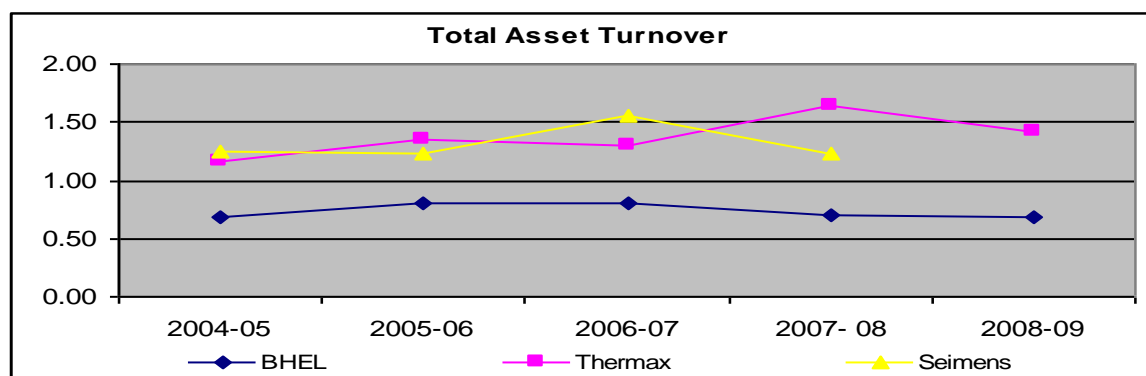
Total Asset Turnover Ratio						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
TATA POWER	0.42	0.48	0.41	0.46	0.45	0.44

NTPC	0.34	0.37	0.41	0.42	0.40	0.39
NPCL	0.15	0.15	0.14	0.12	0.10	0.13
GVK	0.08	0.03	0.01	0.02	0.00	0.03
JP	0.18	0.15	0.16	0.15		0.16
Torrent Power		0.84	0.24	0.50	0.51	0.52
Rel Infra	0.34	0.28	0.31	0.32	0.39	0.33
				<b>AVERAGE</b>		<b>0.29</b>



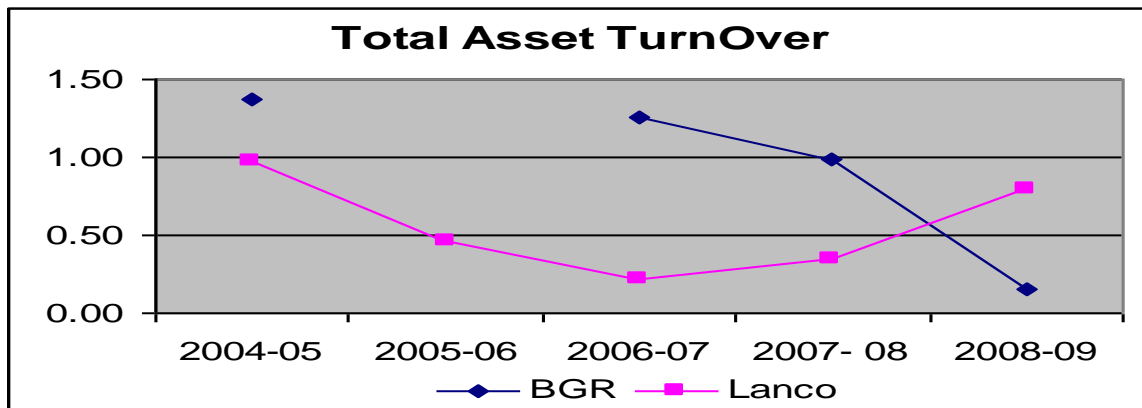
**Power plant equipment manufacturing companies**

Total asset turn over (TAT)						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BHEL	0.69	0.80	0.80	0.69	0.68	0.73
Thermax	1.17	1.35	1.29	1.65	1.43	1.38
Siemens	1.24	1.23	1.56	1.23		1.32
				<b>AVERAGE</b>		<b>1.14</b>



**Power Plant EPC - Companies**

Total asset turn over (TAT)						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BGR	1.37		1.26	0.98	0.15	0.94
Lanco	0.97	0.46	0.22	0.35	0.80	0.56
				<b>AVERAGE</b>	<b>0.75</b>	

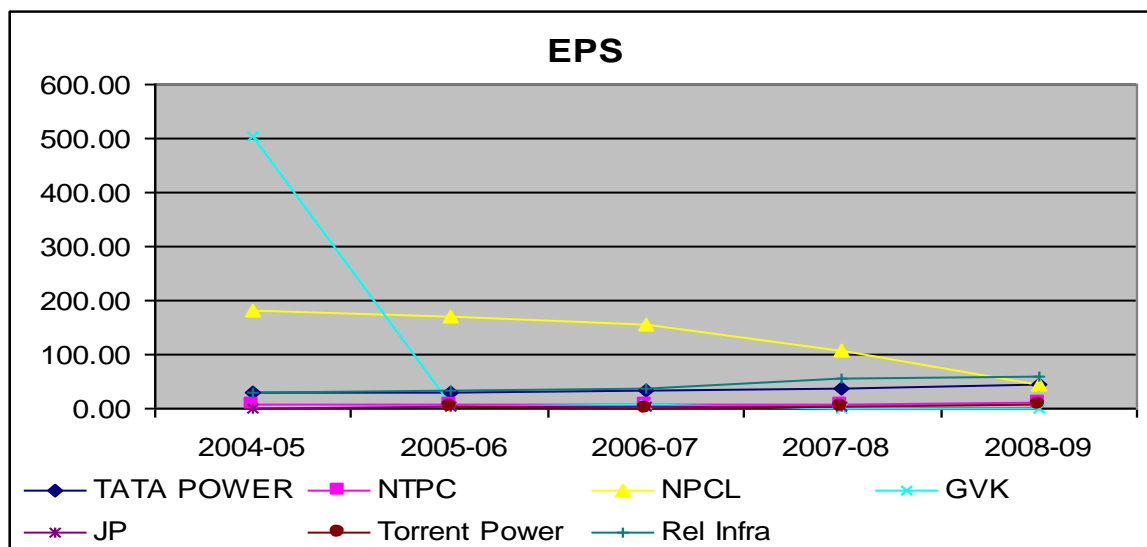


If we compare Total asset turnover of these three groups of companies we find that FAT of power plant equipment manufacturing companies & Power plant EPC are much better than power utilities companies.

### Earning per share

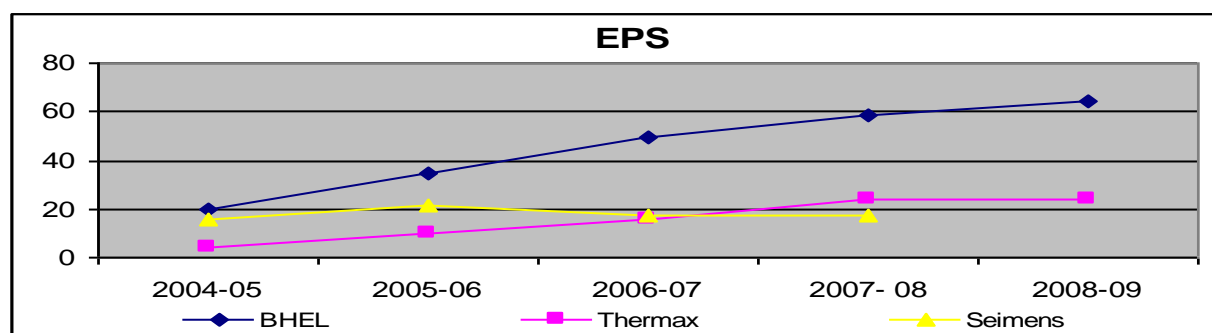
#### Power utility companies

Earning per share						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
TATA POWER	28.02	29.03	34.02	38.64	43.69	34.68
NTPC	7.26	7.06	8.33	8.99	9.95	8.32
NPCL	180	169	155	106	44	130.80
GVK	503.94	3.42	6.28	0.64	0.15	102.89
JP	1.04	2.97	4.06	4.35		3.11
Torrent Power		3.79	1.52	4.47	8.60	4.60
Rel Infra	27.95	32.70	37.00	56.00	60.00	42.73
				<b>AVERAGE</b>		46.73



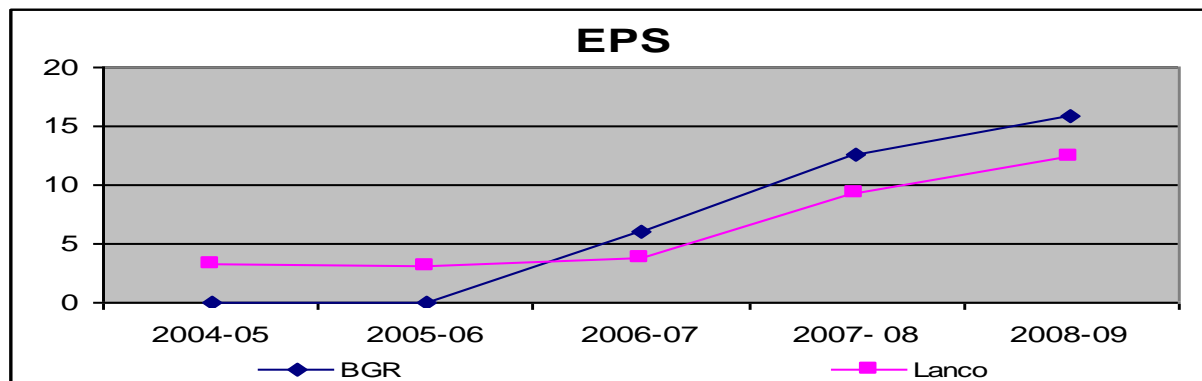
**Power plant equipment manufacturing companies**

Earning per share						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BHEL	19.48	34.3	49.33	58.41	64.11	45.13
Thermax	4.37	9.69	15.76	23.56	24.11	15.50
Siemens	15.72	21.36	17.69	17.6		18.09
				AVERAGE		26.24



**Power Plant EPC - Companies**

Earning per share						AVERAGE
	2004-05	2005-06	2006-07	2007- 08	2008-09	
BGR	0	0	5.98	12.51	15.86	6.87
Lanco	3.21	3.17	3.83	9.26	12.38	6.37
					AVERAGE	6.62



If we compare earning per share of these three groups of companies we find that EPS of power utilities companies is much better than power plant equipment manufacturing companies and EPS for power plant equipment manufacturing companies is better than power plant EPC companies.

## OIL SECTOR: - INTRODUCTION

### INTRODUCTION

For a developing country like India, the energy security task is gigantic. According to Tenth Plan approach paper, “The energy infrastructure will be major constraint on any effort to achieve a significant acceleration on the growth of GDP in Tenth Plan period.

India would need to sustain an economic growth rate of 8-10% over the next 25 years, in order to eradicate poverty and meet its human development needs. India is a hugely energy deficit country where half the population does not have access to commercial energy. Presently, India depends to the extent of 75% or more on imported crude oil.

Energy security addresses not merely economic growth but also more basic human needs of sustenance and poverty eradication. India needs energy to fight poverty. Needless to mention that India’s energy consumption on per capita terms is amongst the lowest vis-à-vis other fellow developing countries, not to mention developed countries.

As infrastructure growth remains the overriding priority for India, the power sector has a pivotal role to play. Thus growth in the power sector has to keep pace at least with the annual GDP growth rate, if sustained socioeconomic development is to be made a reality.

In the electricity sector alone, India face a peaking shortage of almost 12 per cent and an energy shortage of 9 to 10 per cent.

The main issue in oil sector is how, where from and at what cost can fulfill India’s energy needs in a sustainable manner. The functioning of international oil and gas markets in a transparent manner is most important from India’s point of view. Unfortunately, the global energy market is far from perfect and has in recent years been hugely susceptible to non-market considerations. No one can forget the rollercoaster ride of last year which took the prices to a skyrocketing high of \$ 147 per barrel. Such high prices were clearly unsustainable.

The recent trend of rising oil prices is again threatening a renewed volatility, which is neither in interest of producing nor of consuming countries.

Developing and emerging economies are particularly hard hit by this volatility, which adversely impacts on their developmental activities and national economic plans.

With these we can very well understand that energy sector is very vital for India to sustain the GDP growth and power and oil sector are key sector in energy field. Government of India is focusing on reform in both sectors to increase the private sector participation.

### **Overview: India**

The oil industry is a key contributor to the energy requirements of India and, in turn, directly impacts economic growth. India's aggregate essential energy utilization was 433.3 million tons of oil comparable (mtoe) amid 2008, an expansion of 5.6 for every penny more than 2007. Of this, 135 mtoe of oil contributed about 31 per cent to the overall energy consumption, which is in line with the world average share of oil at around 35 per cent. Only about 26.5 per cent of India's oil needs in 2008 were met through domestic production with the balance being met through imports.

Activities in the oil sector can be divided into upstream (exploration and production [E&P], midstream (refining and pipeline infrastructure) and downstream (petroleum products retailing). All three segments are currently dominated by the public sector undertakings (PSUs). The share of the private players is, however, steadily increasing: Cairn India Limited has made significant discoveries of oil in Rajasthan and Reliance Industries Limited (RIL), while not yet a large producer of oil, and has established a significant presence in the oil industry, especially in refining.

As per Basic Statistics on petroleum and Natural Gas 2008-09, India's total proven reserves of crude oil at the end of April 2009 were about 775 million tonnes (mt) amounting to 0.5 per cent share of the total global reserves of 170.8 billion tonnes (bt). In comparison, the total proven reserves as of April 2008 were estimated at 769 mt, constituting 0.43 per cent of global reserves of about 168.6 bt. At current production levels, India's reserves are likely to last around 20 years whereas the world reserves are expected to last for about 40 years.

During 2008-09, India's production of crude oil was 33.50 mt, a decline of 1.8 per cent compared to 34.12 mt produced in 2007-08. The majority of India's crude production comes from offshore, which accounts for about 66.4 per cent of all production. Around 53 per cent of the offshore production- comes from the Mumbai High fields operated by the Oil and Natural Gas Corporation (ONGC) while the balance of offshore production comes from private sector and joint venture (JV) projects.

The remaining 33.6 per cent production is onshore. The key onshore oil producing regions are Gujarat and Assam/ Nagaland, together accounting for 94 per cent of total onshore production. Out of these two Assam/ Nagaland is producing around 41% of total crude of onshore production and 14% of total crude production. Since 1990-91, crude production from Andhra Pradesh, Tamil Nadu and Arunachal Pradesh had been increasing, but for the consecutive years 2007-08 and 2008-09 the production from Tamil Nadu fell by 15.6 per cent and 11.1 per cent respectively.

The estimated total supply of crude oil during 2008-09 was around 161.66 mt compared to 155.79 mt the previous year. As per the Basic Statistics on petroleum and Natural Gas 2008-09, provisional figures, India imported 128.16 mt of crude oil during 2008-09 as against 121.67 mt during 2007-08 with the remaining supply coming from domestic production.

ONGC represents right around 75.7 for each penny of household generation, in any case, its creation amid 2008-09 diminished by 2.2 for every penny more than 2007-08. Oil India Limited (OIL), which expanded its crude production by around 11.9 for every penny in 2008-09 contrasted with the earlier year, represents in excess of 10.4 for each penny of the aggregate residential generation.

The government's attempt to induct private sector investment through the New Exploration Licensing Policy (NELP) has helped attract several international players. But the presence of international majors in the exploration arena remains limited. The government awarded 162 blocks under the first six rounds of the NELP.

NELP VII offered 57 blocks out of which 44 have been awarded and contracts have been concluded in respect of 41 blocks with 17 operators including five foreign incorporated companies. The government has also launched NELP VIII with 70 blocks on offer. The Directorate General of Hydrocarbons, which is the regulator of the upstream activities in oil and gas, has been actively promoting the Indian E&P sector and is trying to bring in international companies with new technologies and know-how.

The share of private players and JVs in domestic crude oil production has steadily increased, from just 1.8 per cent in 1995-96 to over 14 per cent in 2008-09. Key private players in production include Cairn Energy Limited, British Gas and RIL.

Other companies from various segments of the energy industry have been trying to increase or establish the presence in the E&P segment. The prominent players among these are GAIL (India) Limited, Indian Oil Corporation (IOC) and Hindustan Petroleum Corporation Limited (HPCL).

Petroleum refining has been largely the domain of PSUs with RIL and Essar Oil Limited (EOL) being the only private operators. The installed Indian refining capacity on 1<sup>st</sup> April 2009 was 177.97 million tonnes per annum (mtpa) against 148.97mtpa on 1<sup>st</sup> April 2008 i.e. 19.6% addition in annual capacity . About 105.5 mtpa, or about 60 per cent, was in the control of PSUs. The two private players RIL and EOL controlled the remaining capacity.

There are 20 refineries across India. IOC has presently 10 operational (including BRPL & CPCL) and one new refinery at Paradip-Orissa is under construction. Most players have drawn up plans for increasing refining capacity. If the plans materialise, there would be an addition of another 65 mtpa of capacity by 2011-12. In July 2009, IOC announced that it is undertaking investments of over Rs 600 billion to increase its refining capacity to 80 mtpa from the current 60.2 mtpa. The 19 refineries across India (excluding RPL's latest addition) registered a crude throughput of 160.77 mt in 2008-09. This is a 3.3 per cent increase compared to 156.1 mt throughput registered in 2007-08. Indian refineries have a significant cost advantage and account for about 3 per cent of the world's refining capacity.

India has a network of about 15,000 km of crude and product pipelines with over 100 mtpa



capacity. IOC controls more than 10,000 km of pipelines with a capacity of 71.61 mtpa; in 2008-09 it had an operational throughput of 59.5 mt. The remaining capacity is held by HPCL, Bharat Petroleum Corporation Limited (BPCL), ONGC, OIL and Petronet India Limited. During 2008-09, the Petroleum and Natural Gas Regulatory Board came up with various regulations covering issues such as authorisation to build, lay or operate pipelines, sharing of pipelines and other infrastructure, and determining their capacity for the purpose, storage facilities and their registration.

The average monthly price of the Indian crude oil basket for 2008-09 was \$82.7 per barrel. The import bill for crude is steadily rising and As per Basic Statistics on petroleum and Natural Gas 2008-09 provisional figures it amounted to Rs. 341887 Crore in 2008-09, compared to about Rs. 272699 Crore for 2007-08.

The government continues to regulate the prices of four notified products - petrol, diesel, kerosene and liquefied petroleum gas. The public sector oil marketing companies (OMCs) have been incurring huge under-recoveries due to selling these products at the regulated prices. Moreover, private players who entered the business of retailing have shut down their facilities as they cannot compete at the low regulated prices. During 2008-09, the under-recoveries incurred by the OMCs amounted to Rs 1,033 billion.

The dismantling of the administered pricing mechanism resulted in new investment by both new and established players to transform and expand the petro-retailing segment. Private players like RIL, EOL and Shell (India) Limited have entered retailing, while the incumbents are also introducing a gamut of value-added services in their product portfolios.

India had a total of about 36,921 retail outlets (ROs) as on April 1, 2009. The majority of these belong to the OMCs. RIL has 1,432 ROs, all of which it closed down in 2007-08 when crude prices shot up dramatically and the OMCs continued to sell petroleum products at government-regulated prices. The other significant private players in retailing are EOL with 1,100 ROs and Shell with 32 ROs. Both kept their outlets closed while crude prices remained high. Now crude oil is in range of \$ 70 80 per barrel, these Pvt. Players have stated opening some of their ROs in selected locations. A lot of companies that had applied for and received authorisation for setting up ROs have put their plans on hold. Against the 11,500 authorisations received, only 2,500 ROs have been rolled out. The private players are hoping to make more investments if and when the government deregulates the prices of petroleum products.

## **OIL SECTOR: - EXPLORATION AND PRODUCTION**

Given that India is already importing about three-fourths of its oil requirements, it is imperative for the government to formulate appropriate policy to attract investment and new technologies into the domestic industry. The New Exploration Licensing Policy (NELP) was formulated by the Government of India way back in 1997-98 with the aim of providing a level playing field for companies in the E&P segment. The object was to increase the area under exploration and thus enhance India's energy security. Prior to the NELP, just 11 per cent of India's sedimentary basin area was under exploration. After seven rounds of NELP bidding, the area under

exploration now stands at about 50 percent.

During the Eleventh Plan the government plans to take the total sedimentary basin area under exploration to 80 percent. With this objective in mind the Ministry of Petroleum and Natural Gas (MoPNG) has launched NELP VIII offering a total of 70 blocks for exploration. This is the highest number of exploration blocks ever offered. Of these blocks, 24 are in deep water, 28 are in shallow water, eight are onshore and 10 are classed as Type-S. Also, it is proposed to bring a new area under exploration in the western Andaman Sea.

In NELP VII, the Directorate General of Hydrocarbons (DGH) introduced some changes in the parameters in the bidding process like the introduction of the on land Type-S blocks, the government's share of the profit petroleum being made biddable and a preference for joint ventures with foreign companies in order to gain access to the best global technologies and know-how. These have been well received by the industry and have had positive results. Under the NELP, so far 68 oil and gas discoveries have already been made in 19 exploration blocks. It has so far attracted about \$10 billion in investment commitments for E&P.

Hydrocarbon accretion has already been more than 600 million tonnes of oil equivalent (mtoe). The DGH has signed 113 production sharing contracts for exploratory blocks in the last five years which has increased the area under exploration by 30 per cent. Under NELP VII, 44 exploration blocks were awarded and contracts concluded in respect of 41 blocks with 17 operators (including five foreign incorporated companies)

Initially, NELP VIII seemed likely to be delayed in the face of the global economic crisis but the MoPNG has decided to go ahead. Roadshows for promoting the round have, however, been delayed. The 2009-10 budget has extended the benefit of the seven-year tax holiday on mineral oil production to producers of natural gas too. However, this benefit is only applicable for gas produced from blocks awarded under NELP VIII and not for previous rounds.

Along with NELP VIII, the fourth round of bidding under the coal bed methane (CBM) policy for exploration and production has also been launched. So far, a total of 26 CBM blocks have been awarded: 23 in the earlier three CBM rounds, two blocks have been awarded through nomination basis and one through the Foreign Investment Promotion Board route. CBM IV has on offer 10 blocks covering an area of about 5,000 square km which are located in the states of Assam, Jharkhand, Orissa, Madhya Pradesh, Chhattisgarh, Maharashtra and Tamil Nadu.

A few changes have been made in the evaluation criteria for CBM IV as follows: - Given the technical complexity of operating in the segment, more points have been allotted under the technical capability criteria by reducing the weightage for the work programme. Technical capabilities will be assessed on the strength of the operator alone. The exploration period has been reduced from eight years to five years and is not biddable. Biddable parameters include the number of exploratory core holes, any other work considered necessary by the bidder in Phase I, and the number of pilot wells in Phase II

The fiscal package will be evaluated on the basis of the government share of production-linked payment in two tranches. Bids will be evaluated with respect to the government share in

volume-based, net present value production scenario. The bid closing date for both NELP VIII and CBM IV is August 10, 2009

#### **a. Production**

As per British Petroleum's annual publication, the *BP Statistical Review of World Energy*, India's proven oil reserves as of December 2008 stood at 800 million tonnes (mt) or 0.5 per cent of the world's total. The reserves-to-production ratio is 20.7, which means that at current rates of production the reserves are expected to last 20.7 years. This is a drastic decline from the estimate of 23 years that was made in 2008. The proven reserves of natural gas stood at 38.5 trillion cubic feet (tcf) with a reserves-to-production ratio of 35.6

As per the data released by MoPNG, production of crude oil during 2008-09 stood at 33.50 mt against a target of 36.03 mt. It also registered a decline compared to the 34.12 mt production recorded during 2007-08. The Oil and Natural Gas Corporation (ONGC) and Oil India Limited (OIL) continue to be the biggest producers of crude oil with about 25.94 mt and 3.1 mt respectively. The total onshore production was 11.27 mt and offshore production was 22.23 mt. In Rajasthan, oil production is expected to commence shortly from the Cairn India Limited-operated RJ-ON-90/1 block in Barmer district in which ONGC is a consortium partner. Peak production is likely to be 7-8 million tonnes per annum (mtpa) and will increase India's oil production by up to 20 per cent

Against a target of 36.94 billion cubic metres (bcm), the actual production of natural gas stood at 32.85 bcm for 2008-09. This is a nominal increase compared to the 32.4 touch a peak of 80 mmscmd by the end of 2009. The natural gas production from CBM during 2008-09 stood at 20 million metric standard cubic metres (mmscm) against a target of 39 mmscm

Great Eastern Energy Corporation Limited (GEECL), which is the first company to commercially produce CBM at Raniganj (south block) in West Bengal, is currently producing 4 million cubic feet per day. Essar Exploration and Production Limited is likely to start CBM production at Raniganj (east block) by December 2009. The company has already completed drilling 15 production wells and is in the process of setting up two gas gathering stations. Initially, it is estimated to produce 0.05-0.1 mmscmd of natural gas which is to be ramped up to 2.5-3 mmscmd in six years

ONGC is cutting back on some of its CBM activities in Jharkhand and Bengal due to their clashing with captive coal mining and due to technical problems causing delay in producing from other blocks. It has also applied to the DGH for relinquishing three of its blocks - at Satpura in Madhya Pradesh, Vardha in Maharashtra and Barmer Sanchor in Rajasthan - that it won in 2003

#### **b. Overseas production**

The presence of ONGC Videsh Limited (OVL) and other public sector entities in equity oil abroad has increased to 22 countries as against seven countries in 2003-04. Overseas oil and gas production has doubled in the past five years and reached a level of about 8.7 mtoe in 2008-09. During 2008-09, OVL acquired seven properties and now has a total of 40 projects across 16 countries; it has accreted ultimate reserves of 135.08 mtoe and its gross revenues wit-

nessed a 9 per cent increase from Rs 169.34 billion in 2007-08 to reach Rs 185.03 billion in 2008-09. There have been various other developments like ONGC Mittal Energy Limited's 25 per cent stake in the Satpayev oilfield in Kazakhstan, where a peak production of 287,000 barrels of oil per day is envisaged. The company has exited from the North Coast Marine Area Block 2 in Trinidad and Tobago where it had earlier planned to invest about \$500 million.

OVL in consortium with 10C and OIL has submitted a development plan to the Government of Iran proposing an investment of about \$5 billion for the Farzad gas field, which has in-place reserves of about 21.68 tcf of which recoverable reserves are 12.8 tcf. The consortium has requested the Iranian government that it be allowed to liquefy the gas and ship it to India. OVL has been re-offered blocks 321 and 323 in Nigeria

OVL has announced that it has earmarked a capital expenditure of Rs 90 billion for 2008-09. The company plans to drill exploratory wells and develop blocks in Vietnam, Syria, Nigeria, Egypt and Brazil during the year. It has a capex plan of Rs 450 billion for the Eleventh Five Year Plan from which it plans to spend about Rs 90 billion in 2008-09.

The high costs of hiring rigs which prevailed for most of 2007-08 continued for some time in 2008-09 with a decline being witnessed in the second half of the year. The E&P schedules of companies like ONGC and RIL continued to face hurdles because of this. ONGC faced further problems because Shiv-Vani Oil and Gas Exploration Services Limited, which was contracted by it to supply rigs, failed to meet successive deadlines affecting ONGC's operations

The year 2009-10 is likely to see lower hiring rates for rigs resulting in more E&P activity, especially in deep water. The economic downturn and lower costs can be leveraged to increase E&P activity in India and also present an opportunity for Indian companies to acquire assets abroad. The focus on cleaner fuels and the widespread use of natural gas is likely to give a boost to CBM.

The new discoveries over the past few years and the more transparent and attractive terms being offered to players in the segment have enhanced India's status as a significant E&P destination. This explains the MoPNG's confidence that NELP VIII will be successful.

## OIL SECTOR: - MAIN PLAYER

		Subsidiary Company
UPSTREAM (Exploration & Production)	Oil & Natural Gas Corporation Ltd.	ONGC Videsh Ltd.
	Oil India Ltd.	
	Reliance, Cairn Energy, HOEC, Premier Oil	
DOWNSTREAM (Refining, Marketing & Pipelines)	Indian Oil Corporation Ltd.	Chennai Petroleum Corporation Ltd. (Pure Refining)
		Bongaigaon Refinery & Petrochemicals Ltd.

	Hindustan Petroleum Corporation Ltd.	
	Bharat Petroleum Corporation Ltd.	Numaligarh Refinery Ltd.
	Mangalore Refinery & Petrochemicals Ltd.	
	Reliance Industries Ltd./ Essar Oil Ltd./ Shell	
(Gas Transport & Distribution)	GAIL (India) Ltd.	

The year 2008-09 was marked by the commissioning of the 580,000 barrels of oil per day (bpd) refinery at Jamnagar by Reliance Petroleum Limited (RPL) and of the Kakinada-Bharuch pipeline by Reliance Gas Transportation Infrastructure Limited (RGTIL). Both companies are subsidiaries of Reliance Industries Limited (RIL). RIL also announced the commencement of oil and gas production from the Krishna Godavari (KG)-D6 block. The gas production from the field has reached 40 million metric standard cubic metres per day (mmscmd) and is set to reach 80 mmscmd by end 2009

Public sector undertakings (PSUs) still remain dominant in the oil and gas sector but the sector is seeing more private participation across segments such as exploration and production (E&P), refining of crude, retailing products, or setting up of pipeline infrastructure. However, RIL continues to be the only private player featured among the oil and gas majors of India. Brief profiles of the major players

#### a) Oil and Natural Gas Corporation

The Oil and Natural Gas Corporation (ONGC) is the biggest player with operations ranging from exploration to retailing. ONGC accounts for almost 76 per cent of domestic production oil production and over 68 per cent of gas production. The government owns a 74.14 per cent stake, while another 10 percent is held by other PSUs. ONGC has two major subsidiaries - ONGC Videsh Limited (OVL), which it fully owns, and Mangalore Refinery and Petrochemicals Limited (MRPL), in which it has a 71.62 per cent stake. The total oil and gas reserves for the ONGC group (as on April 1, 2009) were 1,591.53 million tonnes of oil equivalent (mtoe). It has in-place reserves of 284.81 mtoe, which is the highest in two decades. Its ultimate reserve accretion excluding its joint ventures (JVs) is 68.9 mtoe from domestic acreages for 2008-09. Total production including JVs for 2008-09 was total crude oil 27.13 million tonnes (mt) as compared to 27.93 mt in the previous year, total gas 25.43 billion cubic metres (bcm) as opposed to 25.12 bcm in the previous year and total value-added products 3.32 mt as compared to 3.19 mt in the previous year.

Under NELP VII, 18 blocks were awarded to ONGC as operator and another two were awarded to consortiums of which ONGC was a part. ONGC made 28 discoveries during 2008-09: 15 new prospects (two deep water one shallow water and 12 onshore) and 13 new pools.

During 2008-09, OVL acquired seven properties; it now has 40 projects across 16 countries. Its production for the year stood at 8.78 mtoe as compared to 8.8 mtoe in 2007-08. It has accreted ultimate reserves of 135.08 mtoe. OVL announced that it has earmarked capital expenditure of Rs 90 billion for 2009-10. The company plans to drill exploratory wells and develop blocks in Vietnam, Syria, Nigeria, Egypt and Brazil. It has a capex plan of Rs 450 billion for the Eleventh Five Year Plan of which it plans to spend about Rs 90 billion in 2009-10.

MRPL achieved the highest ever refinery crude throughput of 12.59 mt during 2008-09, up from its previous level of 12.55 mt in 2007-08. Its capacity utilization stood at 130 per cent for the year

ONGC withdrew from some coal bed methane (CBM) activities at Jharkhand and Bengal due to their clashing with captive coal mining and due to technical problems causing delay in production from other blocks. It has also applied to the Directorate General of Hydrocarbons (DGH) for relinquishing three of its blocks - at Satpura in Madhya Pradesh, Vardha in Maharashtra and Barmer Sanchor in Rajasthan - that it had won in 2003.

The initiatives during the year include an appraisal plan for development of deep water block KG-DWN-98/2 approved by the DGH along with development of petroleum exploration licence acreage KG-OS-DW4. In 2007-08, ONGC had made the first ultra deep water discovery at a water depth of 2,841 metres in NELP block KG-DWN-98/2. The company has outlined its future priorities to include early monetisation of fields, development of marginal fields and integration for growth through special purpose vehicles (SPVs) - ONGC Petro-additions Limited, ONGC Tripura Power Company Limited expansion of MRPL, and taking up more overseas ventures

The turnover during 2008-09 increased 14 per cent from Rs 373.39 billion to Rs 427.19 billion. The net profit, however, fell by 3 per cent from Rs 12.72 billion in 2007-08 to Rs 11.93 billion in 2008-09. The financial performance during the year was impacted by Rs 282.25 billion in subsidies given to oil marketing companies (OMCs) - affecting its profit to the tune of Rs 157.98 billion - and the high costs of hiring rigs. Over the last five years, from 2003-04 to 2008-09, the turnover has grown at 14.49 per cent and net profit increased by 13.23 per cent per annum.

#### **b) Oil India Limited**

Oil India Limited (OIL) is primarily an upstream company and is also into transportation of crude oil and production of liquefied petroleum gas (LPG). OIL accounts for more than 10 per cent of the total domestic crude oil production and about 7 per cent of the natural gas production. Currently, the government holds 88.3 per cent stake in OIL.

OIL has E&P acreages of about 150,000 square km pan-India and overseas. It acquired a total of 21 blocks until NELP VI. Under NELP VII, OIL in consortium with others was awarded a total of three blocks - one deep water and two shallow water. In 2008-09, OIL reported an oil discovery in upper Assam. This was the deepest commercial hydrocarbon strike, at a depth of over 5,610 metres OIL's exploration activities are spread over onshore areas of the Ganga valley and the Mahanadi. OIL also has a participating interest in NELP blocks in -Mahanadi

offshore, Mumbai deep water, KG deep water, etc., as well as various overseas projects in Libya, Gabon, Iran, Nigeria and Sudan. OIL provides various E&P-related services to the industry; it possesses seismic data acquisition capabilities, with support services ranging from satellite navigation systems to remote blasting.

It has a presence in seven countries Libya, Gabon, Nigeria, Yemen, East Timor, Iran and Sudan. OIL has nine blocks in Libya and it is the operator in five of these. In Iran, OIL holds 20 per cent stake in the Farsi Block where oil and gas have been discovered and are being evaluated for commercialisation. During 2008-09, OIL produced 3.47 mt of crude oil and 2.27 bcm of natural gas. This crude oil production is 12 per cent more than the previous year while gas production decreased by 3.1 per cent.

OIL owns and operates 1,432 km of cross-country crude pipelines. The pipelines transport over 8 million tonnes per annum (mtpa) of crude, feeding four public sector refineries in the Northeast. The crude oil production in 2007-08 was 3.1 mt, gas production was 2.34 bcm and LPG was 48,165 tonnes. OIL also owns equity stake of 26 per cent in Numaligarh Refinery Limited (NRL), which is a subsidiary of BPCL. In 2008-09, OIL scrapped its plan to set up a Rs 4 billion pilot coal-to-liquid project at Digboi in Assam which it planned to undertake the project in a JV with Coal India Limited, IOC and Engineers India Limited.

The revenue for 2008-09 was Rs 72.41 billion, a 19 per cent increase over Rs 61 billion for 2007-08. The net profit rose 22 per cent from Rs 18 billion to Rs 22 billion.

### c) Indian Oil Corporation

IOC is primarily a downstream operator with its core business being refining. It controls 10 of India's 20 refineries, two of them through its subsidiary Chennai Petroleum Corporation Limited (CPCL). It has the largest number of retail outlets (ROs) at 18,278 in the country. The government owns 80.35 per cent of IOC, ONGC holds 8.93 per cent and the Life Insurance Corporation holds 2.73 per cent.

IOC had six subsidiaries. Two of them CPCL and Bongaigaon Refinery and Petrochemicals Limited (BRPL) - were refiners. In March 2009, BRPL was merged with IOC leaving it with five subsidiaries. Lanka IOC, Indian Oil Mauritius Limited and IOC FZ Middle East carry out retail marketing of petroleum products in Sri Lanka, Mauritius and the Middle East respectively. Indian Oil Technology Limited was set up to market the intellectual property developed by IOC's research and development centre.

In 2008-09, IOC's eight refineries achieved the highest ever throughput of 51.4 mt and 103.4 per cent capacity utilisation. It registered an 8.4 per cent growth in crude processing over the previous year. The cumulative production for 2008-09 was 49.2 mt. CPCL had a throughput of 10.16 mt from its two refineries.

IOC controls a pipeline network of 10,000 km with a capacity of 71.61 mtpa. It registered an all-time high operational throughput of 59.5 mt of crude oil and petroleum products in 2008-09. During 2008-09, the Paradip-Haldia crude oil pipeline and Panipat-Jalandhar LPG pipeline were commissioned.

The commissioning of the Paradip-Haldia project was delayed by about three years due to several technological challenges, which led to a cost escalation by around 20 per cent to Rs

14.2 billion. The pipeline will transport 11 mtpa of crude to IOC refineries at Haldia and Barauni, improving the refining margins by about \$1 per barrel (bbl). IOC is implementing projects worth over Rs 600 billion currently, to increase its refining capacity to 80 mtpa by 2011-12 from the current 60.2 mtpa. It has approved an investment of Rs 297.7 billion for a refinery and petrochemicals project at Paradip in Orissa.

IOC is trying to become a fully integrated player. It has been pursuing E&P activities both within India and abroad. It has won operator rights of two Type-S oil and gas blocks in the Cambay basin under NELP-VII. IOC, in consortium with ONGC and the Gujarat State Petroleum Corporation (GSPC), has been awarded a deep water block in the KG basin. It has also entered into a farm-in agreement with Reliance E&P DMCC, a subsidiary of RIL, for 12.5 per cent participating interest in the deep water Block-K in Timor-Leste. To consolidate the city gas distribution (CGD) business, the corporation has signed memorandums of understanding (MoUs) with several players.

The gross turnover for 2008-09 reached Rs 2,853.37 billion, up by 15.3 per cent compared to Rs 2,474.57 billion in the previous year. The profit after tax was Rs 29.5 billion. The gross refining margin (GRM) for April-March 2009 is \$3.69 per bbl as compared to \$9.02 per bbl during the comparable period of the previous year. Refining margins during the current year were lower mainly due to fall in the international crude oil price resulting in inventory losses

#### **d) Hindustan Petroleum Corporation limited**

HPCL is in the integrated refining and oil marketing business. The government owns 51.11 per cent controlling interest; financial institutions hold 18.8 per cent and foreign institutional investors and overseas corporate bodies together hold 7.01 per cent.

HPCL owns 10.2 per cent of India's refining capacity and has a market share of 16 per cent. It operates two refineries, one each in Mumbai and Visakhapatnam. The refinery in Mumbai has a capacity of 5.5 mtpa and the Visakhapatnam one has a capacity of 7.5 mtpa. HPCL also holds equity stake of 16.95 per cent in the 9 mtpa MRPL, an ONGC subsidiary. HPCL also owns and operates the largest lube refinery in the country, with a capacity of 335,000 tonnes. This lube-refinery accounts for over 40 per cent of India's total lube base oil production.

HPCL's refineries achieved a total crude throughput of 15.81 mt in 2008-09 against 16.77 mt during 2007-08. For 2008-09, the actual production of the Mumbai and Visakhapatnam refineries was 15.8 mt. The combined GRM for the year was \$3.97 per bbl as against \$6.54 per bbl the previous year. HPCL owns 8,539 ROs, spread across India.

HPCL owns and operates three independent cross-country pipelines, the Mumbai –Pune-Solapur pipeline, Visakhapatnam -Secunderabad pipeline and another pipeline between Mundra and Delhi, to evacuate products cost effectively from its refineries to the major consumption centres. With the commissioning of the product pipeline from Mundra to Delhi, the total pipeline throughput increased to 10.58 mt in 2008-09 from 7.83 mt in 2007-08.

HPCL Mittal Energy Limited (HMEL), a JV between HPCL and the Mittal Group, is setting up a 9 mtpa refinery at Bhatinda in Punjab. During 2008-09, orders were placed for more than 80 per cent of plant and equipment for the refinery. The overall physical progress at 28 per cent was as per schedule. Mechanical completion of the refinery is expected by March 2011. HPCL



has launched CGD operations in various cities through its subsidiaries Bhagyanagar Gas Limited and Avantika Gas Limited

HPCL has entered into the E&P space and has a participating interest in 19 blocks. In India under NELP VII, HMEL was awarded three blocks as part of consortiums. HPCL has set up an LPG cavern storage facility, in JV with Total of France. A new subsidiary, CREDA-HPCL Biofuel Limited, was incorporated in October 2008 to undertake the business of plantation, cultivation, sale and purchase of jatropha, karanja and other similar non-edible oil-yielding plants.

HPCL registered a turnover of Rs 1,164.28 billion for 2008-09 against Rs 1038.37 billion in the previous year representing a 12 per cent growth. The net profit was Rs 57.5 billion compared to Rs 11.35 billion for 2007-08.

#### **e) Bharat Petroleum Corporation Limited**

BPCL is a major player in the downstream segment. The government has 54.93 per cent stake. BPCL controls three refineries, one each at Mumbai and Kochi and another operated by its subsidiary, NRL. The Mumbai refinery has a capacity of 12 mtpa, the Kochi refinery has 7.5 mtpa and NRL has a capacity of 3 mtpa. The total refinery production for 2008-09 for BPCL was 20 mt. It operates a network of 8,389 ROs across the country.

BPCL operates a 1,379 km multi-product pipeline from Mumbai to Bijwasan. This helps it to evacuate products from Mumbai. During the year it completed a modernisation project at the Mumbai refinery, which enhanced capacity to 12 mtpa from the earlier 9 mtpa.

It has entered into a JV with Oman Oil Company to set up a 6 mtpa grassroots refinery at Bina in Madhya Pradesh. The JV is called Bharat Oman Refineries Limited and it also plans to set up a single-point mooring system, and a crude oil storage terminal at Vadinar in Gujarat and a 935 km long crude pipeline from Vadinar to Bina.

BPCL has incorporated a subsidiary, Bharat Petro Resources Limited (BPRL), to carry out E&P activities. It has won nine blocks in India in various rounds of the NELP with one block awarded in NELP VII. Of these, four are deep water blocks and five onshore.

It has acquired five blocks overseas - in Oman, Australia and East Timor. During 2008-09, it placed a successful bid for a block in the North Sea. BPRL and Videocon Industries Limited jointly bid successfully for the acquisition of 10 deep water exploration blocks (across four concessions) in offshore Brazil. The transaction was closed in September 2008 after obtaining approval of the government. In December 2008, BPRL farmed into an offshore block in Mozambique with 10 per cent stake.

BPCL had a turnover of Rs 1,366 billion for 2008-09, an increase of 23 per cent compared to the Rs 1,112 billion posted for 2007-08. Its net profit fell 62 per cent from Rs 19.13 billion to Rs 7.2 billion during the same period.

#### **f) Reliance Industries Limited**

RIL is the largest corporate entity in India in terms of revenue and is engaged in a wide range of business activities. The company along with its subsidiaries is also the largest private player in the oil and gas sector, with a significant presence in both upstream and downstream

segments

It was awarded 33 blocks and five CBM blocks in the NELP and pre-NELP licensing rounds. Under NELP VII, the BP Exploration (Alpha) and RIL consortium was awarded one block. Overseas, RIL has 11 blocks with a total acreage of about 80,000 square km with three blocks in Yemen, two each in Oman, Kurdistan and Colombia, and one each in East Timor and Australia. RIL along with BP was awarded the deep water block KG-DWN-2005j2 offered under NELP VII. RIL has 70 per cent participating interest, while BP is the operator of the block. Further, there were two gas discoveries during the year

RIL commenced production of natural gas from its KG-D6 block in April 2009. It has reached a production capacity of 40 mmscmd and is expected to reach a peak production of 80 mmscmd by end 2009, doubling the country's natural gas production. Oil production from the block commenced earlier in September 2008

RIL has emerged as a major refiner. Its existing refinery at Jamnagar in Gujarat has 33 mtpa capacity. In December 2008, its subsidiary RPL commissioned a 29 mtpa refinery adjacent to the existing refinery. This takes the total capacity controlled by RIL and its subsidiaries to 62 mtpa and makes it the largest Indian refiner, along with IOC.

In April 2009, RGTIL, another subsidiary commissioned a 1,400 km pipeline from Kakinada in Andhra Pradesh to Bharuch in Gujarat with a capacity of 120 mmscmd. This has been built for the primary purpose of transporting the gas produced from RIL's KG basin fields. RGTIL plans to lay 1,140 km more of pipelines - the 470 km Vijayawada Nellore-Chennai and 670 km Chennai-Tuticorin pipelines - during the Eleventh Plan period.

RIL has a network of 1,432 ROs, which it closed down in 2007-08 when crude prices shot up dramatically and oil marketing companies (OMCs) were compelled to sell products at subsidised prices. On March 2, 2009, the board of directors of RIL and RPL unanimously approved RPL's merger with RIL, subject to the necessary approvals. This merger was also approved by the Bombay High Court in June 2009. The GRM for RIL's refinery for 2008-09 was at \$12.2 per bbl as against \$15 per bbl in the previous year. The company recorded a turnover of Rs 1,507.71 billion, reflecting a growth of 8.3 per cent over the previous year. The net profit for 2008-09 was lower by 21.5 per cent at Rs 152.79 billion as compared to Rs 194.58 billion for the previous year.

#### **g) GAIL (India) Limited**

GAIL (India) Limited is a fully integrated gas company with operations extending along the entire value chain including E&P, processing, transmission, distribution and marketing. GAIL has supply contracts with all major Indian gas producers including ONGC and RIL. It procures natural gas from ONGC, OIL and private sector JVs at the Rawa field in southern India, and from the Panna-Mukta and Tapti fields in western offshore. GAIL is the largest transporter of natural gas in India. It owns more than 7,000 km of pipelines with a capacity of 155 mmscmd of natural gas. It has a market share of 78 per cent of the gas transmission business and 70 per cent of the gas marketing business in India. During 2008-09, "natural gas sales increased by 14 per cent to 79.06 mmscmd from 69.1 mmscmd in the previous year. Gas transmission increased to 83.29 mmscmd from 82.1 mmscmd in the

previous year.

GAIL's 3,187 km long Hazira-Vijaipur agdishpur (HVJ) pipeline and 610 km Dahej-Vijaipur pipeline cater to all the gasbased power plants, fertiliser plants and industries along the entire west-north corridor of India. The HVJ pipeline is the largest cross-country gas transmission system in India with a capacity of over 33 mmscmd. The company has approved plans to undertake investment worth Rs 75 billion for laying the 1,389 km Dabhol-Bengaluru pipeline and 1,114 km long Kochi-KanjirkkodBengaluru-Mangalore pipelines. Both these will have capacity of 16 mmscmd each

GAIL has seven LPG gas processing units, which produce 1.2 mtpa of LPG and other liquid hydrocarbons. Four of these plants are situated along the HVJ pipeline. It also has a 1,922 km LPG transmission pipeline network with a capacity to transport 3.8 mtpa of LPG. In 2008-09, total liquid hydrocarbon production including LPG was 1.4 mt as compared to the previous year's production of 1.35 mt. Production of LPG was 1.09 mt during the year against a production of 1.04 mt in the previous year. LPG transmission through pipelines was 2.74 mt in 2008-09 as against 2.75 mt in 2007-08.

GAIL ventured into E&P in 2001. Currently, it has 25 domestic blocks, three overseas blocks and three CBM blocks. Of these, nine are onshore blocks, 18 offshore of which 13 are deep water and five shallow water. During the NELP VII bidding round, a GAIL consortium won one on land block in Cauvery (CY-ONN-2005/1) as the operator

Production has continued from the Cambay onland block (CB-ONN-2000/1-Ahmedabad) and 195,000 bbl of crude was sold during 2008-09. It received a petroleum exploration licence for three CBM blocks in 2008 and core holes drilling has begun. Drilling of wells was undertaken in eight blocks during 2008-09 and oil discovery was made in one block during the period

GAIL plans to invest Rs 55.58 billion during 2009-10. Of this, Rs 40.2 billion will be invested in pipeline projects, and the rest in E&P, petrochemicals, CGD and telecom. For the Eleventh Plan as a whole it plans to invest Rs 111.21 billion to set up new pipelines and increase its capacity to around 300 mmscmd

GAIL Gas Limited, a subsidiary of GAIL has won rights for rolling out CGD projects in Meerut, Sonapat, Dewas and Kota in the firs round of bidding conducted for various cities by the Petroleum and Natural Gas Regulatory Board. GAIL signed agreemnets for the supply of 2.11 mmscmd of natural gas to the Barauni plant, 0.88 mmscmd, 0.87 mmscmd and 1.03 mmscmd for NFL Panipat, Bhatinda and Nangal plants respectively

## **OIL SECTOR: - CHALLENGES**

India has seen a marvelous development in the refining division throughout the years. In 1947, at Independence, there was just a single refinery situated in Digboi with a limit of 0.25 million tons for every annum. In this manner, Standard Vaccum Oil Company set up a refinery in Bombay in 1955: and Caltex at Visakhapatnam in 1957. Today there are 14 refineries in the

nation, 13 in the general population segment and one in the joint part, with an introduce limit of 60.4 million tons for every annum.

### PRESENT SCENARIO

#### Demand for Petroleum Products

1. The demand for petroleum products is linked with the energy requirements of the country, which is a function of the level of economic activity as a measured by the GDP of any particular country. Presently India is undergoing major economic and industrial reforms for integrating its economy with the global economy. In the liberalised scenario, the hydrocarbon sector has been identified as one of the main areas of the focus. Major policy changes are planned for the vital sector to make the oil industry globally competitive. With the reforms package formulated and expected high growth in all economic sectors, the demand for petroleum products is expected to show a compound growth of about 8%. In absolute terms, the demand for petroleum products by the year 2009-10 is expected to increase from the present level of 80 million tonnes to 155 million tonnes per annum.

#### a) Challenges:-

The challenges for the refining sector are threefold:

- To build up adequate refining capacity; new refineries, expansion and replacements.
- To update/implement the emerging technologies to meet the predominant demand for middle distillates.
- To improve the quality of India's petroleum products to make them environment-friendly and globally competitive.
- Lack of adequate transmission and distribution infrastructure has been a major bottleneck in expanding the oil and gas market. In order to create sufficient transportation infrastructure, the Petroleum and Natural Gas Regulatory Board (PNGRB) has come up with a number of regulations covering several issues regarding the same.
- In addition, though oil and gas is under central jurisdiction, there are functions that are undertaken by the states alone. Despite the policies and regulators, the industry needs better alignment of priorities between the Centre and the states.
- For the Indian gas market to mature, it is essential to completely deregulate price, which is not part of the current scenario. There is APM gas available at very low prices (although the volume is decreasing). Then, there are contract prices for gas sourced from various fields. The government has also fixed a price of \$4.2 per million British thermal units for RIL's KG basin gas, and for new gas from the NELP blocks.

#### b) Trends

- Since there was no significant reserves accretion, India's crude oil imports increased at a CAGR of 7.5 per cent over the past five years. Only about 26.5 per cent of the oil needs in 2008-09 were met through domestic production, with the balance being met through imports. India imported 128.16 mt of crude oil during 2008-09 as against 121.67 mt the previous year, an increase of 5.3 per cent. The surge in global crude prices in the middle of 2008-09 increased the crude import bill to \$76 billion compared to \$68 billion for 2007-08
- However, this scenario is likely to improve with Reliance Industries Limited (RIL) starting to produce crude from its KrishnaGodavari (KG) basin block. Moreover, once Cairn India Limited starts crude production from its Rajasthan block, domestic production figures will change dramatically
- During 2008-09, the import of liquefied natural gas (LNG) decreased by 3.5 per cent to 10.98 bcm, as against 11.38 bcm in 2007-08. This was largely on account of a switch from natural gas to naphtha in fertiliser production and electricity generation, due to a sharp fall in oil prices as against that of LNG prices in the second half of 2008. Domestic production was 1.4 per cent higher in 2008-09 at 32.85 bcm, as against 32.27 bcm the previous year (the CAGR for the past five years was 0.85 per cent). The increase was partly due to the commencement of commercial production of coal bed methane (CBM) gas
- The commencement of RIL's KG basin gas production in April 2009 is set to fulfill some unmet demand from the power, fertiliser and city gas distribution (CGD) sectors. The gas utilisation policy accords the highest priority to fertiliser companies (with an allocation of 14 million standard cubic metres per day [mmscmd]), followed by liquefied petroleum gas (LPG) extraction (3 mmscmd), the power sector (18 mmscmd) and the CGD segment (5 mmscmd). At present, RIL's KG gas production is 36 mmscmd. This will increase to 40 mmscmd by end-2009 and to 80 mmscmd by 2010
- LNG imports are expected to increase this year. This is a result of surplus LNG from spot market suppliers to the Asia-Pacific region, which increases the price competitiveness of LNG relative to naphtha and domestically produced gas. In addition, slower-than-expected ramp-up of gas production from the KG basin and a decline in production from the Panna-Mukta-Tapti fields are expected to support LNG imports
- Petroleum refining has been largely the domain of the public sector with RIL and Essar Oil Limited (EOL) being the only private operators. The installed refining capacity until December 2008 was 149 million tonnes per annum (mtpa), of which around 70 per cent was controlled by the public sector. But since the commissioning of the 29 mtpa refinery by Reliance Petroleum limited, a subsidiary of RIL, in December 2008, RIL and RPL's combined capacity rose to 62 mtpa, which puts it at par with Indian Oil Corporation (IOC) with 34 per cent refining capacity each. The 19 refineries in India, excluding RPL's latest addition, registered a crude throughput of 160.77 mt in 2008-09, a 3.3 per cent increase compared to 156 mt throughput registered the previous year. The increase in crude

throughput over the past five years was at a CAGR of 6 per cent.

- IOC is undertaking investments of over Rs 600 billion to increase its refining capacity to 80 mtpa from the current 60.2 mtpa. It is investing in several projects including setting up a new 15 mtpa refinery at Paradip in Orissa and increasing the Panipat refinery's capacity from 12 mtpa to 15 mtpa
- Hindustan Petroleum Corporation Limited is setting up a 9 mtpa refinery at Bhatinda, Punjab, in joint venture with the Mittal Group. The refinery is expected to be completed by December 2010. Meanwhile, the 6 mtpa refinery being set up by Bharat Oman Refineries Limited at Bina, Madhya Pradesh, is likely to be completed by end2009. Even Mangalore Refinery and Petrochemicals Limited plans to increase its refining capacity to 15 mtpa by March 2012, from the current capacity of 9.7 mtpa
- EOL also successfully increased the capacity of its Vadinar refinery to around 14 mtpa in May 2009; it is expected to complete the first phase of expansion to 16 mtpa by December 2010. In the second phase of expansion, a new 18 mtpa unit will be set up by December 2011
- As a result, GAIL (India) Limited and the Gujarat State Petroleum Corporation (GSPC) plan to build another 1,400-1,500 km pipeline connecting the KG basin to central India. This will enable GAIL to strengthen Vijaipur as its hub from where it operates the Hazira-Vijaipur-Jagdishpur pipeline. It will also enable GSPC to prepare its pipeline grid for gas output, set to begin from its KG basin block. Apart from this, there are several pipelines currently under construction. Given the right regulatory environment, around 16,500 km of a nationwide gas grid, including existing pipelines, will be established. Moreover, an investment-linked tax incentive for oil and gas pipelines has been proposed in the union budget for 2009-10.
- The petroleum retailing segment has also been a domain of the public sector. The dismantling of the administered pricing mechanism (APM) resulted in investments by both new and established players. Private players like RIL, EOL and Shell entered retailing
- Since the government continues to regulate the prices of petrol, diesel, kerosene and LPG, the oil marketing companies (OMCs) incur huge under-recoveries due to selling these products at regulated prices. During 2008-09, OMC under-recoveries amounted to Rs 1,033 billion. However, despite the government's stated policy of market-based pricing of products, the government continues to strongly influence the pricing of certain products in the name of public interest.

## FINANCIAL ANALYSIS OF MAJOR PLAYER IN OIL SECTOR

Oil sector can be classified in different ways.

Oil sector can be classified in different ways.

One way is to classify the upstream, Midstream and downstream of operation. In financial Analysis financial results of selected major players in the each above segment of oil sector was reviewed and different ratio were analysed as below:-

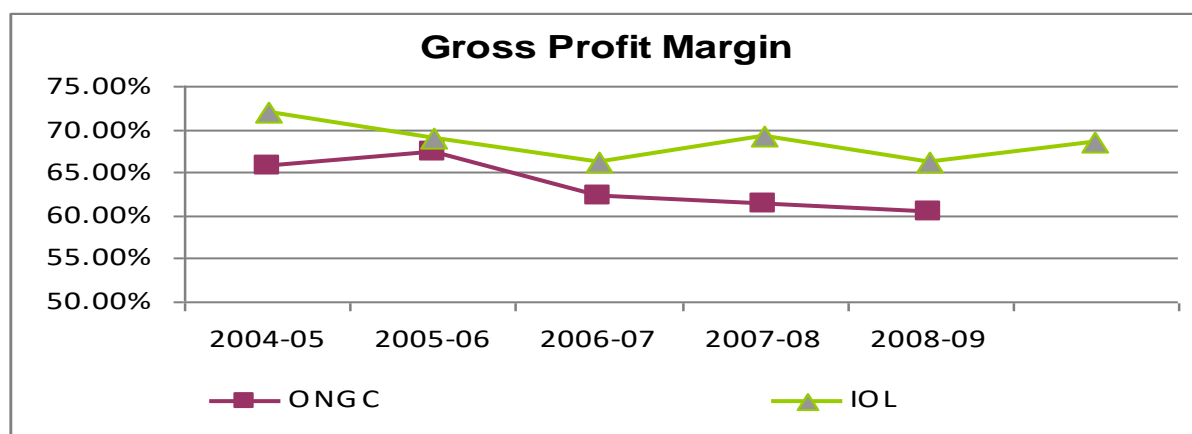
### B) Profitability Ratios:-

#### Gross Profit Margin

Up Stream (Exploration & Production)

Gross Profit Margin						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	65.68%	67.37%	62.25%	61.41%	60.44%	63.43%
IOL	71.91%	68.99%	66.13%	69.28%	66.11%	68.48%
				AVERAGE		<b>65.96%</b>

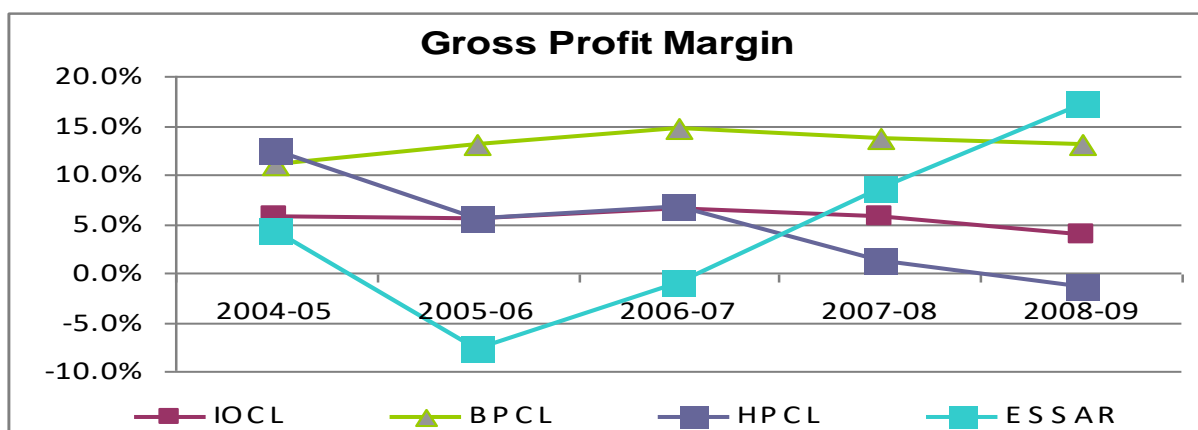
Gross profit margin of both the companies are almost same, however IOL has better results than ONGC.



Down Stream (Refining, Marketing & Pipelines)

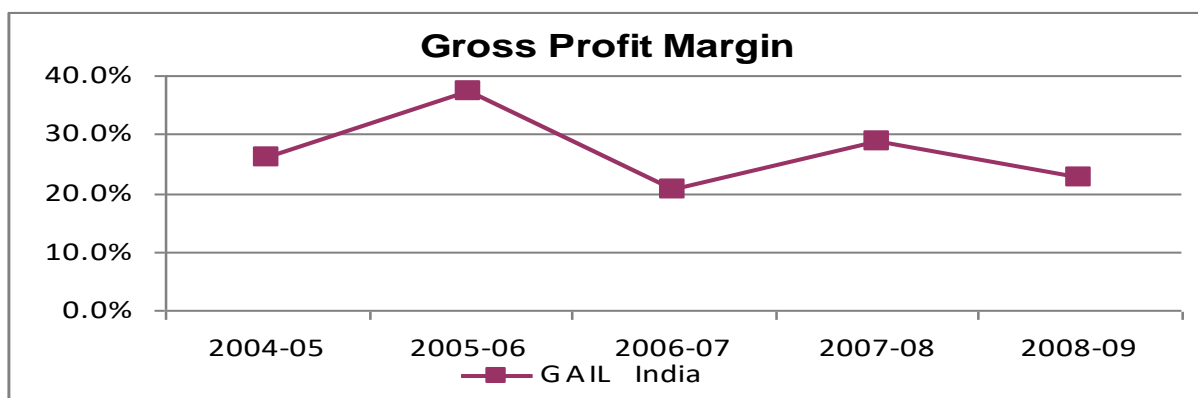
Gross Profit Margin						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
IOCL	5.8%	5.4%	6.6%	5.8%	4.0%	5.52%
BPCL	10.9%	13.1%	14.7%	13.6%	13.1%	13.07%
HPCL	12.5%	5.6%	6.8%	1.3%	-1.5%	4.94%
ESSAR	4.3%	-7.7%	-0.9%	8.5%	17.2%	4.27%
					AVERAGE	<b>6.95%</b>

Gross profit margin of BCPL has better than other companies of same segment.



Gas Transport & Distribution

Gross Profit Margin						AVERAGE
GPM	2004-05	2005-06	2006-07	2007-08	2008-09	
GAIL India	26.0%	37.4%	20.5%	28.6%	22.7%	27.01%
				AVERAGE		27.01%



It has been observed that Gross profit margin of upstream segment of companies are much higher than other segments i.e. downstream and gas transport and distribution.

Operating Profit margin (OPM):-

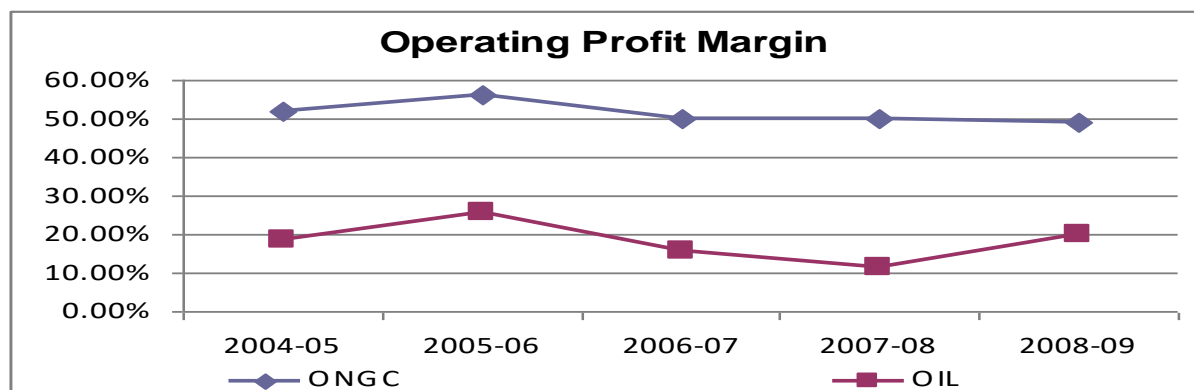
Up Stream (Exploration & Production)

Operating Profit margin (OPM)						AVERAGE
OPM	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	51.69%	56.26%	50.11%	49.96%	49.05%	51.41%
IOL	18.77%	25.91%	15.82%	11.58%	19.76%	18.37%



					<b>AVERAGE</b>	<b>34.89%</b>
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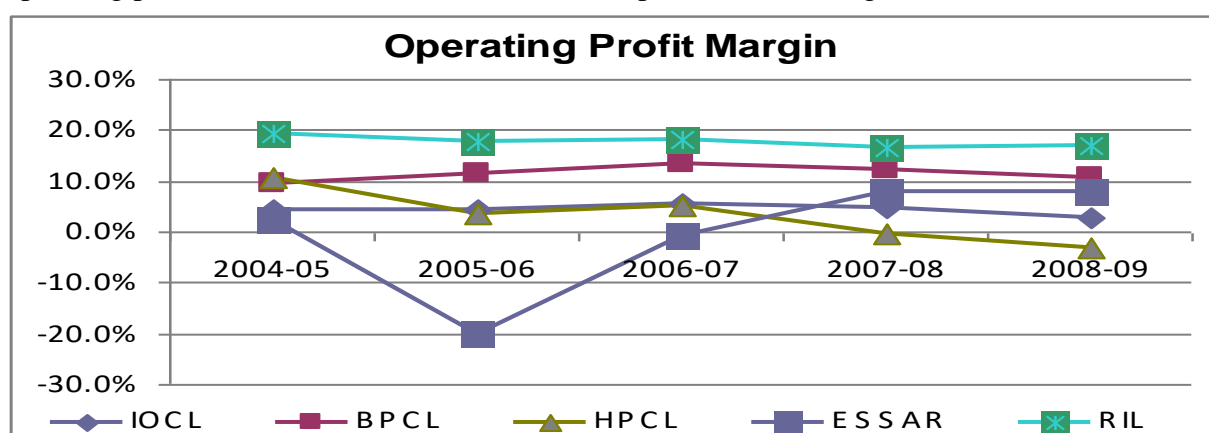
Operating profit of ONGC is better than IOL.



Down Stream (Refining, Marketing & Pipelines)

Operating Profit margin (OPM)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
IOCL	4.3%	4.2%	5.4%	4.7%	2.9%	4.32%
BPCL	9.5%	11.5%	13.3%	12.1%	10.8%	11.42%
HPCL	10.6%	3.7%	5.0%	-0.4%	-3.3%	3.13%
ESSAR	2.5%	-20.2%	-0.9%	7.7%	7.9%	-0.59%
RIL	19.3%	17.9%	18.3%	16.8%	17.0%	17.84%
				<b>AVERAGE</b>		<b>7.22%</b>

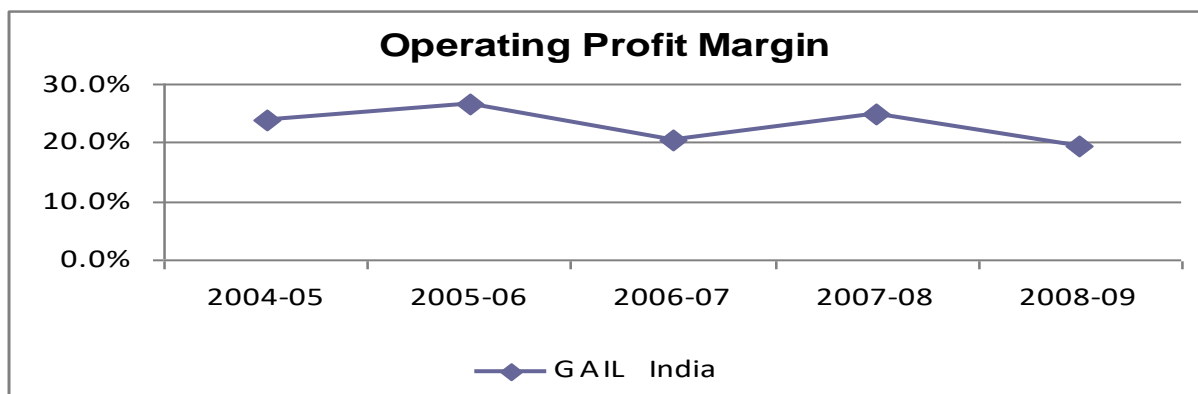
Operating profit of BCPL is better than other companies of same segment.



Gas Transport & Distribution

Operating Profit margin (OPM)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	

GAIL India	23.8%	26.5%	20.5%	25.0%	19.5%	23.06%
					<b>AVERAGE</b>	<b>23.06%</b>



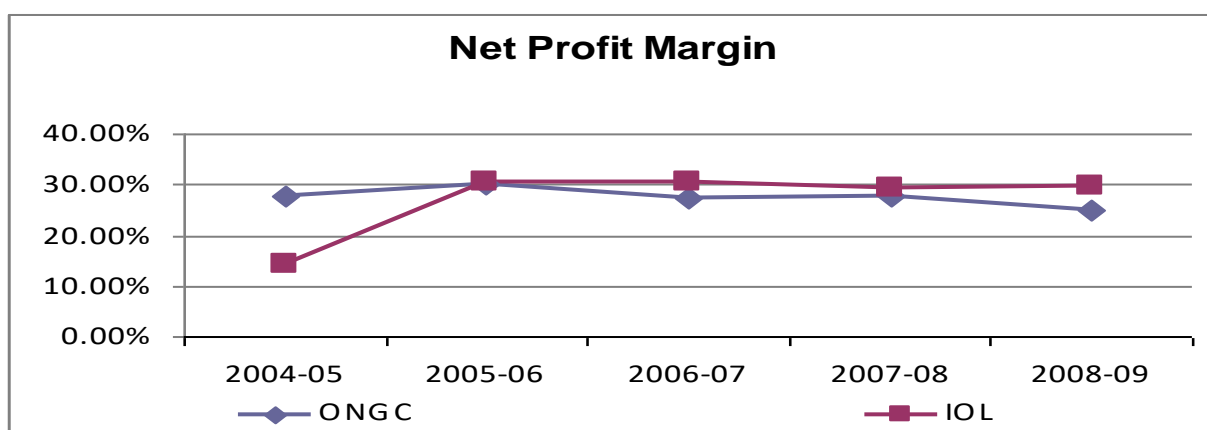
It has been observed that Operating profit margins of upstream segment of companies are much higher than other segments i.e. downstream and gas transport and distribution.

**Net profit Margin (NPM)**

Up Stream (Exploration & Production)

Net profit Margin (NPM)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	27.79%	29.94%	27.49%	27.70%	25.13%	27.61%
IOL	14.34%	30.45%	30.43%	29.41%	29.85%	26.90%
				<b>AVERAGE</b>		<b>27.25%</b>

Net Profit margin are almost same of both the companies, however ONGC is little bit better off.

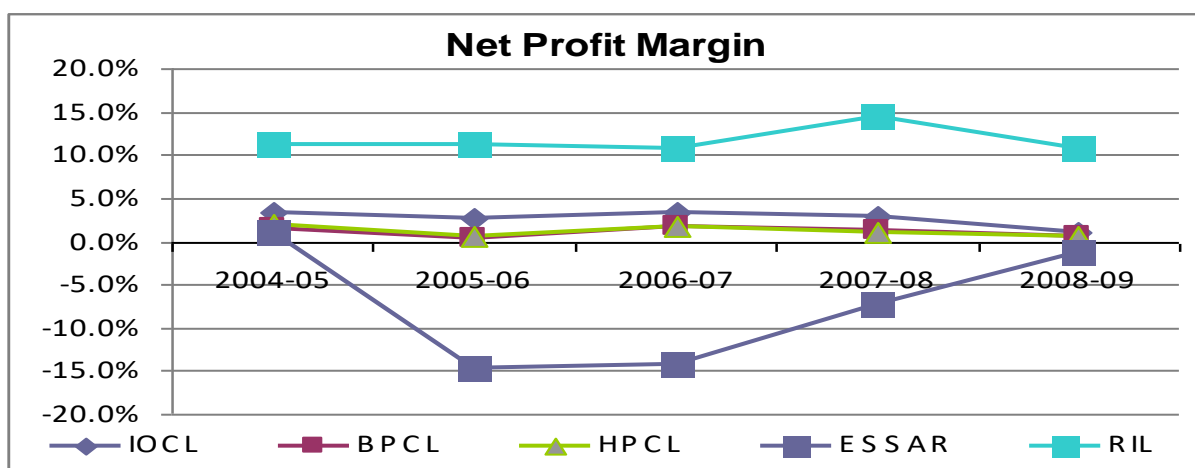


Down Stream (Refining, Marketing & Pipelines)

<b>Net profit Margin (NPM)</b>	<b>AVERAGE</b>
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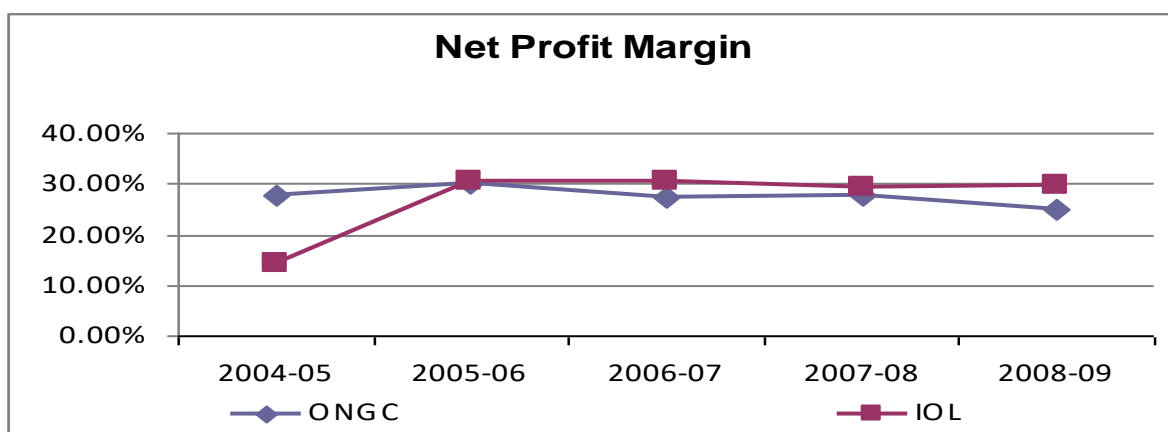
	2004-05	2005-06	2006-07	2007-08	2008-09	
IOCL	3.2%	2.7%	3.4%	2.8%	1.0%	2.63%
BPCL	1.5%	0.4%	1.7%	1.3%	0.5%	1.08%
HPCL	2.0%	0.5%	1.7%	1.1%	0.5%	1.17%
ESSAR	0.9%	-14.7%	-14.2%	-7.3%	-1.2%	-7.31%
RIL	11.3%	11.1%	10.6%	14.5%	10.7%	11.62%
				<b>AVERAGE</b>		<b>1.84%</b>

Net profit margin of RIL is much higher than any of the other PSUs



Gas Transport & Distribution

Net profit Margin (NPM)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	27.79%	29.94%	27.49%	27.70%	25.13%	27.61%
IOL	14.34%	30.45%	30.43%	29.41%	29.85%	26.90%
					<b>AVERAGE</b>	<b>27.25%</b>



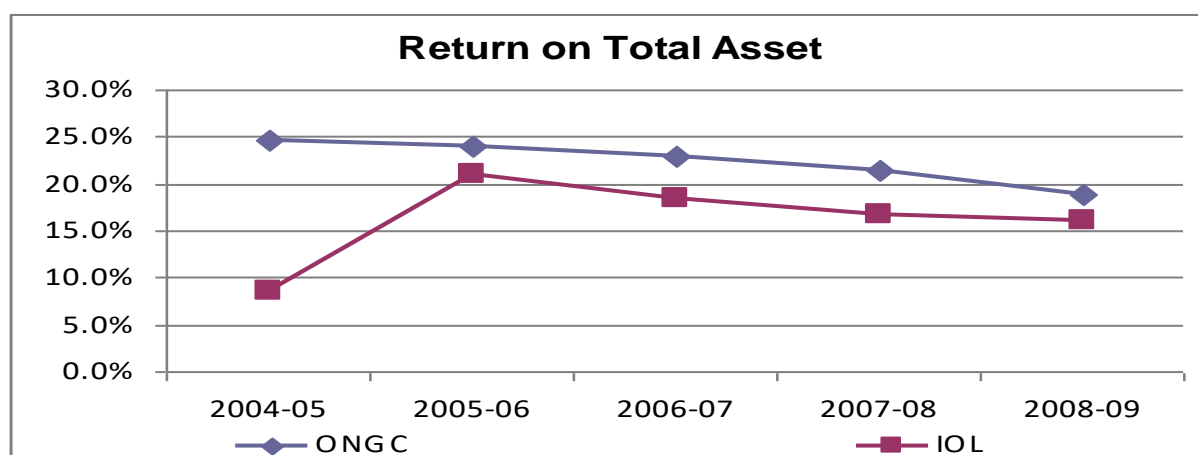
It has been observed that net profit margins of upstream segment and gas transport and distribution segment is almost same and better than the Down Stream (Refining, Marketing & Pipelines) segment.

### Return on Total Asset (ROTA)

Up Stream (Exploration & Production)

Return on Total Asset (ROTA)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	24.6%	24.1%	23.0%	21.4%	18.9%	22.38%
IOL	8.5%	21.0%	18.5%	16.7%	16.2%	16.16%
				AVERAGE		19.27%

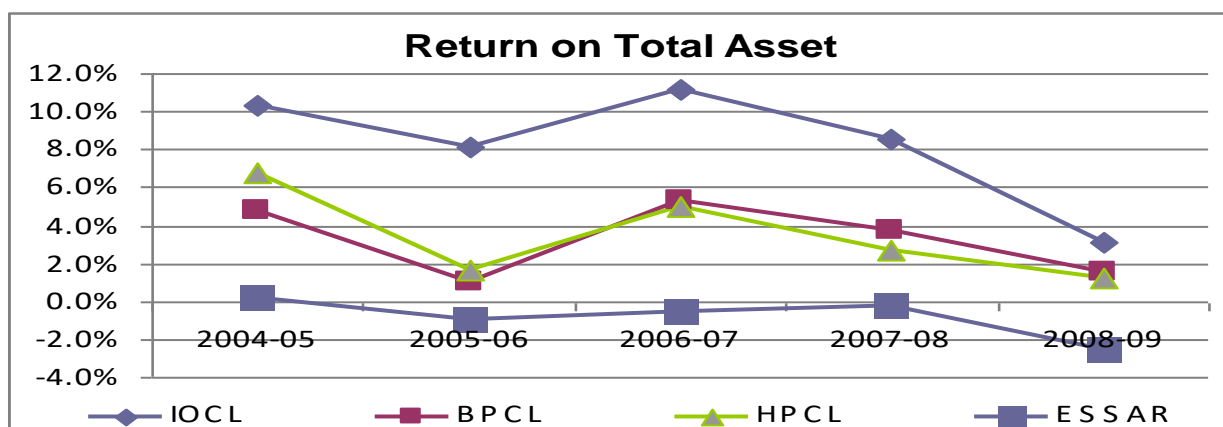
Return on total asset is better in ONGC than IOL



Down Stream (Refining, Marketing & Pipelines)

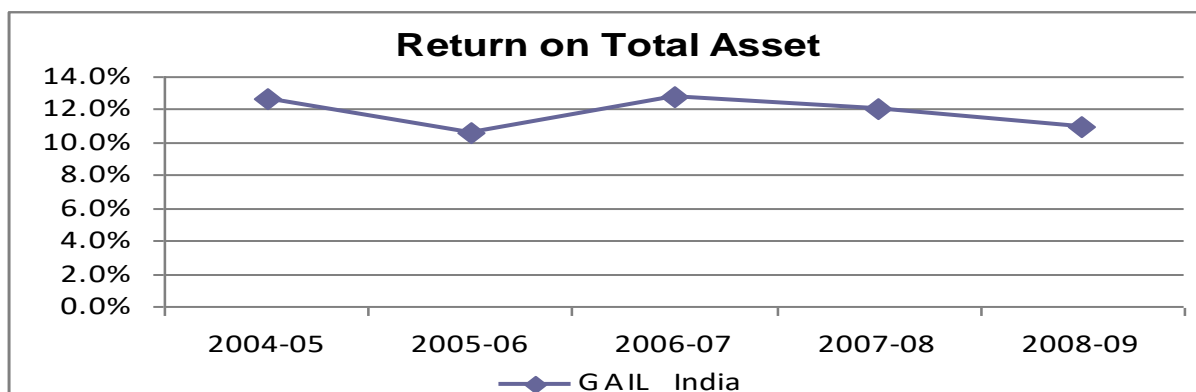
Return on Total Asset (ROTA)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
IOCL	10.3%	8.2%	11.2%	8.5%	3.1%	8.25%
BPCL	4.7%	1.0%	5.3%	3.7%	1.6%	3.27%
HPCL	6.7%	1.6%	5.0%	2.7%	1.2%	3.46%
ESSAR	0.1%	-1.0%	-0.6%	-0.2%	-2.5%	-0.83%
RIL						
				AVERAGE		3.54%

Return on asset is better in IOC than any other in the segment



Gas Transport & Distribution

Return on Total Asset (ROTA)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
GAIL India	12.7%	10.5%	12.8%	12.0%	11.0%	11.82%
				AVERAGE		<b>11.82%</b>

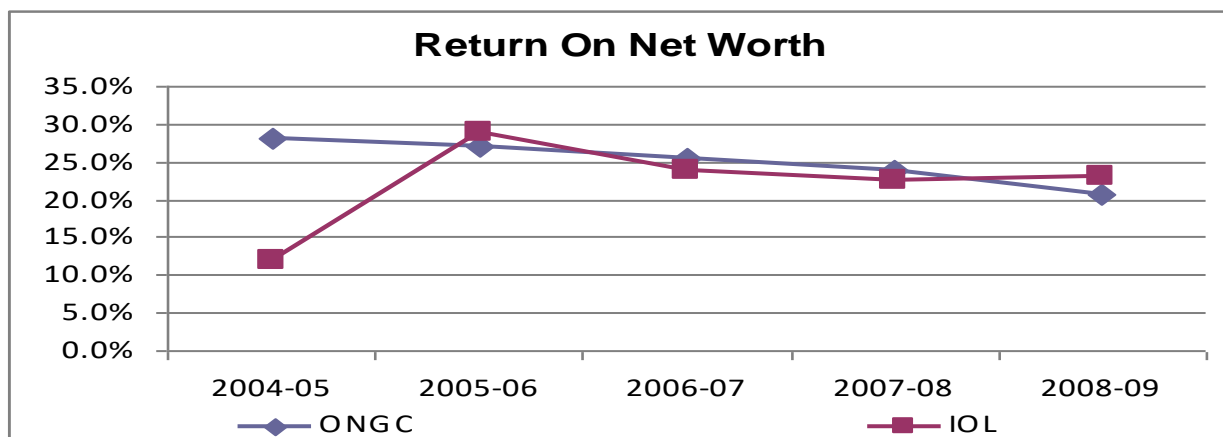


It has been observed that return on total asset in upstream companies is better than any other segment.

Return on Stock holders' equity (or return on net worth) (RONW):-

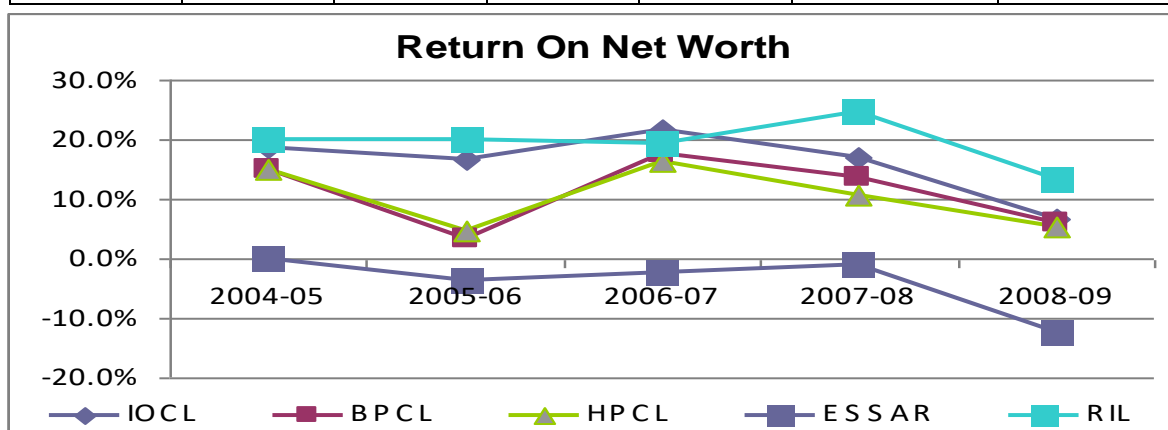
Up Stream (Exploration & Production)

Return on net worth(RONW)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	28.0%	26.9%	25.5%	23.9%	20.7%	24.99%
IOL	11.8%	28.9%	23.9%	22.6%	23.2%	22.08%
					AVERAGE	<b>23.53%</b>



Down Stream (Refining, Marketing & Pipelines)

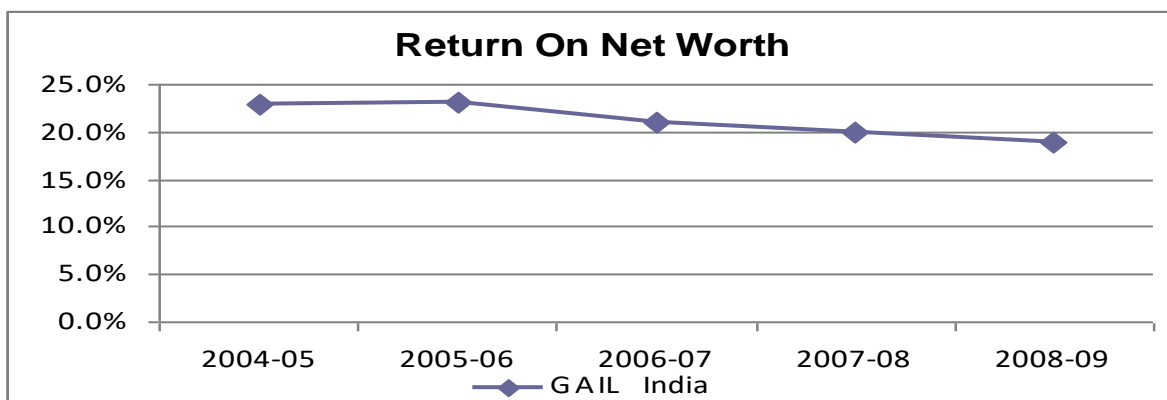
Return on net worth(RONW)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
IOCL	18.8%	16.8%	21.5%	16.9%	6.7%	16.16%
BPCL	15.1%	3.2%	17.6%	13.5%	6.1%	11.10%
HPCL	15.1%	4.6%	16.4%	10.7%	5.4%	10.45%
ESSAR	0.1%	-3.7%	-2.3%	-1.1%	-12.5%	-3.90%
RIL	20.1%	20.1%	19.5%	24.7%	13.4%	19.54%
					AVERAGE	<b>10.67%</b>



Gas Transport & Distribution

Return on net worth(RONW)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
GAIL India	23.0%	23.2%	20.9%	20.0%	19.0%	21.21%

					AVERAGE	21.21%
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It has been observed that return on net worth of upstream segment and gas transport and distribution segment is almost same and better than the Down Stream (Refining, Marketing & Pipelines) segment.

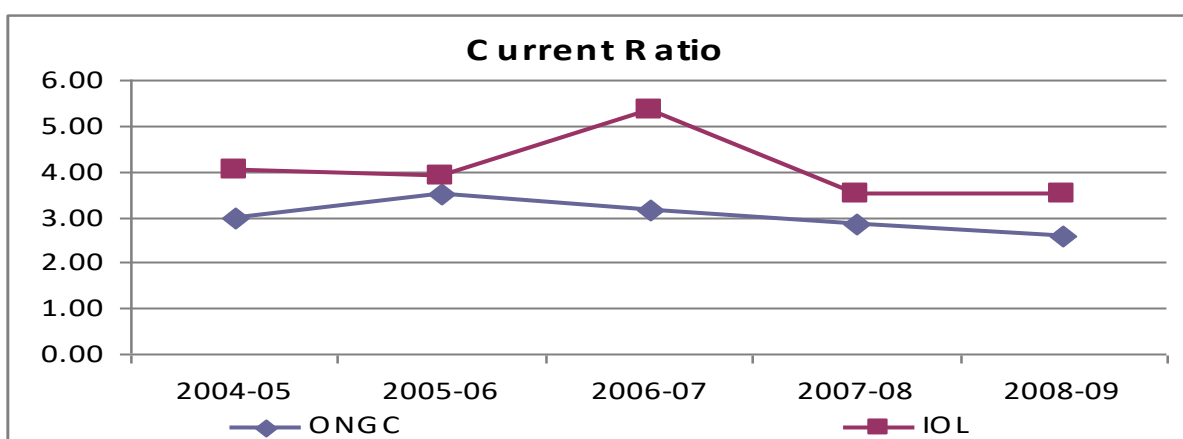
**E. Liquidity Ratios**

**Current Ratio (CR)**

Up Stream (Exploration & Production)

Current Ratio (CR)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	2.96	3.51	3.17	2.83	2.59	3.01
IOL	4.04	3.90	5.34	3.52	3.52	4.07
				AVERAGE		3.54

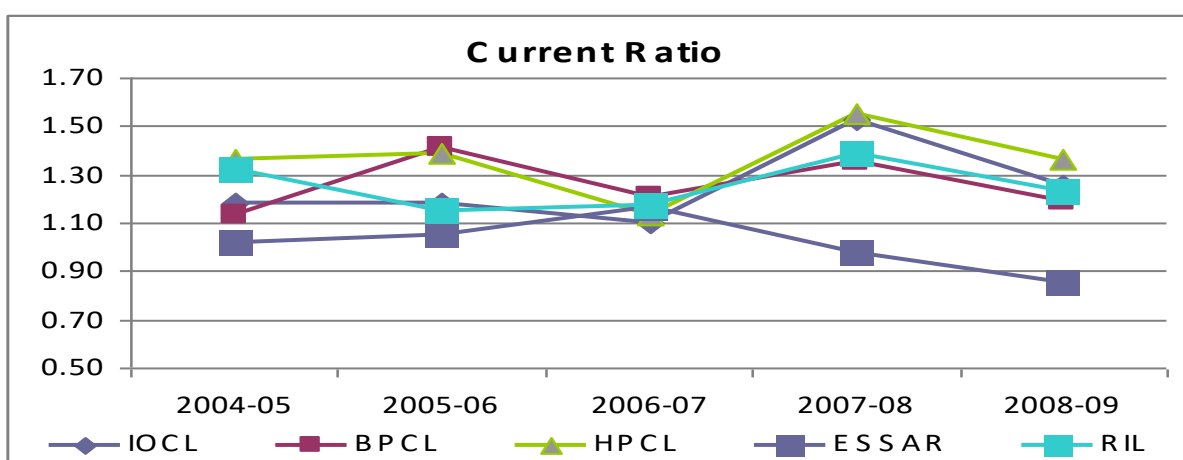
Current ratio of Up Stream companies is in range of 3 to 4 which is quite good.



Down Stream (Refining, Marketing & Pipelines)

Current Ratio (CR)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
IOCL	1.18	1.18	1.10	1.53	1.26	1.25
BPCL	1.13	1.42	1.21	1.35	1.19	1.26
HPCL	1.36	1.38	1.13	1.55	1.36	1.36
ESSAR	1.02	1.05	1.17	0.98	0.85	1.01
RIL	1.32	1.15	1.17	1.39	1.23	1.25
					AVERAGE	<b>1.23</b>

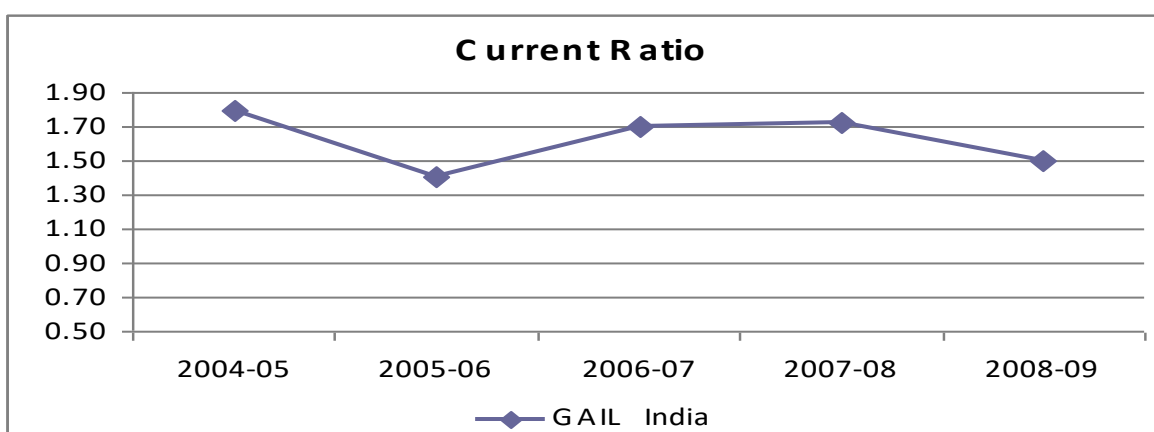
Current ratio of Up Stream companies is in range of 1-1.5.



Gas Transport & Distribution

Current Ratio (CR)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
GAIL India	1.80	1.41	1.70	1.72	1.50	1.63
				AVERAGE		<b>1.63</b>

Current ratio of Up Stream companies is in range of 1-1.5.





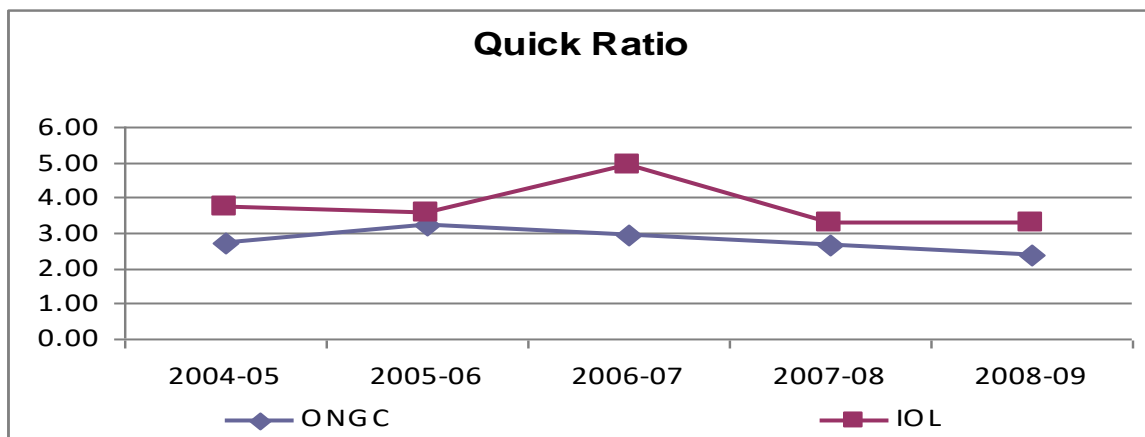
It has been observed that current ration of upstream segment is in range of 3-4 which is quite good.

### Quick Ratio (QR)

Up Stream (Exploration & Production)

Quick Ratio (QR)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	2.72	3.22	2.96	2.63	2.39	2.78
IOL	3.74	3.56	4.94	3.26	3.26	3.76
				<b>AVERAGE</b>		<b>3.27</b>

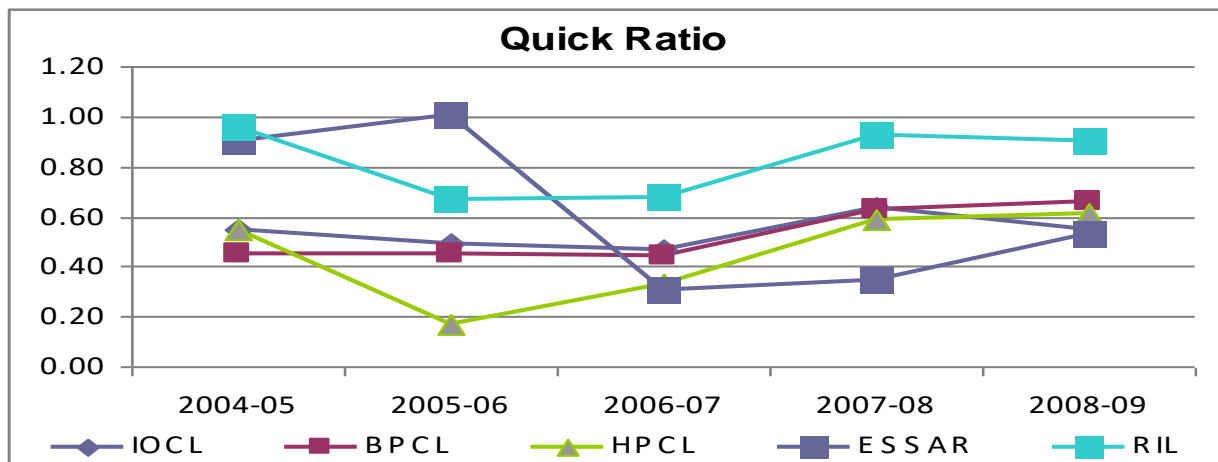
Current ratio of Up Stream companies is in range of 2-3, which is quite good.



Down Stream (Refining, Marketing & Pipelines)

Quick Ratio (QR)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
IOCL	0.55	0.49	0.47	0.64	0.55	0.54
BPCL	0.45	0.45	0.44	0.62	0.66	0.53
HPCL	0.55	0.17	0.33	0.59	0.61	0.45
ESSAR	0.91	1.01	0.31	0.34	0.53	0.62
RIL	0.96	0.67	0.68	0.93	0.9	0.83
					<b>AVERAGE</b>	<b>0.59</b>

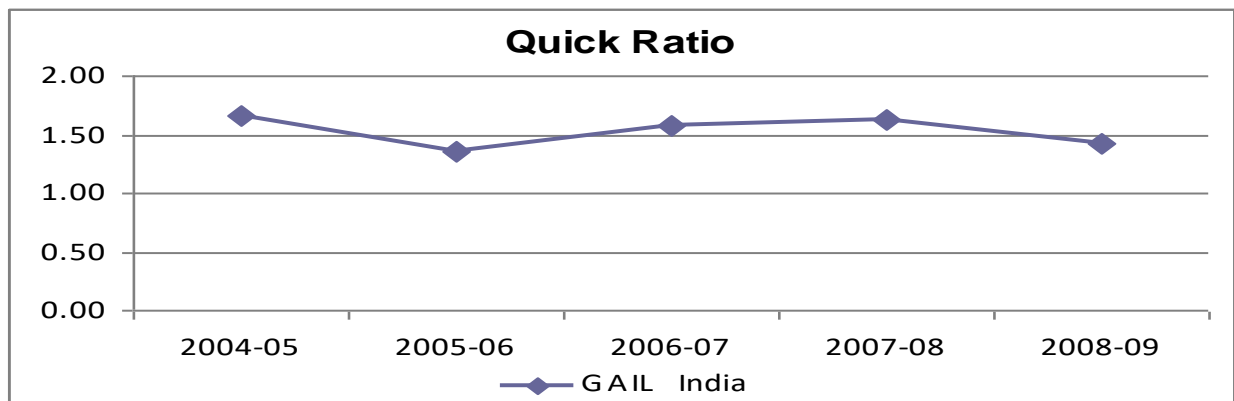
Current ratio of Up Stream companies is in range of 0.5.



Gas Transport & Distribution

QR	2004-05	2005-06	2006-07	2007-08	2008-09	AVERAGE
GAIL India	1.66	1.35	1.58	1.62	1.43	1.53
					AVERAGE	<b>1.53</b>

Current ratio of Gail is in range of 1-1.5.



It has been observed that current ration of upstream segment is in range of 2-3 which is quite good.

F. Leverage Ratio

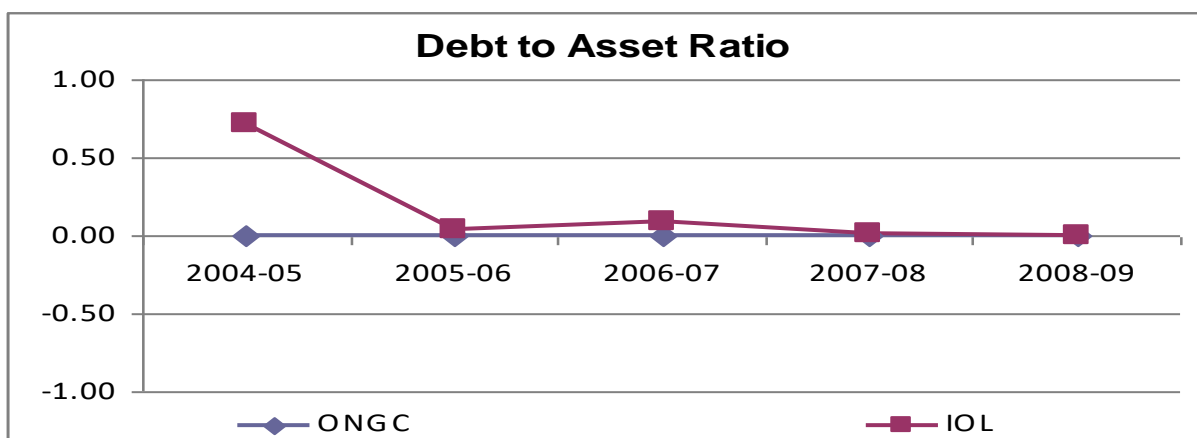
Debt-to-asset ratio (DAR)

Up Stream (Exploration & Production)

Debt-to-asset ratio (DAR)	AVERAGE
---------------------------	---------

	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	0.00	0.00	0.00	0.00	0.00	0.00
IOL	0.72	0.04	0.09	0.02	0.00	0.17
					<b>AVERAGE</b>	<b>0.09</b>

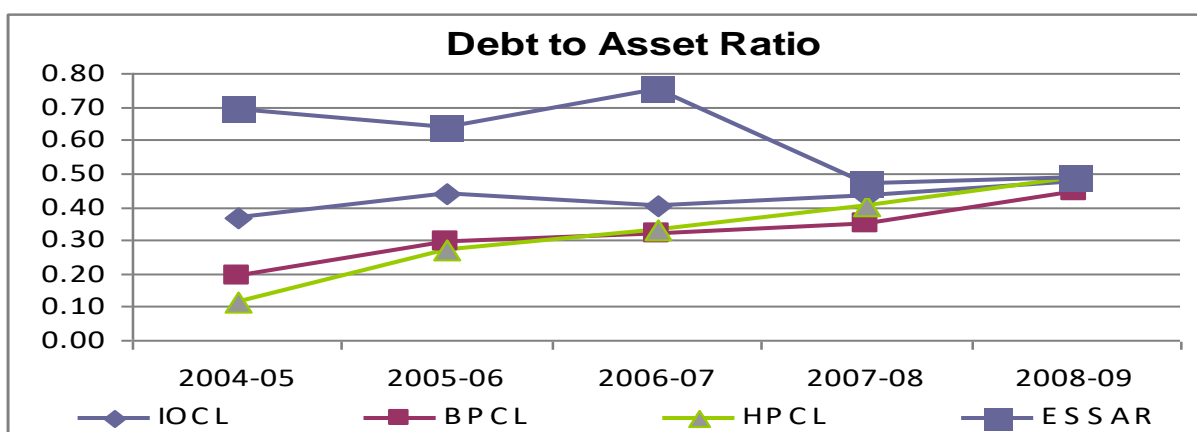
Debt to asset ratio of up stream companies is almost zero. In fact for ONGC it is zero while for IOL it is in tune of 0.01-0.09



Down Stream (Refining, Marketing & Pipelines)

Debt-to-asset ratio (DAR)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
IOCL	0.36	0.44	0.40	0.43	0.48	0.42
BPCL	0.19	0.30	0.32	0.35	0.45	0.32
HPCL	0.12	0.27	0.33	0.41	0.49	0.32
ESSAR	0.69	0.64	0.75	0.47	0.49	0.61
RIL						
				<b>AVERAGE</b>		<b>0.42</b>

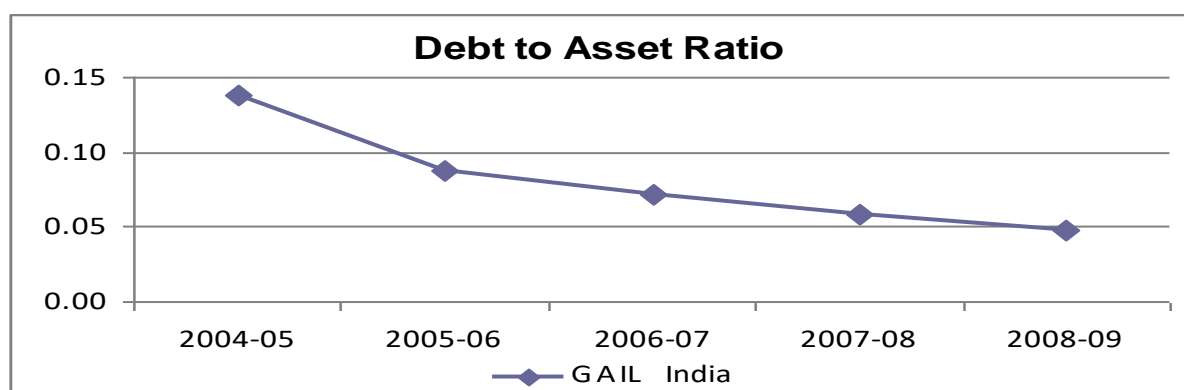
Debt to asset ratio of down stream companies is almost 0.2 to 0.5. In fact for ESSAR it is highest among others



## Gas Transport &amp; Distribution

Debt-to-asset ratio (DAR)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
GAIL India	0.14	0.09	0.07	0.06	0.05	0.08
				AVERAGE		<b>0.08</b>

Debt to asset ratio of down stream companies is almost 0.05. In fact it is continuous decreasing for GAIL



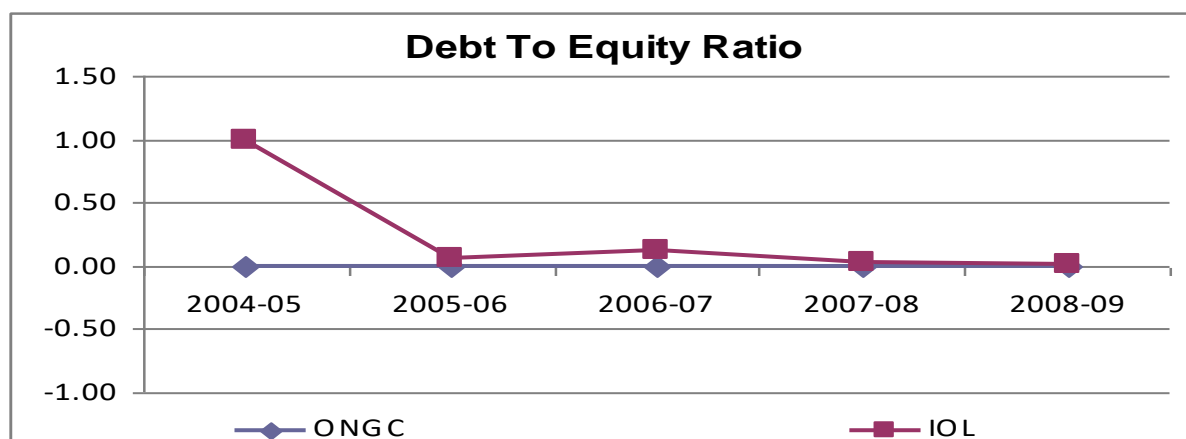
It has been observed that current ration of upstream segment and gas distribution companies are quite low while for down stream companies it is in range of 0.4 -0.5

## Debt-to-equity ratio (DER)

Up Stream (Exploration & Production)

Debt-to-equity ratio (DER)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	0.00	0.00	0.00	0.00	0.00	0.00
IOL	1.00	0.06	0.12	0.02	0.01	0.24
				AVERAGE		<b>0.12</b>

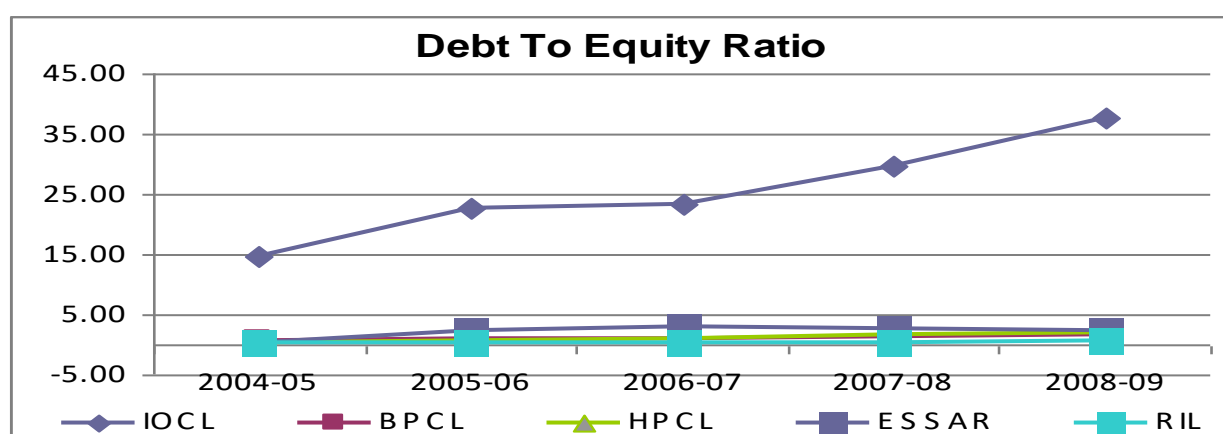
Debt to equity ratio of up stream companies is almost zero. For IOL it is continuously decreasing and In fact for ONGC it is zero.



Down Stream (Refining, Marketing & Pipelines)

Debt-to-equity ratio (DER)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
IOCL	14.83	22.61	23.19	29.80	37.73	25.63
BPCL	0.61	0.92	1.05	1.29	1.75	1.12
HPCL	0.26	0.76	1.10	1.59	2.12	1.16
ESSAR	0.33	2.41	2.86	2.76	2.44	2.16
RIL	0.49	0.48	0.45	0.46	0.64	0.50
				AVERAGE		<b>6.12</b>

Debt to equity ratio of down stream companies is varying significantly among themselves. For IOC it is highest among others, while for RIL it is smallest.

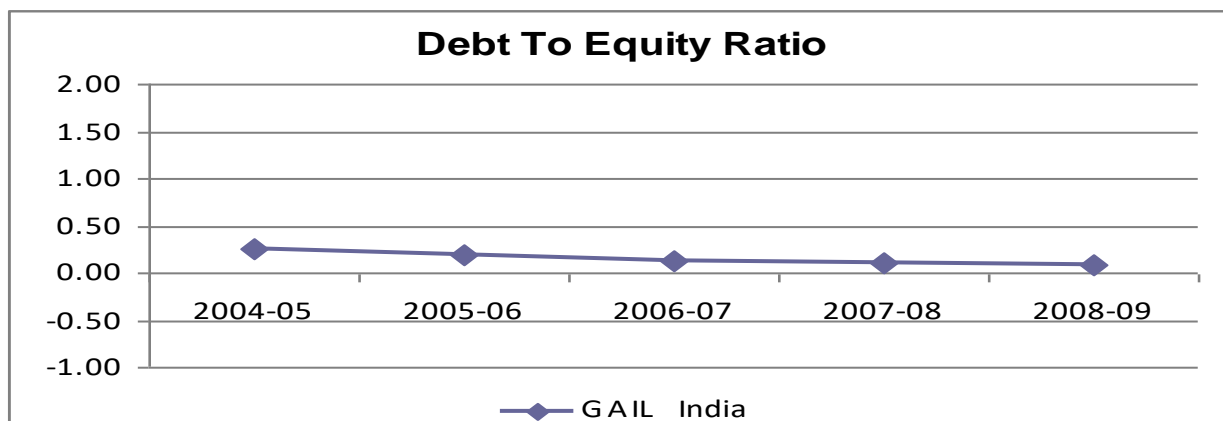


Gas Transport & Distribution

Debt-to-equity ratio (DER)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	

GAIL India	0.25	0.19	0.12	0.10	0.08	0.15
					AVERAGE	<b>0.15</b>

Debt to equity ratio of GAIL is continuously decreasing and for FY 08-09 it is 0.08



It has been observed that debt to equity ratio of upstream segment and gas transport and distribution segment is almost same and in the tune of 0.01 to 0.15 and better than the Down Stream (Refining, Marketing & Pipelines) segment.

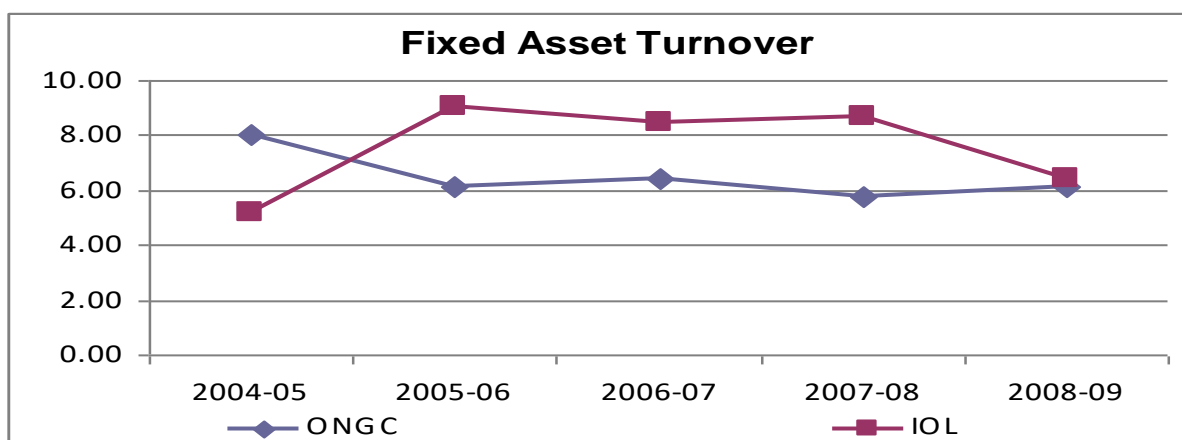
**G. Activity Ratio**

**Fixed asset Turn over**

Up Stream (Exploration & Production)

Fixed asset Turn over						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	8.00	6.15	6.44	5.73	6.16	6.50
IOL	5.17	9.07	8.46	8.65	6.39	7.55
					AVERAGE	<b>7.02</b>

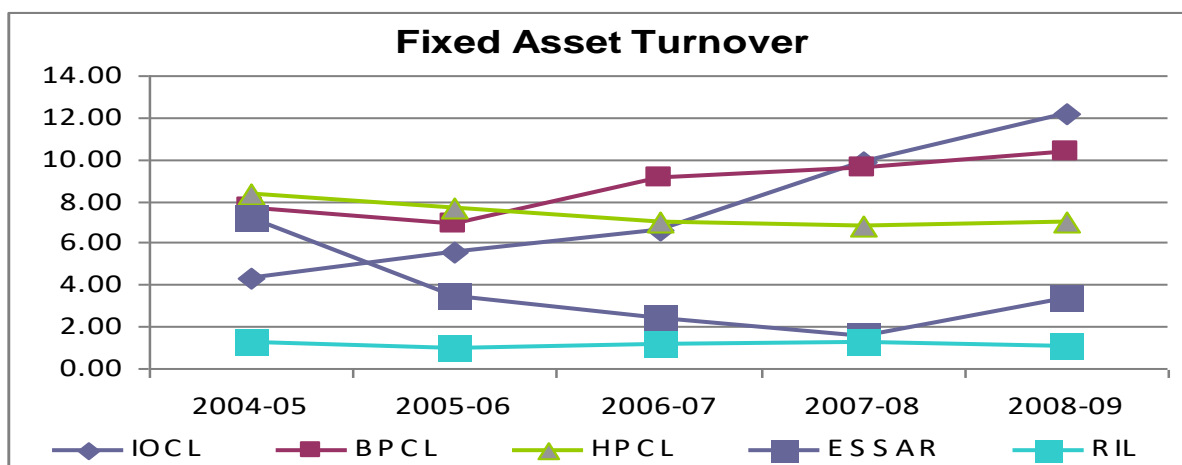
Fixed asset turn over for upstream companies are in range of 5- 7, which is quite good.



Down Stream (Refining, Marketing & Pipelines)

Fixed asset Turn over						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
IOCL	4.33	5.59	6.62	9.89	12.20	7.73
BPCL	7.65	6.95	9.08	9.55	10.38	8.72
HPCL	8.37	7.63	7.00	6.81	6.99	7.36
ESSAR	7.21	3.45	2.41	1.52	3.32	3.58
RIL	1.2	0.95	1.13	1.29	1.01	1.12
				AVERAGE		<b>5.70</b>

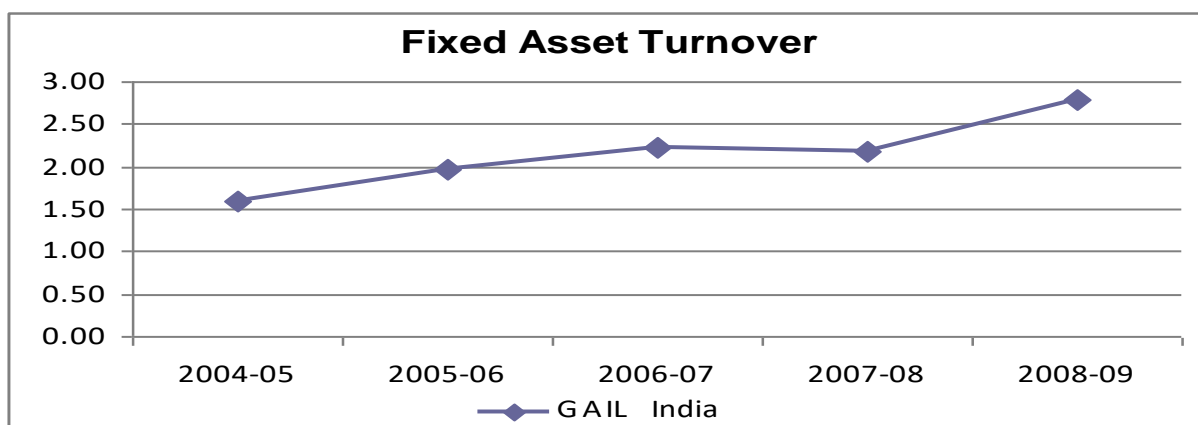
Fixed asset turn over for downstream companies is varying significantly among themselves. For IOC it is highest among others for FY08 to FY09, while for RIL it is smallest.



#### Gas Transport & Distribution

Fixed asset Turn over						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
GAIL India	1.59	1.97	2.22	2.18	2.79	2.15
				AVERAGE		<b>2.15</b>

Fixed asset turn over is continuously improving for GAIL



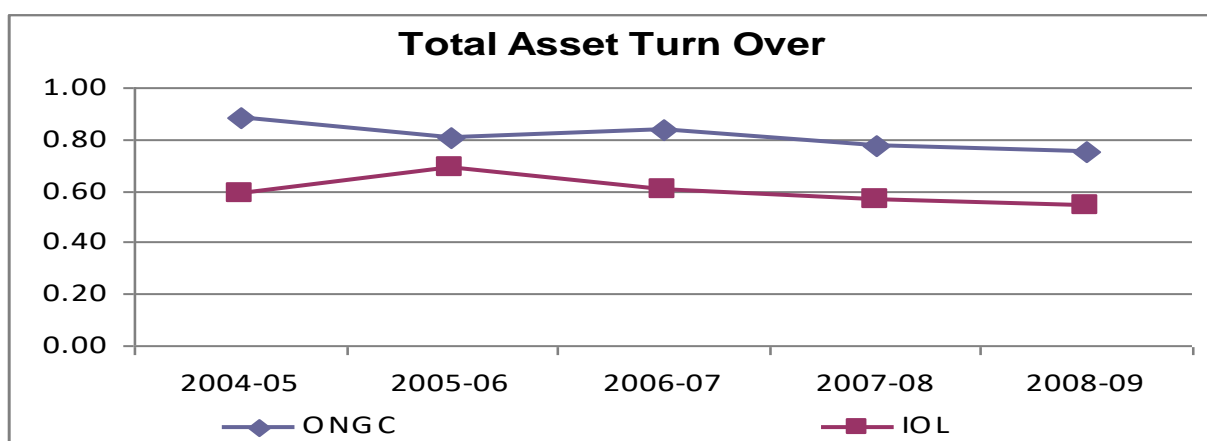
It has been observed that fixed asset turnover of upstream segment and down stream segment is better than gas distribution company i.e. GAIL.

**Total asset turn over (TAT)**

Up Stream (Exploration & Production)

Total asset turn over (TAT)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	0.88	0.80	0.84	0.77	0.75	0.81
IOL	0.59	0.69	0.61	0.57	0.54	0.60
				AVERAGE		0.70

Total asset turnover for up stream companies are less than 1.



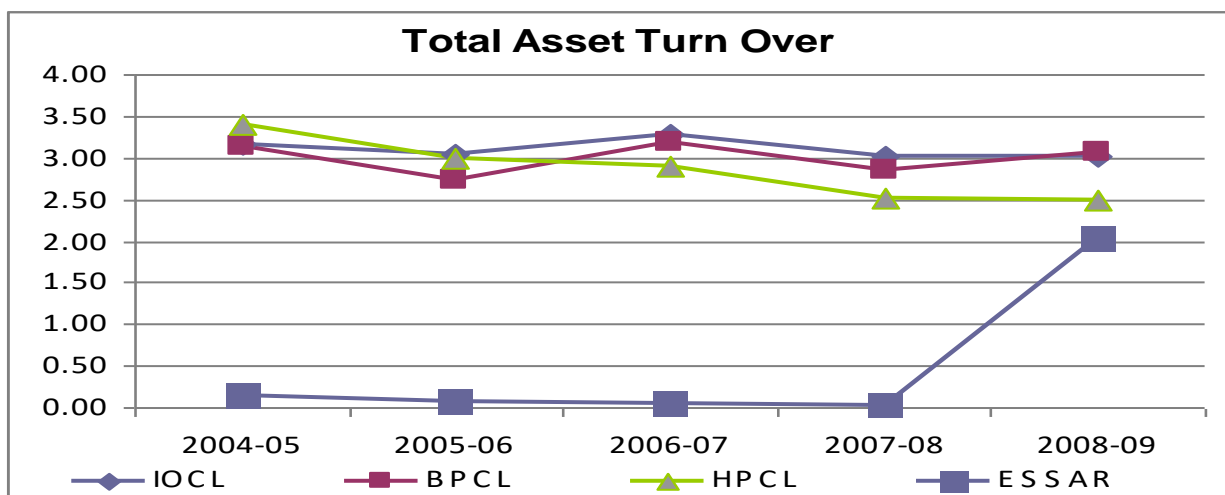
Down Stream (Refining, Marketing & Pipelines)

Total asset turn over (TAT)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
BPCL	3.13	2.72	3.18	2.85	3.07	2.99



HPCL	3.41	2.99	2.89	2.51	2.49	2.86
ESSAR	0.14	0.07	0.04	0.03	2.04	0.46
					<b>AVERAGE</b>	<b>2.36</b>

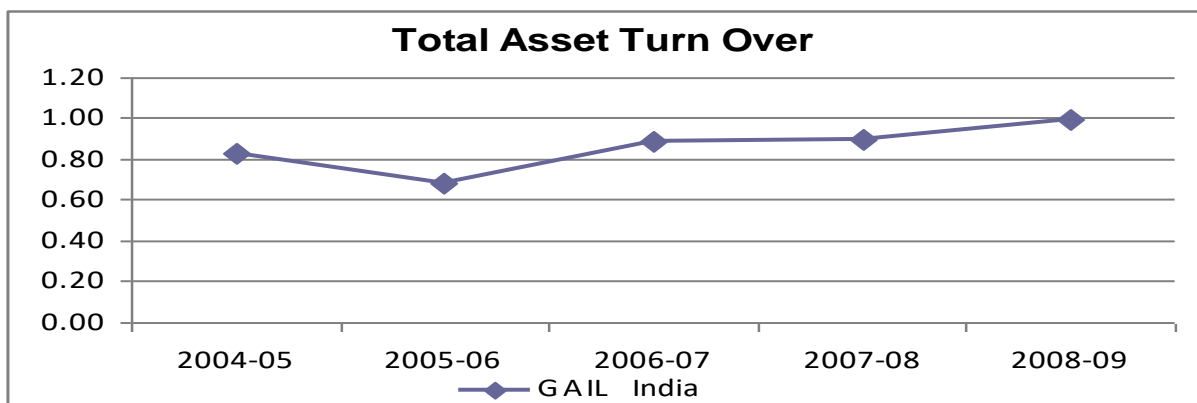
Total asset turnover for down stream companies above 2.0. For IOC is it highest among others, while for ESSAR it is lowest.



Gas Transport & Distribution

Total asset turn over (TAT)						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
GAIL India	0.83	0.68	0.89	0.90	0.99	0.86
				AVERAGE		<b>0.86</b>

Total asset turnover for gas Distribution Company i.e. GAIL is less than 1.



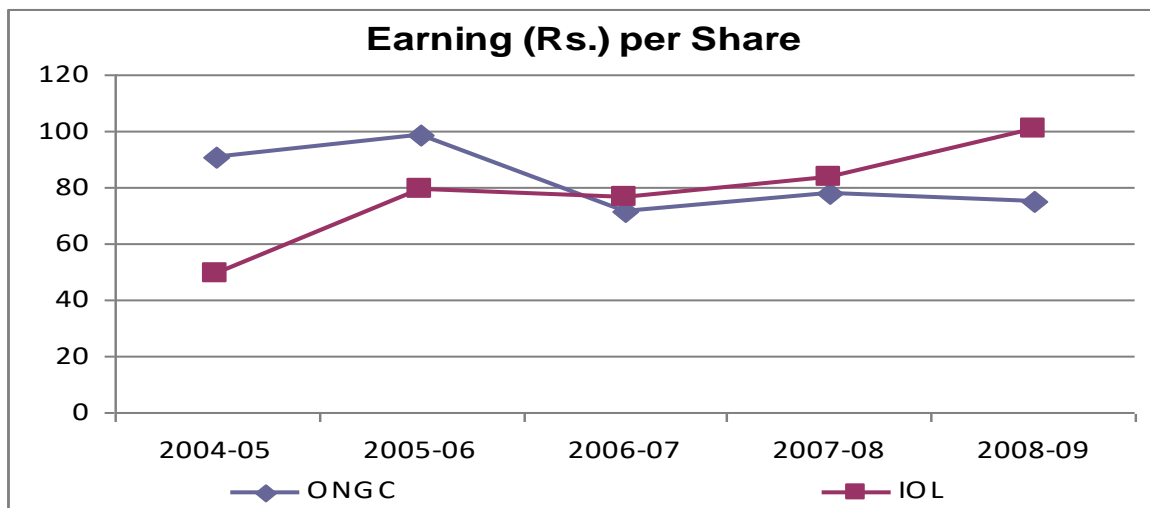
Total asset turnover for up steam and gas Distribution Company i.e. GAIL is less than 1, while for down stream companies it is around 2-3.

### Earning per share

#### Up Stream (Exploration & Production)

Earning per share						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
ONGC	91.05	98.22	71.66	78.09	75.19	82.84
IOL	49.61	78.97	76.63	83.59	101.01	77.96
				<b>AVERAGE</b>		<b>80.40</b>

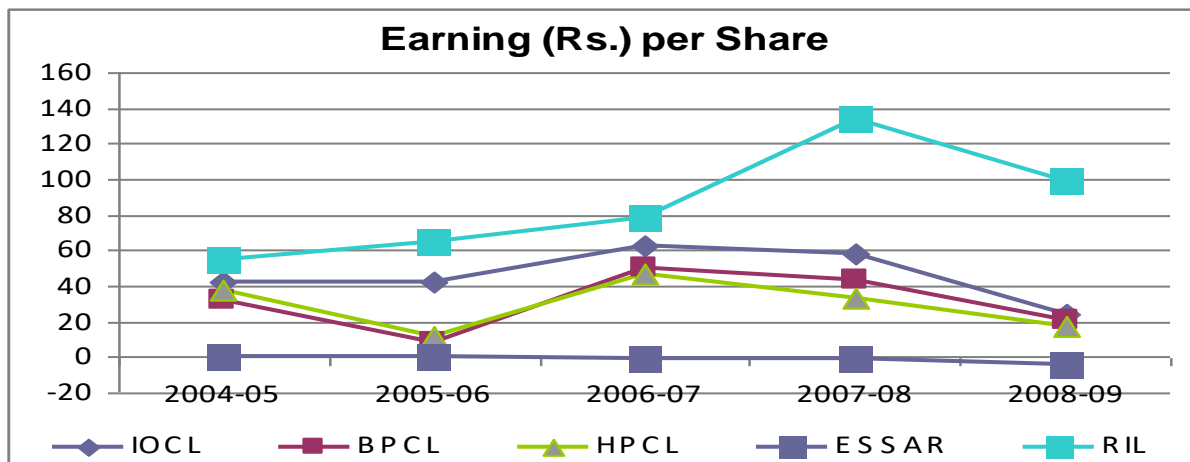
EPS for IOL is continuously increasing and higher than ONGC from from FY07



#### Down Stream (Refining, Marketing & Pipelines)

Earning per share						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
IOCL	41.88	42.08	62.9	58.39	24.3	45.91
BPCL	32.19	8.07	49.94	43.72	20.35	30.85
HPCL	37.69	11.97	46.97	33.51	16.98	29.42
ESSAR	0.28	0.89	-0.61	-0.36	-4.3	-0.82
RIL	54.32	65.06	78.25	133.82	99.35	
				<b>AVERAGE</b>		<b>26.34</b>

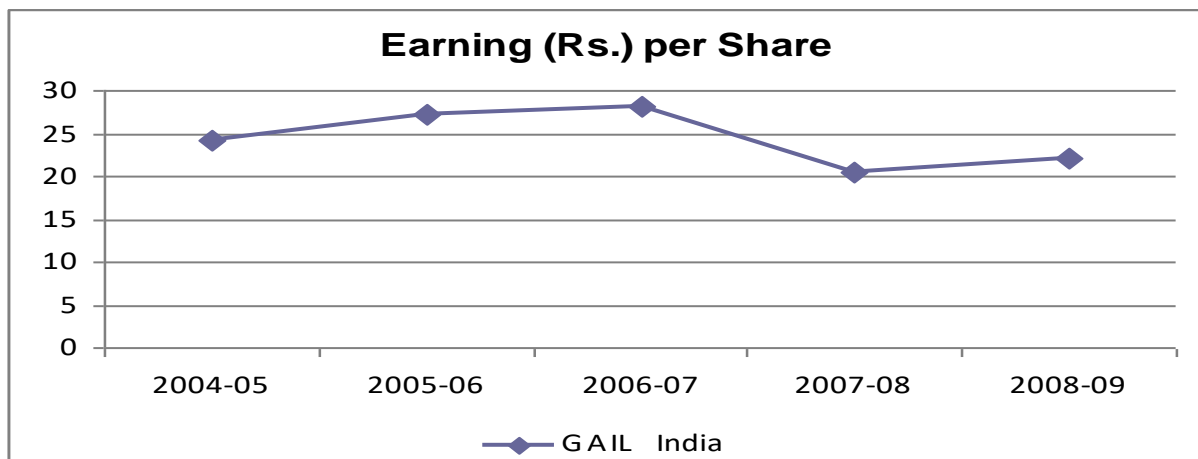
EPS for RIL is continuously increasing and highest than any other PSU of same segment. Other Pvt player among the segment is poor in terms of EPS



Gas Transport & Distribution

Earning per share						AVERAGE
	2004-05	2005-06	2006-07	2007-08	2008-09	
GAIL India	24.11	27.32	28.22	20.51	22.1	24.45
				AVERAGE		<b>24.45</b>

EPS for GAIL is tune of Rs. 20-28



EPS for up stream companies are better than other two segment of companies.