EXECUTIVE SUMMARY

Captive power Plants are developed to cater the industrial demand in the scenario where the electricity supplied by the utilities is short in supply or is of bad quality. Captive plants over the years have been evolved from plants owned by single promoter to group captive to the medium of maximizing the benefit by selling its surplus power.

Apart from the mentioned benefits, other ones are associated with the option of selling the surplus power through the power exchanges, depending upon the technology used claiming the incentives under clean development mechanism (CDM), earning energy efficiency certificates, and renewable energy certificates. Although the trading of these certificates is currently not in practice in India but very soon this is to be adopted in Indian power markets.

On the other hand the Government is also making a conscious attempt to encourage captive generation by earmarking the coal blocks to be dedicatedly used by these plants. Captive generator has a number of fuel options today. The choice could be between oil, natural gas, naphtha, biogas or coal. Availability of open access is the major issues related to the strengthening of intra state and inter-state transmission network, reasonable tariff and availability of additional fuel required by captive power plants.

This report consists of detailed study of regulatory framework for Captive power plants in India as well as in the state Orissa by intensive study of the existing provisions in the Electricity Act 2003, National Electricity Policy, Captive Power Policy, and National Tariff Policy, Also the various ways that how VAL can sell its surplus power.

OBJECTIVES

(1) To study in detail the Captive Power Scenario in India including legal regulations, policies & further prospects .

(2) To study in detail the Captive Power Scenario in the state Orissa including legal regulations, policies & further prospects .

(3) To study how economically VAL can harness its surplus potential .

SIGNIFICANCE OF THE STUDY

Electricity Act - 2003 has made the generation free from licensing and invited the private players to participate in Indian Power Sector. In view rising Tariffs of SEBs/utilities & unreliability of power supply captive generation is becoming more & more feasible & attractive proposition for large HT & EHT consumers. The study has an objective significance of exploring the type of industry most extensively using or likely to use the captive power plants rather than rely on grid power supply. It also covers the benefits associated with the usage of captive power plant.

LITERATURE REVIEW

Price Water House Coopers made a report on Infrastructure development action plan for Chhattisgarh in which captive scenario in India was mentioned. The report mentioned that industrial sector is one of the largest consumers of electrical energy in India. However, a number of industries are now increasingly relying on their own generation (captive and cogeneration) rather than on grid supply, primarily for the following reasons: non-availability of adequate grid supply, poor quality and reliability of grid supply and high tariff as a result of cross subsidization. The captive power plant owners have some concerns regarding tariff structure for surplus power sold to the grid, no risk sharing in case of non-availability of fuel, need to devote time and energy to an activity, which is not their core business. The growing importance of captive power plants have also affected SEBs like there is an adverse impact finances of the utilities, loss of HT consumer.

While the research which is conducted by Bureau of Research on Industry and Economic Fundamentals (BRIEF) ,where data in the report paints a rather grim picture of the current scenario in the power sector, the survey results show a different view. Where the data suggest that India Inc may be negatively impacted by the power situation of the country, it was surprising to discover that other than an increase in costs mainly that in fuel, there was minimal impact of power failures and outages on the various businesses. It revealed that the business owners across the country have adapted rather well, by installing back up or captive units negated the impact on operations, production and various other processes of their enterprises. The original premise that power failures, especially the larger 'black outs', were seriously negatively impacting Indian business, may not hold true after all.

POWER SCENARIO IN INDIA

ABSTRACT

Since the industrial revolution, power has become the most basic element required for any function in an economy. Each segment of modern society is dependent heavily on power, from domestic, agriculture and industrial to service and governmental operations, all require electricity and energy to function, without which the world, regardless of a specific sector, would come to a standstill and India is no exception to the rule. With a growing population, especially that in urban areas, this new industrializing country (NIC) has increasing demands of electricity and power production. India currently ranks at fifth in the global scale in terms of the power sector. With an installed capacity of 225 GW, India is falling short to meet the demands of a rapidly growing economy and population. This excessive demand has put a strain on the power production facilities; especially as India's power production is derived primarily from conventional sources such as thermal generation or hydroelectric.

The strain on the current production facilities was recently evident by the failure of the Northern and Eastern grids, effectively halting two fifths of the country. These failures put cities such as Delhi on a standstill, not supplying electricity for almost two consecutive days. With the innovation of captive power generation units and power back-ups, the Indian economy did not shut down completely, but the affect of such a power failure were felt across segments and sectors throughout the country, most notably in the industrial sector.

POWER SECTOR OVERVIEW

India's power sector is one of the more ignored sectors in the Indian economy. While there has been some investment and calls for increase in capacity, a third of Indian citizens, especially in the rural parts of the country remains without power, as does 6% of the urban population.

India suffers from an acute shortage of electricity and power, even after being the fourth largest consumer of electricity and power in the world, following USA, China and Russia. According to the International Energy Agency (IEA), India requires a further US $ 135 billion in investment for the power sector. The shortages translate into massive power cuts and intermittent supply issues, which in turn affect all segments of the Indian economy. The exponentially growing population of the country is creating more pressures on the power sector.

Wherein countries like the United States and China, the per capita consumption of power stands at 11,919 KWh and 2559 KWh respectively, in India, with a population of 900 million (1.2 billion minus 300 million without power), the per capita consumption stands at 879.22 KWh.

The power sector of India has been scrutinized immensely in the past but no study has captured the impact the shortages and power cuts have on the Indian industry. Data and research collected shows a grim vision of the current situation of the Indian power sector. It is evident that, while supply of power and electricity in the country is increasing, it is not meeting current demands, let alone future demands. At current, the Indian power sector has an installed capacity of 225 GW, comprising of 68 percent from thermal, 2.1 percent from nuclear, 17.6 percent from hydro and 12.2 percent from renewable and alternate sources. While thermal power remains the highest source of power, hydro is becoming a major player as well. Nuclear power is still untapped as countries like France and Ukraine derive more than 77 percent and 46 percent of power from nuclear sources.

During the year 2012-13, though the total ex-bus energy availability increased by 6.2% over the previous year and the peak met increased by 6.1%, the shortage conditions prevailed in the Country both in terms of energy and peaking availability as given below:-

	ENERGY (MU)	**PEAK (MW)**
REQUIREMENT	998,114	135,453
AVAILABILITY	911,209	123,294
SHORTAGE	86,905	12,159
PERCENTAGE	8.7	9.0

India’s demand has been growing at a steady annually for the last 30 years and is projected to continue growing at faster rates until investment and capacity cannot be increased. Western and Northern regions of India remain the highest consuming and demanding regions in the country with the southern region demand holding not too far behind. The only area to show a significantly smaller demand is the Eastern region, owing to the fact that industry is predominantly situated in the three other parts of the country, as is population.

According to research data available from various sources, the problems in the power sector or power shortages apart from the obvious shortage in supply result from issues like:-

(1) High Aggregate Technical and Commercial losses (AT&C losses)

(2) Poor financial health of DISCOMs

(3) Shortage of fuel

(4) Low plant load factor

Five national grids manage the country's power supply. These grids maintained by the center are the primary sources of electricity in the country. The five grids, Northern, Western, Southern, Eastern and North Eastern, are spread across the country and cater mainly to their own region. Some grids are connected to each other and may occasionally share the load. For example, the Northern, Eastern, Northeastern and Western grids are interconnected to cater to the many spikes in demands during peak periods. The Southern grid remains isolated and thus is less prone to power shortages and failures.

This burgeoning demand with shortage in supply is one of the reasons behind intermittent power cuts across India. There have been two instances of major cuts in the country. Both major cuts have occurred in the Northern power grids. The first of these major breakdowns occurred on January 2nd, 2001 and resulted in the effective halting of most of the northern states. It was estimated that in the duration of this 'black out' the Indian industry lost close to Rs. 2-2.5 billion. The second, more recent black out occurred on 30th July 2012. This black out further expanded to the Eastern and North Eastern grids on the 31st of July 2012, resulting in 22 states and union territories being out of electricity for a number of hours. While the blackout brought most of the nation to a standstill, halting transportation and effectively shutting down industry and services while affecting millions of people, it did not affect the southern or western parts of the country. affecting millions of people, it did not affect the southern or western parts of the country.

The results obtained from the survey done by Bureau of Research on Industry and Economic Fundamentals (BRIEF) surprisingly discover that other than an increase in costs mainly that in fuel, there was minimal impact of power failures and outages on the various businesses. It revealed that the business owners across the country have adapted rather well, by

installing back up or **captive units** negated the impact on operations, production and various other processes of their enterprises. The original premise that power failures, especially the larger 'black outs', were seriously negatively impacting Indian business, may not hold true after all.

KEY FINDINGS

As per sector wise average monthly electricity consumption, approximately 17 percent consume less than 10000 KWh, 36 percent of the firms consume 10001-50000 KWh monthly , 50001-100000 KWh per month is consumed by 18 percent ,25 percent of firms consume between 100001-500000 KWh, while. Only 4 percent show average monthly consumption of above 500000 KWh. This depended upon the size of the firms and the degree to which their production process relied on electricity.

To maximize output and production, 39 percent of companies require 10001-50000 KWh monthly, 26 percent require 100001-500000 KWh and 6 percent require above 500000 KWh. Only 11 percent of companies mainly in the ceramics/glass sector require less than 10000 KWh per month. The remaining 18 percent require 50001-100000 KWh monthly. This was again determined by their scale and intensity of operations.

Average cost of electricity from the government sources in the country ranges between Rs 5 to Rs 8.50. ORISSA and Delhi show lowest prices of electricity per unit, while Maharashtra, Jharkhand and West Bengal are the higher prices in the range.

Majority of the firms (54%) spend Rs. 1.01-10 Lakhs on their monthly electricity consumption. Only 12 percent of the firms incur monthly electricity cost of above Rs. 25 lakhs while 22 percent spend less than Rs. 1 Lakh a month. The remaining share (12 percent) of the sample frame spends Rs. 10.01-25 Lakhs per month on electricity consumption.

The analysis of duration of power cuts faced by industry reveals that approximately 37 percent of firms face less than 1 hour of power shortage in a week and at the same time 5 percent suffer 21-30 hours per week and 21 percent suffer more than 30 hours per week. 16 percent face 6-10 hours per week, while 15 percent face between 1-5 hours weekly . This is due to their location primarily. The location wise analysis revealed that while majority of the

industries in Tamil Nadu and Andhra Pradesh suffer power shortage of more than 30 hours a week, majority of the industries in states like Gujarat, Maharashtra and Karnataka face power shortage of less than 1 hour a week .

The survey revealed 54% of companies, primarily from ORISSA, Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra, were aware in advance of the load-shedding schedule while the remaining 46 percent were unaware of such load shedding schedule of their DISCOM. As measures to manage operations during power cuts, highest mean ranking was secured by immediately running power back ups, followed by switching off air conditioner and using green technology in office . But 61 percent of the firms suffer above 10 percent shortfall in production due to power cuts. 13 percent suffer 2-5 percent shortfall in production, 12 percent suffer 6-10 percent and only 14 percent, mainly in Gujarat, Karnataka and Maharashtra, suffer less than 2 percent production losses. More specifically, companies in Gujarat incur such low losses due to the fact that power shortages in Gujarat are negligible. Companies in Karnataka tend to be in the IT enabled services sector which is not as power intensive as Iron and Steel, Aluminums etc. and hence suffer less shortfall in production when compared to those electricity intensive sectors. It was observed from the survey, that Maharashtra, which as a mix of both IT and manufacturing companies, like Gujarat, does not suffer as acutely by power shortages as some of the other states around the country .

To evade shortfall in production, companies use power back up units, which ultimately increase their cost of production/operations. 61 percent of the firms suffer above 10 percent cost escalation due to power cuts. The highest cost escalation was observed in Andhra Pradesh, Tamil Nadu and ORISSA where cost escalation even extended beyond 30 percent for few firms. With a smaller supply capacity and increasing demands on power, coupled with high costs of captive power facilities, these three states tend to not only pay higher in terms of regular supply but also for back-up facilities. Only 13 percent, mainly in Gujarat, Karnataka and Maharashtra, suffer less than 2 percent cost escalation. The other cost escalation categories of 2-5 percent and 6-10 percent were constituted by 14 percent and 12 percent of the total studied companies.

The revenue losses (due to costs incurred to mitigate any problems arising from power outages including use of power back-up facilities) range between less than Rs. 1000 to above Rs 40000 per day. Even small and medium firms incur losses above Rs. 40000 per day, mainly in states like Andhra Pradesh, Tamil Nadu and ORISSA. In states like Gujarat, Karnataka and Maharashtra, the majority lose less than Rs. 1000 per day.

The comparison of losses due to planned and unplanned power cuts for states like Andhra Pradesh, Tamil Nadu and ORISSA revealed that losses due to planned power cuts were much lower as compared to losses due to unplanned power cuts. Losses due to voltage fluctuations were as low as Rs. 1000 (per day) for states like Karnataka and Maharashtra and as high as Rs. 40000 (per day) for Andhra Pradesh, Tamil Nadu and ORISSA. In Gujarat and Delhi NCR, no voltage fluctuations were observed.

As per state wise analysis that in Andhra Pradesh, Tamil Nadu and ORISSA more than 85 percent of the firms were willing to pay an additional amount to avail an uninterrupted power supply. In Jharkhand, Madhya Pradesh and West Bengal, more than 70 percent of the firms were willing to pay an extra amount for quality power supply, while in Gujarat; only 9 percent were willing to do so.

INTRODUCTION

Overview **(GENERATION)**

India's power sector is the fifth largest in the world. It had an installed capacity of 225133.10 MW (as on may 13) comprising of 153187.99 MW thermal, 4780 MW nuclear, 39623.40 MW hydro and 27541.71 MW renewable (CEA)(TILL MAY 13).

However, owing to India's growing industrialization, the generation from power utilities has always been unable to keep pace with the rapidly growing demand. Hence, a large number of captive plants have been set up by industries to ensure reliable and quality power supply. As per Central Electricity Authority, Installed capacity of captive power plants increased from 21,468 MW in 2005-06 to **34444.12 MW** (Till 31-3-2011) and the energy generation grew from 697,459 GWh during 2005-06 to a significant 911,209 GWh during 2012-13.

Earlier, surplus power from **captive plants** could not be used to cater to the overall system demand but with the introduction of the electricity act 2003, surplus power, if any, can be fed into the grid and used for serving the nation. Studies have inferred that encouraging growth of captive power in India can add the much-needed capacity, while increasing competition in the power market. Over the years, the share of state sector in installed capacity has gone down but it continues to be the largest owner with 42% share in 2011-12 and the share of private sector has been continuously increasing since 2007-08.

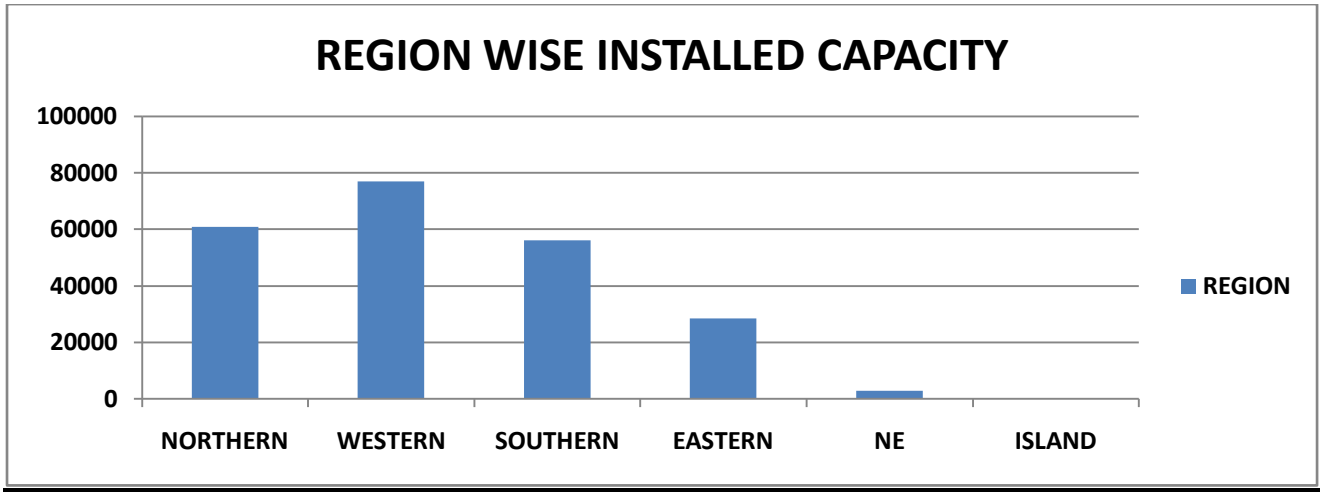
The majority of India's electricity production is derived from thermal power generation. Thermal power generation currently holds 68% of total energy production in the country. Hydroelectric power is generated through the energy of falling water. As per assessment made by Central Electricity Authority, India is endowed with economically exploitable and viable hydro electric potential to the tune of 1,48,700 MW and hence ranks fifth in terms of exploitable hydro electric potential when considered globally. Till date it contribute only 18% of the total power generation. Hydro power in total electricity generation is just 11.9% whereas for Brazil it is as high as 78.2%. Russia and china are also ahead of India, their hydro power contribution being 16.2% and 17.2% of total electricity generation respectively. At current levels, India is the 15th largest nuclear power producer with 1.2% of worldwide nuclear power generation. However, its contribution to domestic power generation is modest at best. In 2012, it provided

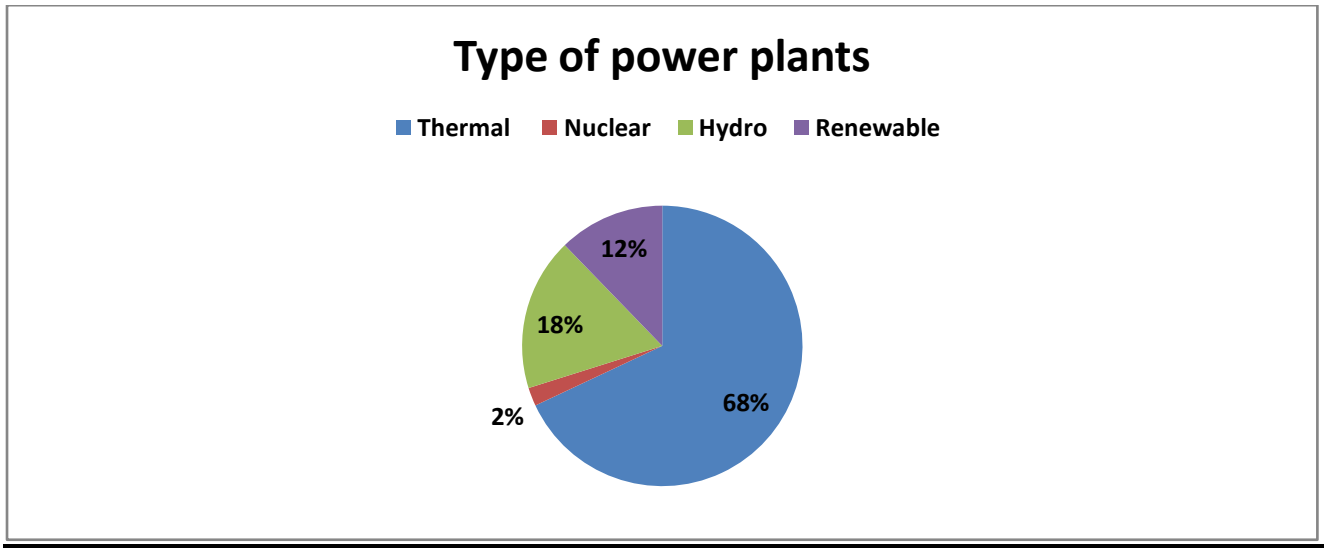
only 3.7% of the country's total electricity generation whereas in other countries like France, Ukraine and U.S the contribution of nuclear power to power generation was 77%, 46.7% and 19.3% respectively.

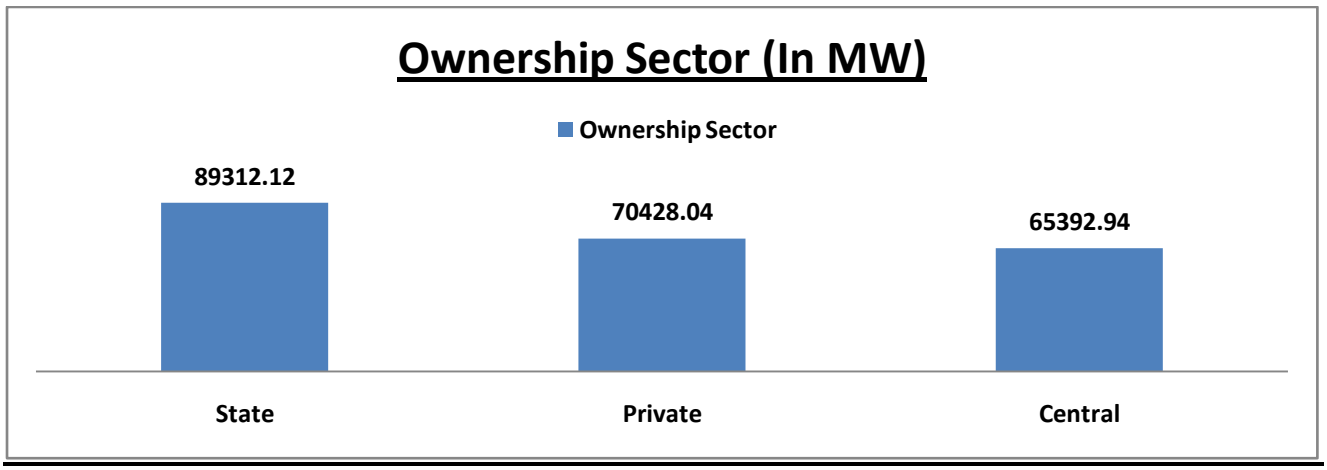
India's substantial and sustained economic growth, coupled with rapid industrialization and population growth is placing immense pressure on the country's non renewable natural resources (fossil fuels and nuclear fuels) and increasing India's dependence on imported fuels. So to meet the growing demand & to avoid the depletion in fossil fuel thus the government has thus realized the importance of exploring alternate sources of energy, particularly, renewable energy sources, for addressing the growing demand for electricity. Wind power is the largest renewable source used in India. By August 2012, the total exploited potential of wind energy was 17967.15 MW. Apart from wind power, other renewable sources used for electricity generation are small hydro, biomass and solar.

REGION	**THERMAL**	**NUCLEAR**	**HYDRO**	**RENEWABLE**	**TOTAL(MW)**
NORTHERN	38117.75	1620.00	15467.7	5589.25	**60794.75**
WESTERN	58590.30	1840.00	7447.50	8986.93	**76864.73**
SOUTHERN	31084.60	1320.0	11353.03	12251.85	**56009.48**
EASTERN	23935.0	0.00	4113.12	454.91	**28503.11**
NE	1390.24	0.00	1242.00	252.68	**2884.92**
ISLAND	70.02	0.00	0.00	6.10	**76.12**
ALL INDIA	**153187.99**	**4780.00**	**39623.40**	**27541**	**225133.10**

ALL INDIA	**Ownership Sector**	**Thermal**	**Nuclear**	**Hydro**	**Renewable**	**Grand Total**
	State	58126.93	0.00	27437.00	3748.19	**89312.12**
	Private	43940.52	0.00	2694.00	23793.52	**70428.04**
	Central	51120.54	4780.00	9492.40	0.00	**65392.94**
	Total	**153187.99**	**4780.00**	**39623.40**	**27541.71**	**225133.10**


REGION WISE INSTALLED CAPACITY
100000
80000
60000
40000
20000
0
NORTHERN
WESTERN
SOUTHERN
EASTERN
NE
ISLAND
REGION


Type of power plants
Thermal
Nuclear
Hydro
Renewable
12%
18%
2%
68%

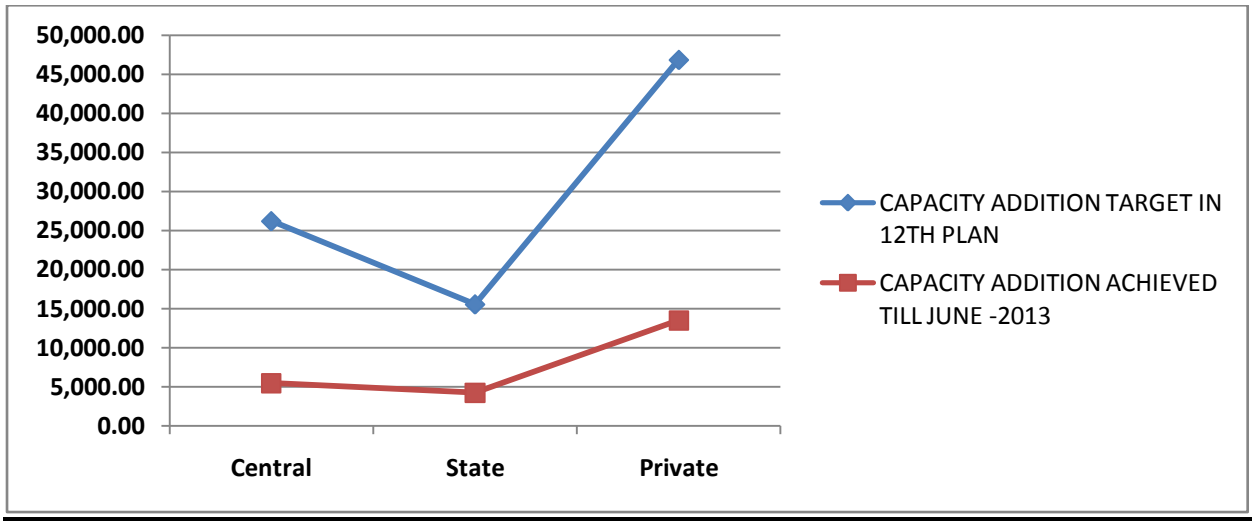

Ownership Sector (In MW)
Ownership Sector
89312.12
70428.04
65392.94
State
Private
Central

CAPACITY ADDITION TARGET & ACHIEVEMENT IN 12TH PLAN

Type/Sector	Central	State	Private	Total
Thermal	14,878.00	13,922.00	43,540.00	**72,340.00**
Hydro	6,004.00	1,608.00	3,285.00	**10,897.00**
Nuclear	5,300.00	0.00	0.00	**5,300.00**
Total	**26,182.00**	**15,530.00**	**46,825.00**	**88,537.00**

CAPACITY ADDITION ACHIEVED TILL JUNE -2013

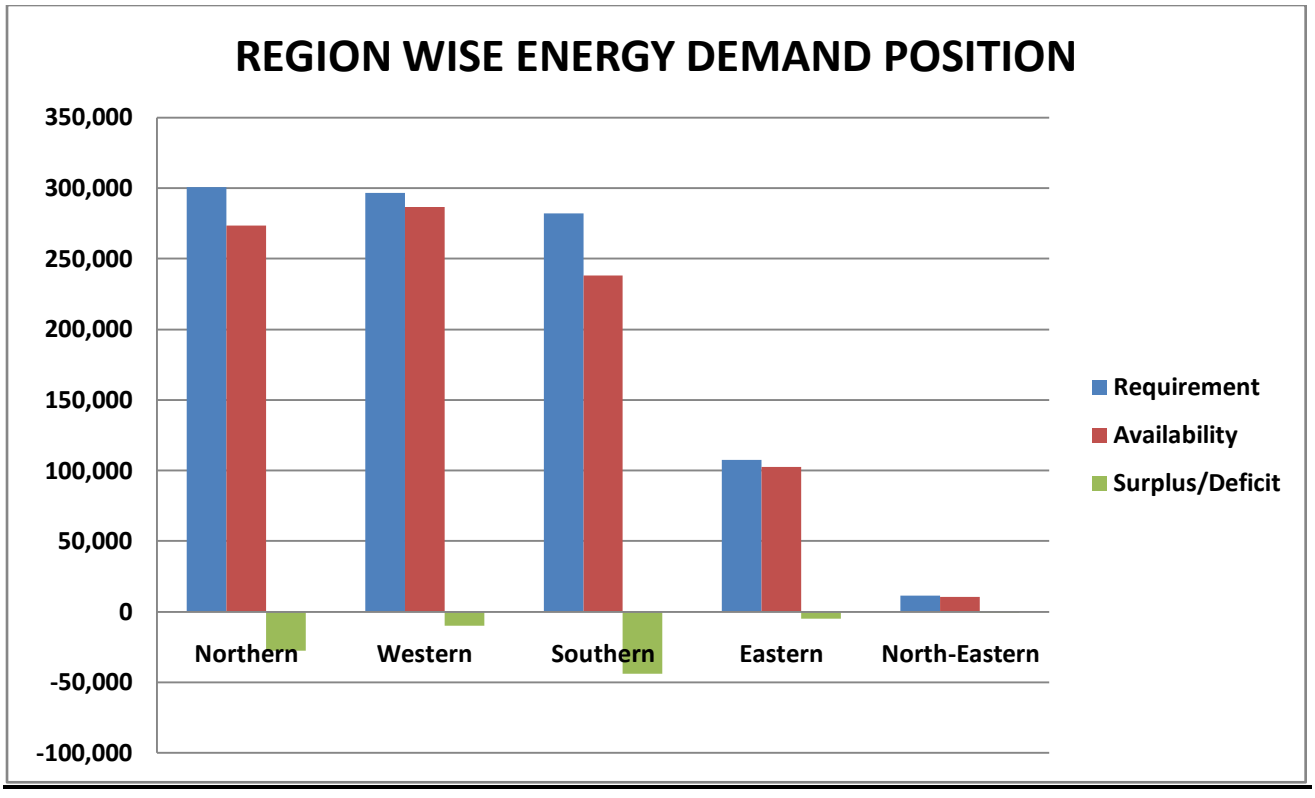
Type/Sector	Central	State	Private	Total
Thermal	5,023.30	4,161.00	13,317.50	**22,501.80**
Hydro	407.00	57.00	169.00	**633.00**
Nuclear	0.00	0.00	0.00	**0.00**
Total	**5,430.30**	**4,218.00**	**13,486.50**	**23,134.80**
Acievement %	**20.74**	**27.16**	**28.80**	**26.13**



The major hurdles in capacity addition are Land & Environmental clearances, Timely Procurement of BTG & BOP equipments, Improper project planning & execution, lack of fund availability etc.

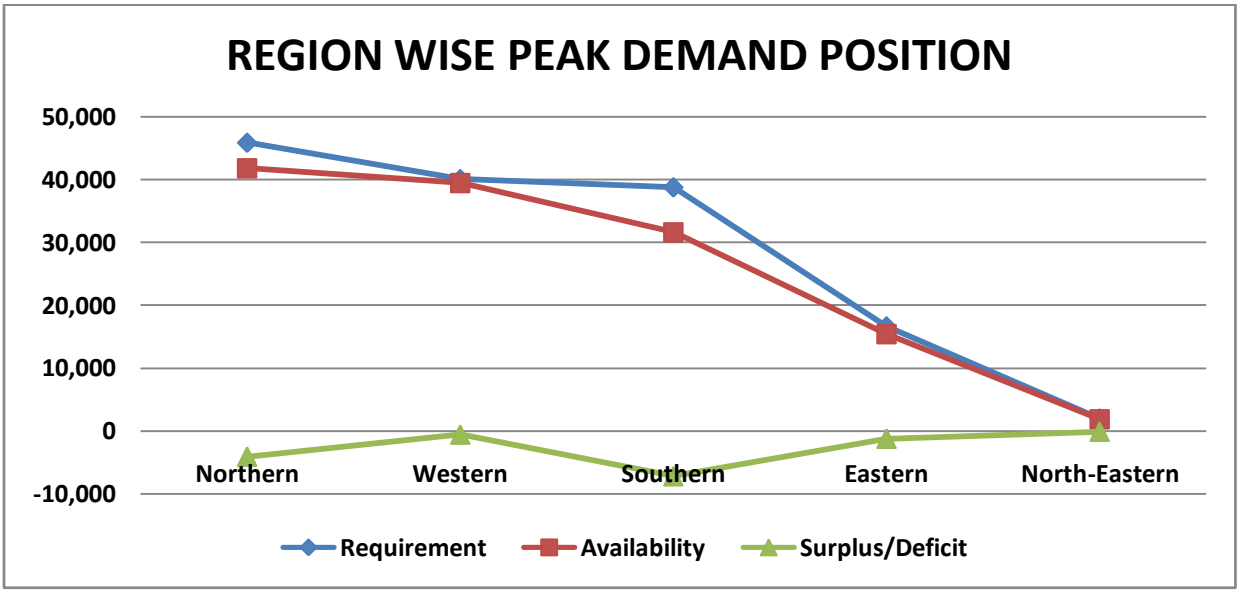
REGION WISE ENERGY NEED POSITION (2012-13)

REGION	Requirement	Availability	Surplus/Deficit	Surplus/Deficit
	MU	MU	MU	%
Northern	300,774	273,240	-27,534	-9.2
Western	296,475	286,683	-9,792	-3.3
Southern	281,842	238,058	-43,784	-15.5
Eastern	107,457	102,510	-4947	-4.6
North-Eastern	11,566	10,718	-848	-7.3



REGION WISE PEAK DEMAND POSITION (2012-13)

REGION	Requirement	Availability	Surplus/Deficit	Surplus/Deficit
	MW	MW	MW	%
Northern	45,860	41,790	-4,070	-8.9
Western	40,075	39,486	-589	-1.5
Southern	38,767	31,586	-7,181	-18.5
Eastern	16,655	15,415	-1,240	-7.4
North-Eastern	1,998	1,864	-134	-6.7



It may be seen that in the **Northern Region** Chandigarh, Delhi and Himachal Pradesh faced negligible energy shortage. Rajasthan, Haryana, Punjab and Uttarakhand experienced energy shortages in the range of 3-8% whereas the shortage in Uttar Pradesh was 16.6%. The maximum energy shortage in Northern Region was in Jammu & Kashmir and was 25%.

In the **Western Region**, Gujarat was faced negligible energy shortage. Dadra & Nagar Haveli, Chhattisgarh, Maharashtra and Goa were faced energy shortage in the range of 1-4%. Daman & Diu faced energy shortage of 6.6% whereas the maximum energy shortage in Western Region was in Madhya Pradesh and was 9.6%.

In the **Southern Region**, Kerala and Pondicherry faced energy shortages in the range of 1-4% whereas the shortage in Karnataka was 13.9%. The energy shortage in the Tamil Nadu was 17.5% and the maximum energy shortage in Southern Region was in Andhra Pradesh and was 17.6%.

In **Eastern Region**, West Bengal faced negligible energy shortage and DVC, ORISSA and Jharkhand faced energy shortages in the range of 3-6%. The maximum energy shortage of 16.7% was faced by Bihar.

In the **North-Eastern Region**, Assam, Manipur, Tripura and Nagaland faced energy shortages in the range of 5-7%. The maximum energy shortage in North-Eastern Region was in Meghalaya at 12.1%. The shortages witnessed were partly on account of constraints in transmission, sub-transmission & distribution system and/ or financial constraints.

It may also be seen that the Northern, Western, Southern, Eastern and North Eastern Regions faced peaking shortage of 8.9%, 1.5%, 18.5%, 7.4% and 6.7% respectively.

Inter-Regional Exchanges

Efforts were made for optimal utilization of the available electricity in the country by enhancing inter-regional exchanges. The total inter-regional exchange during the year 2012-13 was **44139.6 MU** which was 46.6% less than the previous year.

TRANSMISSION SECTOR

At the end of	**400 kV Transmission lines**	**220 kV Transmission lines**	**765 Kv Transmission lines**	**+/- 500 kV HVDC Lines**
12th Plan* uptoJune'13	118955 cKm	141527cKm	7576 cKm	9432 cKm

At the end of	**400 kV Sub-Stations**	**220 kV Sub-Stations**	**765 kV Sub-Stations**	**+/- 500 kV HVDC Converter**
12th Plan* uptoJune'13	169267 MVA	244484 MVA	55000 MVA	13500 MVA

(1)Present Transmission Network

The present transmission system has to meet the firm transmission needs as well as Open Access requirements. The Long term Access (LTA) gives the transmission system strengthening required for future generation additions and the Short Term Open Access (STOA) facilitates increased real time trading in electricity, utilizing the inherent margins provided for required redundancies as per planning criteria. The STOA leads to market determined generation dispatches resulting in supply at reduced prices to the distribution utilities and ultimately to the consumers. It is being managed by Various STUs, CTU(Power Grid).

(2) Transmission System Development – Issues

In order to meet growing requirement, development of strong transmission system between pit-head/resource generation complex and bulk consumption centers are required. However, development of transmission system involves following issues: -

(a) Minimization of Right of Way

(b) Protection of flora & fauna, wild life

(c) Creation of long distance high capacity transmission corridors to enable minimum cost per MW transfer as well as Optimal Transmission losses

(d) Minimal Impact on Environment.

(e) Strengthening of National Grid.

(3)Investment in Transmission

The Estimated total fund requirement for transmission by 12th Plan i.e. 2016-17 has been assessed as USD 42 Billion.(Inter-State Sector -USD 21 Billion, State Sector -USD 21 Billion).Projects are awarded through competitive bidding route. Also it can be managed by various PPP model.

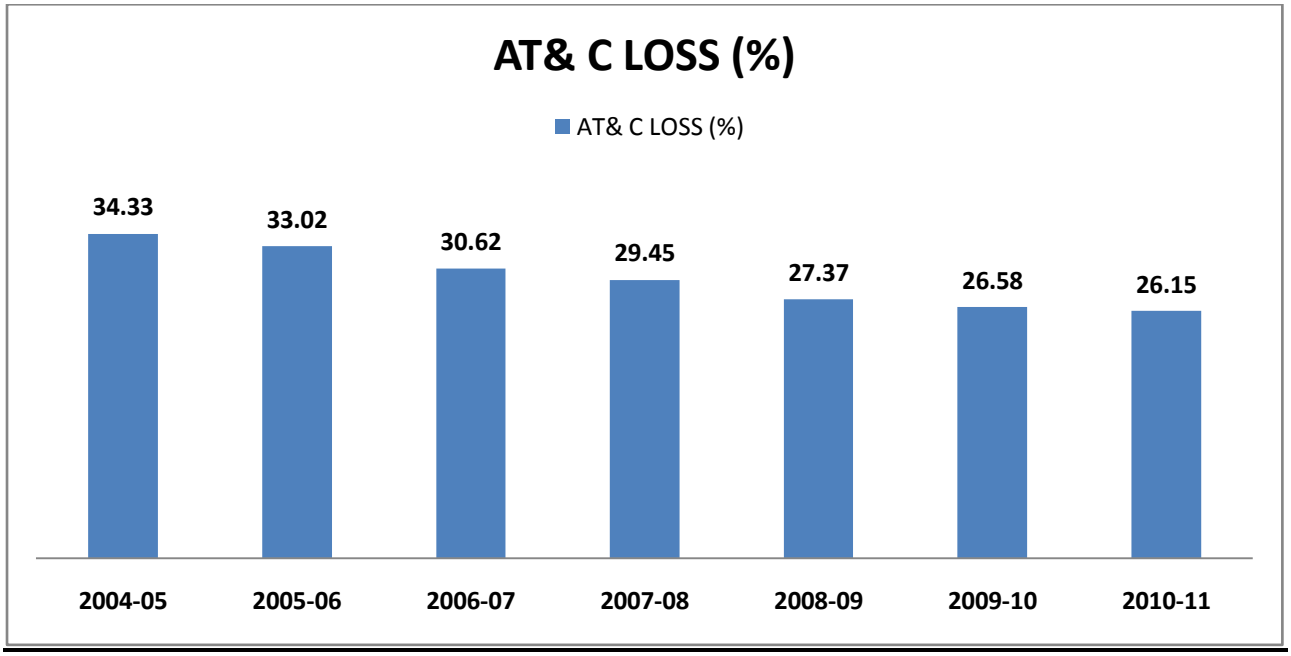
DISTRIBUTION SECTOR

Power distribution is the most crucial link of the electricity supply chain & the most weakest one of the country. It has great significance as a segment that has impact on the sector's commercial viability & ultimately the consumer's who pays for the service. The sector has distribution loss coupled with Theft, low metering levels,& poor financial health of utilities due to low cost recovery. Due to this the distribution utilities have not been able to undertaking investment in the infrastructure augmentation.

The sector has started receiving greater attention and investment with the restructuring of the state electricity boards (SEBs). Several new initiatives have been introduced to reduce aggregate technical and commercial (AT&C) losses along with a definitive regulatory framework. Electricity Act 2003, National Electricity Policy 2005 and National Tariff Policy 2006 are important regulations governing the sector today with an aim to bring competition in the sector and improve the services to the end consumers. The Govt. has also made heavy investments in the distribution sector through the Rajiv Gandhi Grameen Vidyutikaran Yojna (RGGVY) and Accelerated Power Development and Reforms Programme (APDRP) during the Tenth Plan and has continued to extend the same in the Eleventh Plan as well. The aim of these programs is to provide access of electricity to all and bring down the AT&C losses to a level of around 15% across the country. The various policies and regulations introduced by the government are set to increase competition and bring about commercial viability.

Participation of private players into the Distribution Sector has also been encouraged through various models such as Public Private Participation as in case of Delhi and Orissa and more recently through input based distribution franchisee models in Maharashtra, Madhya Pradesh and Uttar Pradesh.

YEAR	AT& C LOSS (%)
2004-05	34.33
2005-06	33.02
2006-07	30.62
2007-08	29.45
2008-09	27.37
2009-10	26.58
2010-11	26.15



Future Requirement

The government has set an ambitious target for system augmentation in the distribution segment. It plans to quadruple the distribution network by adding 3.2 million ct. km of distribution lines in the Eleventh Plan. Another 4.2 million ct. km is planned to be added in the Twelfth Plan. Thus by the end of the Twelfth Plan, the total distribution network in the country would have doubled, thus greatly facilitating delivery of power to the expanding base of end-use customers. Further, it plans to bring about 214,000 MVA of transformer capacity in the Eleventh Plan and another 270,000 MVA in the Twelfth Plan. Of these, the distribution transformers for the Eleventh and Twelfth Plans will be 128,000 MVA and 162,000 MVA respectively.

KEY DRIVERS OF THE DISTRIVUTION SECTOR

(a)Continued demand for power

(b) Distribution Reforms

(c)Supply codes and Performance Standards

(d) Growing consumer awareness

(e) Focus on IT

(f) Move towards demand side management (DSM)

(g) Environmental and social pressures

(h) Tariff rationalization

(i) Improving grid standards

STATUS OF IMPLEMENTATION OF DISTRIBUTION PROJECTS

(1)Accelerated Power Development Reforms Programme

The scheme was launched in 2002-03 as Additional Central Assistance to the States for strengthening and up-gradation of sub-Transmission and Distribution systems.50% incentives were given to SEBs / Utilities to reduce their financial losses for actual cash loss reduction.

(2) Restructured APDRP (Eleventh Plan)

The focus of recently approved Restructured APDRP (R-APDRP) in 11th Plan and beyond is on actual, demonstrable performance in terms of loss reduction. State Power Utilities are expected to reduce AT&C losses to 15%. The Utilities are also to achieve the following target of AT&C loss reduction for the Utility as a whole:-

- Utilities having AT&C loss above 30%: Reduction by 3% per year.
- Utilities having AT&C loss below 30%: Reduction by 1.5% per year.

(3)Rajiv Gandhi Grameen Vidyutikaran Yojna (RGGVY)

RGGVY aims at electrification of 125,000 un-electrified villages and un-electrified hamlets and electrification of 7.8 crore households. The estimated cost of the scheme (including 11th Plan) was Rs.16,000 crores approximately. Electrification of un-electrified Below Poverty Line (BPL) households will be financed with 100% capital subsidy as per norms of Kutir Jyoti Programme in all rural habitations. Households above poverty line will be paying for their connections at

prescribed connection charges and no subsidy will be available for this purpose. 10% of the project cost will be provided by REC as soft loan @ 5%.

(4)Recent Debt Restructuring Package

Under this plan, 50 per cent of the short-term outstanding liabilities of this distribution companies (Discoms) would be taken over by state governments. The debt will be first converted into bonds to be issued by discoms to participating lenders, duly backed by the state government's guarantee. Balance 50 per cent loans would be restructured by providing moratorium on principle and best possible terms for repayments.

According to survey done by ICRA & CARE Power distribution entities in states like Gujarat, Maharashtra, Karnataka, Madhya Pradesh, Haryana, Kerala and Chhattisgarh have been receiving the tariff related subsidies regularly from the state. In Andhra Pradesh, while distribution entities are receiving normal tariff subsidy in timely manner the expensive power related subsidy receivables have increased sharply in past few years.

However utilities in certain states like West Bengal have not received any direct revenue subsidy support from the State Governments as they are not dependent on government subsidies. As far as the unbundling/corporatization is concerned majority of states have effectively implemented the same with exception of few states such as Kerala and Jharkhand.

With increasing losses, and inadequate support from the State Govt., most of the State Distribution Utilities have been forced to increase their level of borrowings, mostly bank borrowings, beyond their sustainable limits. Banks in the past have generally relied on sovereign guarantees for taking loan exposures to the State Power Distribution utilities and have continued to increase their lending exposure sizably.

As on date a major portion of the losses of state distribution utilities are funded by bank borrowings, mostly short term borrowings. With signs of severe financial strain emerging in the distribution sector in certain states, lending institutions, especially banks had become cautious as a result of which the fund flow to the entire state power sector had been affected adversely .

KEY ISSUES

(1)AT&C losses remain woefully high though the Restructured APDRP is aiming to bring it to 15 per cent.

(2) Poor recoveries of the generated electricity.

(3) Tariffs continue to suffer from lack of commercial principles in most Cases.

(4) Investment in distribution infrastructure remains lower than desirable**.**

(5) Distribution Open Access Still in Nascent Stages due to inadequate power & high cross subsidy.

REVIEW OF LGBR FOR THE YEAR 2012-13

All India

As per LGBR, the forecast of all India energy requirements, energy availability, peak demand and peak met for the year 2012-13 were close to the actual figures. Forecast vis-à-vis actual power supply position of the country is given below:-

Power Supply Position	LGBR	Actual	Deviation (%)
Energy Requirement (MU)	985317	998114	1.3
Energy Availability (MU)	893371	911209	1.9
Peak Demand (MW)	140090	135453	-3.3
Peak Demand Met (MW)	125234	123294	-1.5

The actual requirement of energy was higher than the forecast and the energy availability was also more than the target ,The actual peak demand was less than the anticipated peak demand resulting in **higher load factor** than the anticipated.

Region wise comparison of LGBR v/s ACTUAL

Here in Variation in energy availability and peak met of the states were caused mainly because of changes in allocation from central sector projects and bilateral energy contracts of the states.

(1) **Northern Region**

Power Supply Position	LGBR	Actual	Deviation (%)
Energy Requirement (MU)	299166	300774	0.5
Energy Availability (MU)	267495	273240	2.1
Peak Demand (MW)	44953	45860	2.0
Peak Demand Met (MW)	39429	41790	5.9

The actual peak demand of the Northern Region was higher than the anticipated on account of less rainfall in the region resulting in higher demand of irrigation pumping in the region.

(2)Western Region

Power Supply Position	LGBR	Actual	Deviation (%)
Energy Requirement (MU)	285541	296475	3.8
Energy Availability (MU)	286497	286683	0.06
Peak Demand (MW)	40659	40075	-1.4
Peak Demand Met (MW)	39352	39486	0.3

The actual peak demand of the Western Region was less than the anticipated due to higher load factor. The actual energy shortage in the Western Region was more than the forecasted figure on account of higher requirement. All the states of Western Region except Chhattisgarh and D.N. Haveli experienced lower shortage than the forecast due to lower energy requirement than anticipated. The higher energy availability in Maharashtra, Daman & Diu and Dadra and Nagar Haveli was due to import of power **through bilateral contracts or traders**.

(3) **Southern Region**

Power Supply Position	LGBR	Actual	Deviation (%)
Energy Requirement (MU)	277480	281842	1.5
Energy Availability (MU)	223271	238058	6.6
Peak Demand (MW)	39614	38767	-2.1
Peak Demand Met (MW)	29178	31586	8.2

The actual peak demand of the Southern Region was less than the anticipated on account of higher load factor and demand side management measures taken by the states. The actual energy shortage in the Southern Region was less than the predicted figure mainly on account of higher availability and lower requirement than the forecast.

(4) **Eastern Region**

Power Supply Position	LGBR	Actual	Deviation (%)
Energy Requirement (MU)	111159	107457	-3.3
Energy Availability (MU)	105831	102510	-3.1
Peak Demand (MW)	17922	16655	-7.0
Peak Demand Met (MW)	17966	15415	-14.1

There was energy shortage of 4.6% in the Eastern Region against anticipated shortage of 4.8%. This was mainly due to higher energy availability as compared to the forecast as most of Eastern Regional states traded their surplus power. The actual peak demand of the Eastern Region was less than the forecast due to less than anticipated growth.

(5)North Eastern Region

Power Supply Position	LGBR	Actual	Deviation (%)
Energy Requirement (MU)	11970	11566	-3.3
Energy Availability (MU)	10277	10718	4.2
Peak Demand (MW)	2314	1998	-13.6
Peak Demand Met (MW)	1807	1864	3

The actual energy shortage in the Region was 7.3% as compared to forecast shortage of 14.1%. The actual peak demand of the North Eastern Region was less than the forecasted peak demand due to less than anticipated growth. The lower energy availability was due to net export of power by Mizoram and Tripura through bilateral contracts or through traders and under drawl of power vis-à-vis the scheduled drawl by Arunachal Pradesh and Tripura.

Assessment of Power Supply Position (2013-14)

(1)Energy Generation Targets

The assessment of gross energy generation in the country during the year 2013-14 has been carried-out in CEA taking into consideration the past performance of the thermal plant, their vintage and maintenance schedule of the generating units during the year, likely partial and forced outages and availability of fuel etc. The generation from new units considering their commissioning schedule has also been included in the estimates of the generation targets. A capacity addition programme of 18,432.3 MW during the year has been considered comprising as under:

Category Installed Capacity (MW)

Thermal	15234.3
Hydro	1198.0
Nuclear	2000.0
Total	**18432.3**

(2) Assessment of Energy Availability

The energy availability in each State is worked out at respective Regional Power Committee Secretariat (RPC) as under:-

(a) Generation from generating plants owned by the State,
(b) Share of Power from the common projects,
(c) Allocation of firm power from Central Generating Stations,
(d) Allocation from unallocated quota of power from Central generating Stations as per the allocation in vogue.
(e) Energy import-export under long term bilateral agreements including that from IPPs.

(3) Assessment of Peak Availability

The estimated peak availability is calculated from the units available for generation for various utilities in different months after considering schedule maintenance in the RPC forum and auxiliary consumptions.

(4) **Assessment of Power Requirement**

The assessment of the constituent-wise unrestricted peak demand and energy requirement of each region is made using the past data and trend analysis with the concerned state/ UTs and finalized after detailed discussions at respective RPCs (for the forecast of the peak demand and energy requirement).

(5) **Assessment of Shortage/Surplus**

The anticipated electricity shortage or surpluses are calculated as a difference between the net unrestricted anticipated requirement and the net anticipated availability in terms of energy and peak demand.

Anticipated Power Supply Position during 2013-14

Particulars	Energy (MU)	Peak (MW)
Requirement	1048533	144225
Availability	978301	140964
Surplus(+)/Shortage (-)	-70232	-3261
Surplus(+)/Shortage(-) %	-6.7	-2.3

REGION WISE ENERGY NEED POSITION (2013-14)(Anticipated)

REGION	Requirement	Availability	Surplus/Deficit	Surplus/Deficit
	MU	MU	MU	%
Northern	319885	301418	-18467	-5.8
Western	286752	283396	-3356	-1.2
Southern	309840	250583	-59257	-19.1
Eastern	119632	131880	12248	10.2
North-Eastern	12424	11024	-1400	-11.3

REGION WISE PEAK DEMAND POSITION (2013-14)(Anticipated)

REGION	Requirement	Availability	Surplus/Deficit	Surplus/Deficit
	MW	MW	MW	%
Northern	47500	46879	-621	-1.3
Western	43456	46389	2934	6.8
Southern	44670	33001	-11669	-26.1
Eastern	18257	19700	1443	7.9
North-Eastern	2251	2025	-226	-10.0

It may be seen that all regions except Eastern region would face energy shortage Varying from 1.2% in the Western region to 19.1% in the Southern region. The peaking shortage is to prevail in the regions of Northern, Southern and North- Eastern Region of 1.3%, 26.1% and 10.0% respectively. There are heavy shortages in Southern Region due to **inter-regional Transmission constraints**.

The hydro rich States having run of river schemes on the Himalayan rivers viz. Himachal Pradesh, Jammu & Kashmir, and Uttarakhand are Surplus in energy during monsoon period, while they would face severe shortage Conditions during the winter low inflow months when the generation from hydro Schemes dwindles to the minimum. Haryana, Himachal Pradesh, Chhattisgarh, Madhya Pradesh, DVC, West Bengal, Mizoram and Sikkim shall have both peaking and energy surplus on annual basis.

Chandigarh, Delhi, Gujarat, DD, Pondicherry, Manipur and Meghalaya would have surplus in terms of energy whereas Maharashtra, Jharkhand and Orissa will be in comfortable position in terms of peak on annual basis. All other States in the country would have electricity shortages of varying degrees both in term of energy and peaking.

Inter Regional Energy Exchanges (APRIL 12-MARCH 13)(In Million Units)

To / From	**Northern Region**	**Western Region**	**Southern Region**	**Eastern Region**	**N-Eastern Region**	**Total Export**
Northern Region		3034.9	267.5	2122.8	216.8	**5642.0**
Western Region	6060		2258.2	2063	68.4	**10449.6**
Southern Region	51.2	8.8			0.2	**60.2**
Eastern Region	15886.4	6499.7	3612.7		1977.2	**27976.0**
N-Eastern Region	2.9			8.9		**8.9**
Total Import	**22000.5**	**9543.4**	**6138.4**	**4194.7**	**2262.6**	**44139.6**

DEMAND SUPPLY SCENARIO

On the demand side, India is considered to be the fifth largest consumer of power in the world accounting for 3.4% of global energy consumption. Due to India's economic rise and population growth, the demand for power has grown at an average of 3.6% over the past 30 years. The electricity consumption increased from 411,887 MU during 2005-06 to 911,209 MU during 2012-13, showing a cumulative average growth rate of 11 percent.

Due to this fast growing demand for electricity, the generation capacity, though large, has not been sufficient to meet the demand, resulting insubstantial shortages. During 2012-2013, load requirement was 998,114 Million Units (MU) against availability of 911,209 MU, which implied an energy shortage of 8.7%. During peak loads, the demand was for 135 GW against availability of 123 GW, leading to a peak shortage of 9.0% (Central Electricity Authority, Ministry of Power).But still the per capita consumption is low (879 KWh) as compared to other developing countries.

India is divided into five regions and hence has five electricity grids, namely Northern grid, Eastern grid, Western grid, Southern grid and North eastern grid. Except the Southern grid, all of them are interconnected.

Also, following the recommendations of India Smart Grid Task Force, smart grid pilot projects have been initiated in 14 states with a view to mitigate frequent power failures and voltage problems faced by the industrial groups. This modern electricity distribution network would address issues related to energy theft and trace malpractices, besides making the billing system more transparent and effective. The automatic fault finding & rectification and advanced metering infrastructure are few of its others features that would enable this network to drastically resolve industrial power woes

REASONS OF POWER SHORTAGES

Despite impressive growth in power generation and huge investment in the power sector, power shortage still continues in our country due to:-

(1)<u>High Aggregate Technical And Commercial Losses (AT& C Losses)</u>

AT&C loss captures technical as well as commercial losses in the network. High technical losses in the system are primarily due to inadequate investment on transmission and distribution in comparison to the generation, too many stages of transmission, overloading of system elements like transformers and conductors, absence of up-gradation of old lines and equipments, etc.The commercial losses are mainly caused by theft & pilferages; defective meters, errors in meter reading and in estimating unmetered supply of energy, absence of energy accounting and auditing, etc.

The Eastern region suffered the highest AT&C losses in 2010-2011. It was recorded at 38.24%, which when compared to the lowest losses, i.e. 19.26% in the southern region.(Till 2010-11 T&D loss -23.97%,AT&C loss-26.15%-all India)

(2)<u>Poor Financial Health of DISCOMs</u>

The financial health of the DISCOMs is extremely poor mainly because the pricing of power is far below the average cost of supply particularly for the agricultural consumers.

(3)<u>Shortage of Fuel</u>

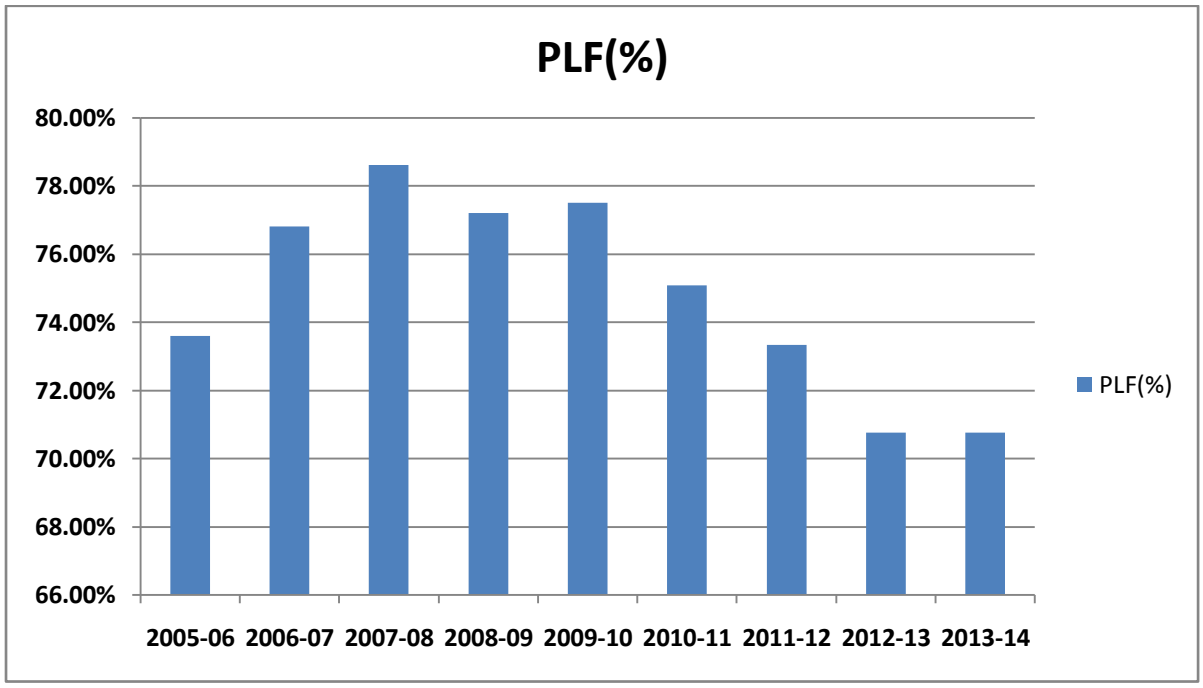
There is a finite reserve of coal in India. Due to poor management and lack of proper infrastructure, the country isn't producing enough to feed its power plants. This can be directly attributed to the Ministry of Environment and Forest's green activism. The long running tussle between the Ministry of Coal and Ministry of Environment and Forests over **'Go, No Go' classification** is only partially resolved and hence continues to pose a problem for the Ministry of Coal. The permission to divert forest areas for coal is not given for areas classified as 'No-Go', leaving few virgin coal blocks to be capitalized by public sector companies like Coal India Ltd (CIL), Bharat Coking Coal Ltd., etc.

Rail transportation of coal is another bottleneck in the sector. Inadequate placement of rakes delays the delivery of fuel to the various generation sites, leading to piling of fuel at company's various mines. Besides there is state level management problem also that aggravates the issue.

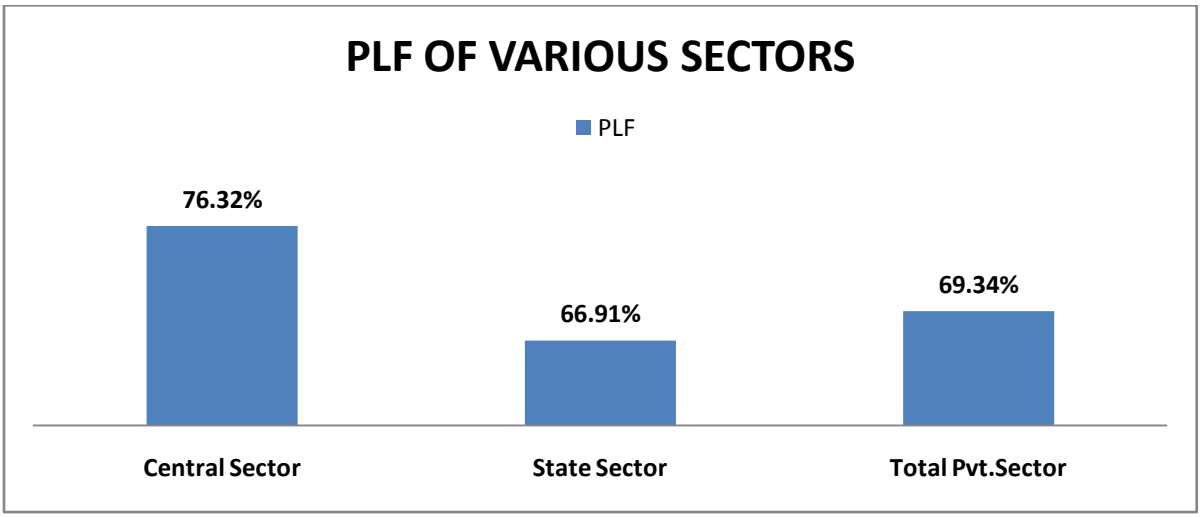
(4)**Low Load Factor**

upto May 13

YEAR	**PLF(%)**
2005-06	73.6%
2006-07	76.8%
2007-08	78.6%
2008-09	77.2%
2009-10	77.5%
2010-11	75.07%
2011-12	73.32%
2012-13	70.76%
2013-14	70.76%(up to MAY 13)



SECTOR	**Apr, 13 -May 13**
Central Sector	76.32%
State Sector	66.91%
Total Pvt.Sector	69.34%
All India	**70.76%**



As per the sector wise plant load factor, the State sector is the least efficient. However, the private sector utilities and the Central utilities have managed to achieve competent efficiency rates. With such problems, a clear shortage in supply and the heavy demand on the national grids and public power facilities, India has experienced two major power cuts in the last few years; apart from the many smaller cuts experienced by all parts of the country at any given time.

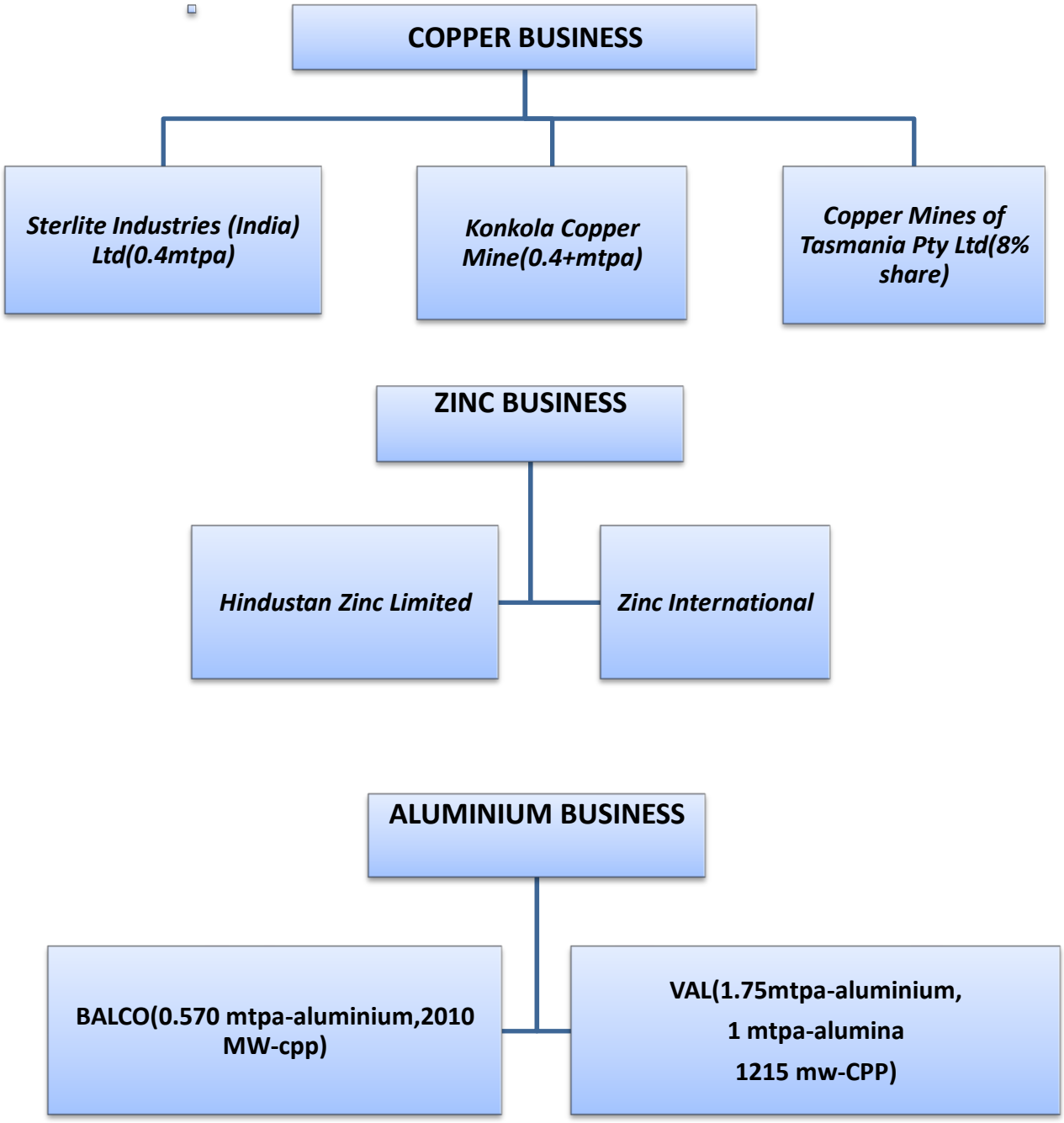
(4)**Transmission Line**

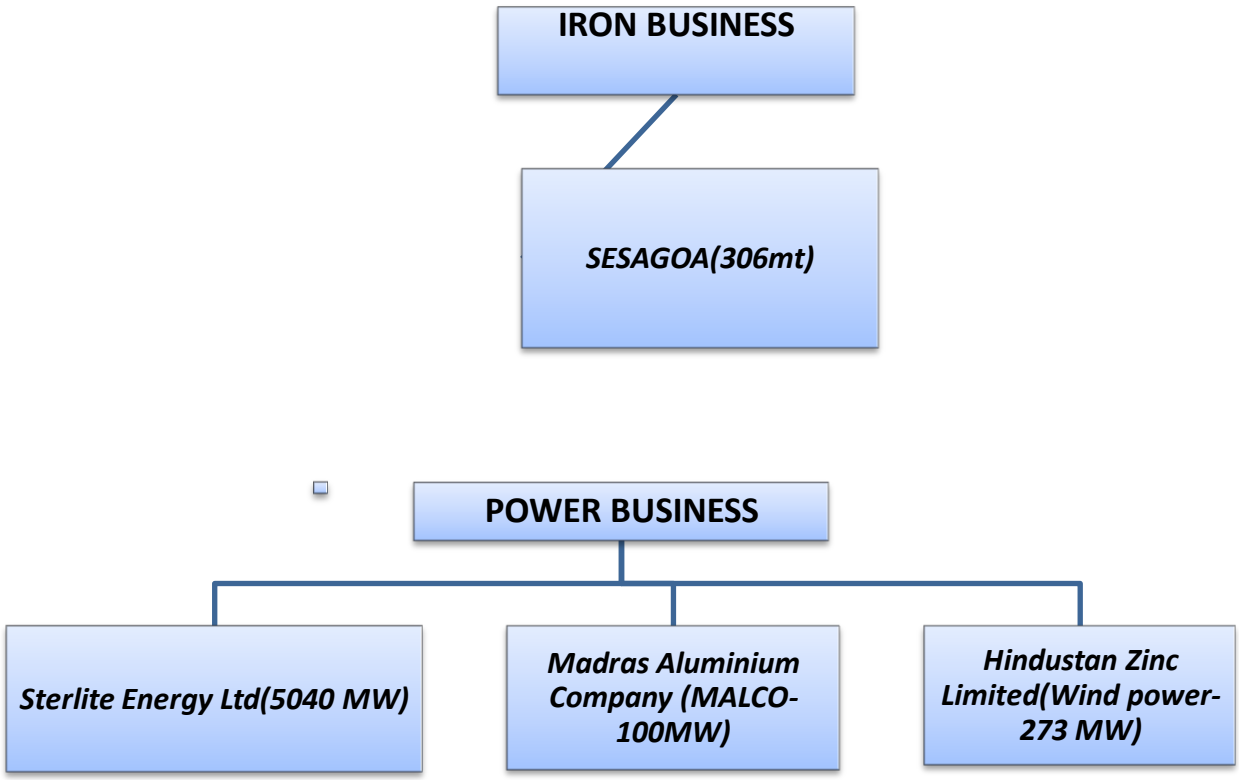
Also Congestion in Transmission line corridor, Right of Way issues, improper R&M various T/Ls & S/Ss are the major problems for the evacuation of the available generated power to meet the growing demand in the present growing economy condition.

OVERVIEW ABOUT THE COMPANY

Vedanta Resources plc is a globally diversified natural resources group with revenues in excess of US$ 11 billion. It is the first Indian manufacturing company to be listed on the London Stock Exchange. Mr. Anil Agarwal is the Chairman of the Company. Its workforce of over 31,000 people is distributed among our operating locations in India, Zambia, Namibia, South Africa, Liberia, Ireland and Australia.

The principal members of our consolidated group of companies are as follows:-





ABOUT CAPTIVE POWER PLANT(CPP)

The 1215 MW Captive Power Plant (CPP) of Vedanta Aluminum Limited at Jharsuguda (Orissa) is the largest CPP of India.

This coal-based thermal power plant of Vedanta Aluminum has been built alongside one of India's largest deposit of coal at IB Valley and Asia's largest non-brackish reservoir – 'Hirakud Reservoir'.

Commissioned in July 2008, the plant is configured with 9 nos. coal-fired sub-critical units of 135 MW. Each unit has sub-critical single-reheat condensing steam turbine and direct pulverized coal-fired natural-circulation boiler of 'Sanghai Electric' make. It sources water from Hirakud Reservoir over a distance of 33 kilometers. Coal is transported from Mahanadi Coal Fields through bottom discharge wagons. It generation basically fulfilling the load requirement for the 0.5mtpa smelter plant.

REGULATORY PROVISIONS FOR CAPTIVE POWER PLANTS (BY CERC)

Captive power plants are a necessity for the Indian electricity scenario. The Electricity Act 2003 has been a landmark in institutionalizing captive power. Captive power generation also finds mention in the National Electricity Policy and the Electricity Rules 2005. A draft captive policy is also in the pipeline. Some of the important provisions highlighting captive power are listed below:

(1)PROVISIONS FOR CAPTIVE POWER PLANTS IN ELECTRICITY ACT 2003

Captive generating plant is defined under **Section 2 (8)**. It is a power plant set up by any person to generate electricity primarily for his own use and includes a power plant set up by any cooperative society or association of persons for generating electricity primarily for use of members of such cooperative society or association.

Section 9 (1) further stipulates that a person may construct, maintain or operate a captive generating plant and dedicate transmission lines. It also provides that supply of electricity from the captive generating plant through the grid shall be regulated in the same manner as the generating station of a generating company.

Section 42 (2) states that surcharge (for meeting the requirements of cross-subsidy) on wheeling charge shall not be leviable in case open access is provided to a person who has established a captive generating plant for carrying the electricity to the destination of his own use.

(2)PROVISIONS FOR CAPTIVE POWER PLANTS IN NATIONAL ELECTRICITY POLICY

In consonance with the Electricity Act 2003, the National Electricity Policy emphasizes that the liberal provision in the Act with respect to setting up of captive power plant has been made with a view to not only securing reliable, quality and cost effective power but also to facilitate creation of employment opportunities through speedy and efficient growth of industry.

The provision relating to captive power plants to be set up by group of consumers is primarily aimed at enabling small and medium industries or other consumers that may not individually be in a position to set up plant of optimal size in a cost effective manner. It needs to be noted that

efficient expansion of small and medium industries across the country would lead to creation of enormous employment opportunities.

The Policy further states that a large number of captive and standby generating stations in India have surplus capacity that could be supplied to the grid continuously or during certain time periods. These plants offer a sizeable and potentially competitive capacity that could be harnessed for meeting demand for power.

Under the Act, captive generators have access to licensees and would get access to consumers who are allowed open access.

Grid inter-connections for captive generators shall be facilitated as per section 30 of the Act. This should be done on priority basis to enable captive generation to become available as distributed generation along the grid. Appropriate commercial arrangements would need to be instituted between licensees and the captive generators for harnessing of spare capacity energy from captive power plants. The appropriate Regulatory Commission shall exercise regulatory oversight on such commercial arrangements between captive generators and licensees and determine tariffs when a licensee is the off-taker of power from captive plant. Towards this end, non-conventional energy sources including co-generations could also play a role.

(3)PROVISIONS FOR CAPTIVE POWER PLANTS IN ELECTRICITY RULES 2005

These rules state that no power plant shall qualify as a 'captive generating plant' under section 9 read with clause (8) of section 2 of the Act unless it satisfies the following conditions.

(a) In case of a power plant it is stipulated that not less than 26% of the ownership is held by the captive user and the user has to consume a minimum of 51 % of the aggregate electricity generated in such plant.

In case the captive power plant is set up by a cooperative society, the conditions mentioned above shall be satisfied collectively by all the members. In case of association of persons, the captive users shall hold not less than 26% of the ownership of the plant in aggregate and such captive users shall consume not less than 51% of the electricity generated, determined on an

annual basis, in proportion to their shares in ownership of the power plant within a variation not exceeding 10%.

(b) In case of a generating station owned by a company formed as special purpose vehicle for such generating station, a unit or units of such generating station identified for captive use and not the entire generating station should have 26% of the proportionate equity out of the total equity of the company related to the generating unit(s) identified as captive plants. For example in a generating station with two units of 50 MW each namely Units A and B, one unit of 50 MW namely Unit A may be identified as the Captive Generating Plant. The captive users shall hold not less than thirteen percent of the equity shares in the company (being the twenty six percent proportionate to Unit A of 50 MW) and not less than fifty one percent of the electricity generated in Unit A determined on an annual basis is to be consumed by the captive users.

(c) It shall be the obligation of the captive users to ensure that the consumption by the Captive Users at the percentages mentioned above is maintained and in case the minimum percentage of captive use is not complied with in any year, the entire electricity generated shall be treated as if it is a supply of electricity by a generating company.

(4)PROVISIONS FOR CAPTIVE POWER PLANTS IN NATIONAL TARIFF POLICY

In pursuance to section 3 of the Act, the Central Government has notified on 6-01-2006 the tariff policy which among others has also emphasized the need for harnessing the Captive generation. The salient features of which are as under:-

While it is recognized that the State Governments have the right to impose duties, taxes, cess on sale or consumption of electricity, these could potentially distort competition and optimal use of resources especially if such levies are used selectively and on a non-uniform basis.

In some cases the duties etc. on consumption of electricity is linked to sources of generation (like captive generation) and the level of duties levied is much higher as compared to that being levied on the same category of consumers who draw power from grid. Such a distinction is invidious and inappropriate. The sole purpose of freely allowing captive generation is to enable industries to access reliable, quality and cost effective power .

Particularly, the provisions relating to captive power plants which can be set up by group of consumers had been brought in recognition of the fact that efficient expansion of small and medium industries across the country will lead to faster economic growth and creation of larger employment opportunities. For realizing the goal of making available electricity to consumers at reasonable and competitive prices, it is necessary that such duties are kept at reasonable level.

(5)TARIFF STRUCTURING AND ASSOCIATED ISSUES

A two-part tariff structure should be adopted for all long term contracts to facilitate Merit Order dispatch. i.e. the capacity charge & energy charge.

According to National Electricity Policy the Availability Based Tariff (ABT) has been introduced at State level by April 2006. This framework would be extended to generating stations (including grid connected captive plants of capacities as determined by the SERC).

The Appropriate Commission may also introduce differential rates of fixed charges for peak and off peak hours for better management of load.

CAPTIVE POWER POLICY IN DIFFERENT STATES

GUJARAT

Any industrial undertaking to set up captive power plant requires the consent of the Gujarat Electricity Board (GEB) .

Wheeling of electrical power from captive power plant of an industrial company to the other industrial units within the same company or to any/all industrial units of its group companies is allowed. Minimum quantity of power to be wheeled shall not be less than 5% of the installed capacity of the captive power plant or 5MW, whichever is more, among the group companies taken together subject to the condition that supplying company consumes at least 50% of the generated power.

Wheeling charges are 13.5 paisa per kWh and 21 paisa per kWh for power delivered at EHV and HV level respectively subject to revision from time to time Wheeling of power is also not allowed when system frequency is 51 Hz and above

No night hour tariff concession shall be admissible for power consumed/drawn from the grid during night period.

System losses shall be considered as 10% for power delivered at EHV and 15% in case of power delivered at HV and the same would be deducted from the account of recipient unit.

The rate for purchase of surplus power would be decided by GEB and will depend on the fuel being used and would be on cost plus basis, where the fuel cost will be decided by GEB on normative basis for each quarter for each type of fuel and gross calorific value.

The State government is empowered to prescribe terms and conditions relating to electricity supply and tariff for such supply. The electrical energy supplied/wheeled to different recipient units of group companies from captive power plant of a supplying company would be subjected to payment of Electricity Duty as per schedule I of the Bombay Electricity Duty Act, 1958 and Tax on sale of electricity as per the provisions of Gujarat Tax on sale of electricity Act, 1985, as amended from time to time.

PUNJAB

A CPP may itself use or sell electricity to a Licensee or an Open Access customer in accordance with provisions of Section 9 of the Act.

A CPP intending to supply electricity to a Licensee will bear the cost of the switch yard and interconnection facilities up to the point of injection into the grid substation of the Licensee. In case the quantum of such electricity is 3 MW or more, the cost of the bay, breaker in the Licensee's grid and equipment for communication of real time data to SLDC will also be borne by the CPP. Specifications of the synchronization and other equipment including technical details of connectivity will be prescribed by the Licensee and the CPP will ensure compliance therewith.

Charges in the form of one time permission fee will be payable by a CPP seeking connectivity with the grid and operation in synchronism with the grid, at the rates specified in the Tariff Order/ Schedule of General Charges. A CPP connected in parallel with the grid, will ensure compliance of the State Grid Code & Indian Electricity Grid code. A CPP supplying electricity to a Licensee in excess of 10 MW will furnish its Annual Maintenance Schedule (1st April to 31st March) to the SLDC and the Licensee by the 15th of November of the previous year. In the case of a CPP supplying electricity less than 10 MW, its Annual Maintenance Schedule for the succeeding year will be furnished to the Licensee by 31st of March of the current year.

A CPP will intimate planned outages to the SLDC with details of their commencement, estimated duration and resumption of generation, at least an hour in advance. In the case of an unplanned outage, the CPP will inform the SLDC and the Licensee both of the stoppage of its power plant and resumption of generation within 15 minutes of their occurrence. A CPP seeking to sell power to a Licensee will enter into a contract with the Licensee on mutually agreed terms & conditions for sale of Firm Power.

Metering point will be on the high voltage side of the step up transformer in the CPP premises. Meters, metering procedures, type of meter and its testing etc. will be as per the State Grid Code notified by the Commission. Based on the energy account prepared by the SLDC, a CPP will raise bill(s) at the end of each billing cycle for electricity actually injected after accounting for energy drawl, if any, from the Licensee. Other charges such as meter rentals, commitment charges, Open Access charges payable to the Licensee, etc. will also be taken into account while preparing the bills. Payment of such bills will be effected by a Licensee in the same period as is applicable to LS consumers of the Licensee. The Licensee will be liable to pay surcharge in case of delayed payments at the rate as applicable to LS consumers. In case the amount payable by the Licensee for purchase of power is less than the total charges payable by the CPP, then the CPP will pay the net amount within the same period as applicable to LS consumers of the Licensee. CPP will also be liable to pay surcharge for delayed payments at the rate applicable to LS consumers.

The CPP will inject reactive power which will not be less than 62% of the active energy to be supplied to the grid. Any shortfall in the injection of reactive energy will be charged as per rates approved by CERC. Power from a CPP will be purchased as and when it is generated and the merit order will not be applicable in such a case.

Tariff for sale of Firm power from a CPP to a Licensee will be equivalent to tariff rates applicable to LS (General Category) consumers. These rates will be applicable when power is supplied for a period of up to five years. For a period beyond five years, power will be purchased through competitive bidding process. Infirm Power will be paid for by the Licensee at UI rates notified by the Central Electricity Regulatory Commission. A CPP may sell electricity to a third party which is a consumer of the Licensee subject to compliance with the Open Access Regulations notified by the Commission. The State Transmission Utility and the Licensee will facilitate such third party sale.

CAPTIVE POWER SCENARIO

Captive power plant has been defined under the Electricity Act-2003 as:-
"...a power plant set up by any person to generate electricity primarily for his own use and includes a power plant set up by any co-operative society or association of persons for generating electricity primarily for use of members of such cooperative society or association".

According to Electricity Act 2003 section 9(1) a person may construct maintain or operate a captive generating plant and its own dedicated transmission lines. The grid connected surplus power of the Captive power Plant will be dealt in the same way as of other generating stations.

The industry in India pays among the highest tariffs in the world and is not assured of the quality of supply. In this era of globalization, it is essential that electricity of good quality be provided at reasonable rates for economic activity so that competitiveness increases. In the last two plan periods barely half of the capacity addition planned was achieved. The optimistic expectations from the IPPs have not been fulfilled and in retrospect, it appears that the approach of inviting investments based on Government guarantees was perhaps not the best way. The energy as well as peaking shortages across the country is a matter of concern and the situation would have been worse but for the slowdown in manufacturing sector.

A number of industries are now increasingly relying on their own generation (captive and cogeneration) rather than on grid supply, primarily for the following reasons:-

(a) Non-availability of adequate grid supply.
(b) Poor quality and reliability of grid supply.
(c) High tariff as a result of heavy cross-subsidization.

The State Governments and SEBs have been concerned about the growing importance of Captive Power Plants on account of the following reasons:-

(a)Captive plants may have adverse impacts on the finances of the utility**.**

(b) Industrial load is the main source for cross-subsidizing revenue flows.

(c)Billing and collection is much more efficient for HT consumers.

(d) SEBs ability to service escrow accounts for security packages is also reduced.

(e) Non-optimal growth of the sector.

(f) Problems in grid management especially in case of states with surplus power.

(g) Adverse environmental impacts arising from types of fuels used and from higher emissions per unit of production, as compared to large power plants.

(h) Reliability of power supply from captive plants as a source of firm power.

While on the other hand the concern of the owners of captive plants are:-

(a)Non-remunerative tariff structure for surplus power produced by them .
(b) No risk sharing in case of non-availability of fuel, change in variable cost due to switching of fuel after entering into power purchase agreement (PPA), etc.
(c) Inadequacies in wheeling and banking facilities.
(d)High contract demand charges.
(e) High level of duties and taxes on sale of power .
(f) High wheeling losses assumed for power to be sold to grid by captive plants.
(g)Need to devote time and energy to an activity, which is not their core business.

(h)Restrictions on the minimum amount of power to be wheeled

(i) If the captive power plant (CPP) fails, charges for back-up or standby power from the grid are twice the normal rate for captive plants.

(j) No formal policy for purchase of captive power (in most of the states).

The opportunities emerged after the enforcement of the Electricity Act-2003 in the form of delicensing of generation, implementation of open access and setting up of common trading platform, has made the captive power plants an attractive option to industries to meet their in-house requirement on one hand and to maximize their profits from sale of the surplus power from their captive plants on the other.

CATEGORIES OF C.P.P.s

In the present context, Captive generation can be categorized as follows:-

i) Stand - alone, i.e. isolated from the grid
ii) Stand-by, i.e., normally idling
iii) Running, but separately
iv) Running in synchronism
v) Located away from the associated industry, and wheeling power through the utility network.

Each of these categories has a different connotation, and would need to be treated accordingly, for effectively bringing the surplus capacity into the utilities' network.

(1)STAND - ALONE C.P.P.s

Poor quality of grid supply (low voltage, fluctuating frequency and frequent interruptions), high tariffs (much higher than actual cost of supply), unfair impositions (peak hour restrictions and unplanned load shedding) and unresponsive attitude of SEBs have forced many industries to isolate themselves totally from the State grid and be on their own. For a reliable operation of the industry, they necessarily have to have Captive generation with a redundancy. In other words, they have available a significant amount of surplus capacity.

To harness the above surplus capacity for increasing the availability of power in the grid, a pragmatic approach is required. The concerned SEBs / successor utilities have to realize that their own urge for harnessing such capacity is more pressing than the need of the CPP owner to get reconnected. In any case, the CPP owner cannot be expected to supply power if his net recovery is less than his variable cost. The utilities have to play their part, and this would include the following, at the utility's cost:-

i) Constructing / restoring the line upto the industry's premises, for adequate grid connectivity.
ii) Providing necessary switchgear, transformers, etc., and the required metering equipment in the utility's system.
iii) Allowing the industry and CPP to run in synchronism with the utility's system.
iv) Agreeing on a reasonable commercial arrangement.
v) Promptly paying for the power supplied by the CPP.

(2)STAND - BY C.P.P.s

Many CPPs have been set up for standby supply only. These are kept off most of the time, when grid supply is available for running the industry, and are run only when grid supply goes off, or the industry is told not to draw power, e.g. in evening hours. In these situations, the industry would be drawing power from the utility as per applicable tariff.

(3)SEPARATELY RUNNING C.P.P.s

For reasons similar to those listed above in case of Stand - alone CPPs, many industries have split their system, with one part operating on grid supply and the other on CPP. The two parts are operated separately due to historical considerations – technical and commercial.

(4)C.P.P.s RUNNING IN SYNCHRONISM

There are many large industries (steel plants, etc.) which have CPPs of substantial size running in synchronism with the grid, but only at part capacity due to one-sided contracts.

(5)C.P.P.s LOCATED AWAY FROM ASSOCIATED INDUSTRY

These are necessarily synchronized with the grid. Besides, the utility can separately record the injection of CPP and consumption of the associated industry.

HARNESSING OF CAPTIVE GENERATION

Captive power plants (CPPs) have been installed by many industries and commercial establishments all over the country, and Captive Generation Capacity in Industries having demand of 1 MW or above, Grid interactive (as on 31-03-2011)=34444.12 MW Many of these plants have been set up to serve as standby sources of power (to run critical parts / services of the respective industrial unit / commercial establishment when grid supply fails or is cut off), and are, therefore, idling for considerable lengths of time.

Many other CPPs also operate on part - load for long durations, and have spare capacity. However, since these plants have been established primarily for self - use, in most cases, there is no structured commercial arrangement in place between CPP owners and host utilities to facilitate injection of the idling / spare capacity into the grid.

All regions of the country presently suffer from serious peak-hour shortages and load-shedding / rostering has to be resorted to. With the continued growth of consumer demand, and slow pace of generating capacity augmentation, the demand - supply gap is likely to persist for many years to come. This gap could be quickly bridged, at least partly, by harnessing the existing Captive generation.

The dominant share of the metals and minerals industry, which mostly uses coal, states like Chhattisgarh and ORISSA together account for a major part of the capacity, followed by West Bengal.

As We know that

(a) Quantum of surplus power available from a CPP for feeding into the grid would most often be uncertain. Since the primary objective of the CPP installation is to support the associated industry, any increase in the industry's load and / or any decrease in CPP availability would automatically bring down the power availability for the grid (which would be the second priority here). As a consequence, the CPP may not be in a position to supply power to a utility / licensee on a committed basis. In other words, the CPPs would not be able to supply power as per a firm schedule, but only on "as-and-when-available" basis. The concerned utility / licensee would generally be unwilling to pay a remunerative tariff for such infirm power.

(b) In many cases, power supply to the industries / commercial establishments is cut off during peak-load hours (as a regular rostering measure to restrict the State's over-drawl from the regional grid), and these industries / establishments have to run their Captive generation during such hours for continued operation. What this means is that availability of Captive generation for feeding power back into the grid would be much lower during peak hours (when its support is needed the most) and comparatively higher during off-peak hours (when the utility / licensee may be able to meet its own requirement with power available from other sources).

(c) Due to their smaller size and use of costly fuel, cost of generation at CPPs would generally be comparatively higher. On the other hand, the utility / licensee would be reluctant to pay to CPPs a price higher than what it pays for bulk supply on contracted basis from regular generating stations, particularly when the CPP power is of comparatively **low reliability** and **low peak-hour availability**. Consequently the price that a utility / licensee may be prepared to pay to a CPP on a contracted basis may not even cover the variable cost of the CPP.

Due to the above, it is very likely that the SERCs, in spite of their best intentions and efforts, may not be able to arrive at a tariff (based on the conventional tariff determination principles) which is acceptable to both the parties. Under such a situation, the following approach may be adopted as a viable alternative, for harnessing the available idling / surplus capacity of the CPPs.

Application Of "UI" Mechanism

Instead of trying to induct the surplus CPP capacity on a contracted basis, it may be absorbed in the grid on "as-and-when-available" basis, utilising the UI mechanism. Suppose an SEB, at a given time, is overdrawing 20 MW from the regional grid. The SEB would be required to pay UI charges for 20 MW, i.e. for 5000 kWh per 15 minutes at the UI rate for that 15 minute time block. Now suppose that this particular SEB starts getting 8 MW from a CPP. If the generation and consumer load within the State remain unchanged, the SEB's over-drawl from the regional grid would come down from 20 MW to 12 MW. As a consequence, the SEB would now have to pay UI charges to the regional pool account only for 3000 kWh per 15 minutes. It can, thus, be said that 2000 kWh (per 15 minutes) received by the SEB from the CPP has replaced the 2000 kWh of UI from the regional grid. The SEB can, therefore, pay the prevailing UI rate for CPP injection and still remain financially unaffected.

The UI rate would be comparatively low during off-peak hours, and the CPP may find it unattractive to inject its surplus capacity into the grid. This would automatically solve the problem of costly power coming into the grid when it is not really required. **On the other hand**, during peak-load hours, UI rate would be high, and the CPP owner would be induced to maximise his injection (at a time when it is needed the most). This extra input would add to total power availability in the grid and enable a corresponding additional consumer demand to be catered. The host SEB has the option of supplying extra consumer load within the State (in which case it would have to reconcile to paying the prevailing UI rate for this incremental power), or remaining unaffected (consumer load wise and financially) as described earlier. In the later case, the extra power (from CPP) would flow to some other SEB which would pay for it at the UI rate, and cater to extra consumer demand in its area.

In this whole scheme, all actions are voluntary and nobody is under any compulsion – contractual or otherwise. The CPP gets to know the prevailing UI rate online from a local frequency meter and decides whether to inject power into the grid or not, depending of how the UI rate compares with its variable cost. The local SEB also has the option, as described above, of meeting or not meeting extra consumer load, depending on how the UI rate compares with the highest permissible power procurement rate for supply of power to these consumers. Further, there would be no complications related to contracts / agreements, scheduling and dispatch, defaults and non-compliance. The SERCs too would not have to worry about judicious determination of tariff for the concerned CPPs.

The transmission losses in the intra-State grid have been neglected and it is assumed that the SEB operates the scheme on a totally back to back basis. However, it may be reasonable for the SEB to expect a compensation for (i) extra efforts on its part, (ii) use of its transmission system, and (iii) any incremental transmission losses. This can be easily provided by stipulating that the payment to CPPs would be at, say 95% of the regional UI rate.

On the whole, the SEB / utility should view the industry - CPP as a friend-in-need, and not as an adversary. Instead of throwing up problems and creating road blocks, the utilities should be more pro-active. The only aspect (though of paramount importance) which the utilities need worry about is that synchronizing of the previously isolated industry - CPP does not adversely affect them financially. As explained earlier, any energy supplied by the CPP can be taken by the utility at the UI rate, either for meeting extra consumer load or for passing on to

other utilities. That only leaves the problem of the CPP owning industry occasionally drawing power from the utility's network to be tackled.

Once the industry (with its CPP) is synchronized with the grid, it is possible that in case of a tripping in the CPP, the industry starts drawing power from the utility's system. How should this be commercially handled? A reasonable and pragmatic approach would be to treat this also as UI, on the criterion of reciprocity. Once the industry has invested money in setting up the CPP, it would not be fair to ask it to pay again for the fixed cost of utility's system (in the form of demand charge, connection charge, standby charge, etc.). However, to discourage the industry from unduly leaning on the utility, a 10% differential could be specified between the rates at which energy is taken from and supplied to the industry. **For example**, if the industry is paid at 95% of the regional UI rate for energy it supplies, it may be charged at 105% of the regional UI rate for the energy it draws. This would automatically dissuade the industry from resorting to energy drawl from the grid in situations of over-all shortage. On the other hand, the industry would get the benefit of standby power, and would readily accept the provision. The local utility also should not feel aggrieved since the support actually comes from the large interconnection (the regional grid), and it gets a wheeling charge, though not by that name.

GROWTH DRIVERS

At the macro level, GDP growth and the resultant growth in the industry and the services sector is the primary driver for captive capacity. Also, inadequate capacity of the grid to meet the increasing power demand and supportive policy initiatives continue to drive captive generation.

In 2010-11, the GDP recorded a strong grown in 2010-11 at 9.3%,,2011-12 at 6.2%,2012-13 at 5.2%,2013-14 at 5.7% (RBI expects).The major reason for fall in GDP due to a slowdown in the global economy and developments like downgrading of the US credit rating, policy paralysis etc. Moderate growth can be expected in the coming years. Growth of the industrial sector, which is reflected by the Index of Industrial Production (IIP), is also expected to be moderate in the next three-four years. While the IIP grew at 8 per cent between 2009-10 and 2010-11, in 2011-12, 2012-13(2.9%) its growth has been slow. This has been due to a drop in export orders following the slowdown in several developing economies. Reflecting this, the stock markets have also been down and many scripts are trading near their 52-week lows. However, over the next three-four years, the situation is expected to improve the IIP growth is

expected to be moderate. Therefore, the captive segment is likely to see a moderate capacity addition.

Besides the macro factors and policy, the real driver for industries to set up captive plants is inadequate grid power and their need for uninterrupted power supply. In 2012-13, the average energy deficit was 8.7% while the peak energy deficit was 9%,In 2013-14 the expected energy deficit likely to be 6.7% & Peak deficit likely to be 2.3% as anticipated. Further, given the increasing power procurement costs due to rising fuel prices, state power distribution utilities, which are facing huge financial losses, often resort to load shedding. This implies a huge opportunity cost for energy-intensive industries.

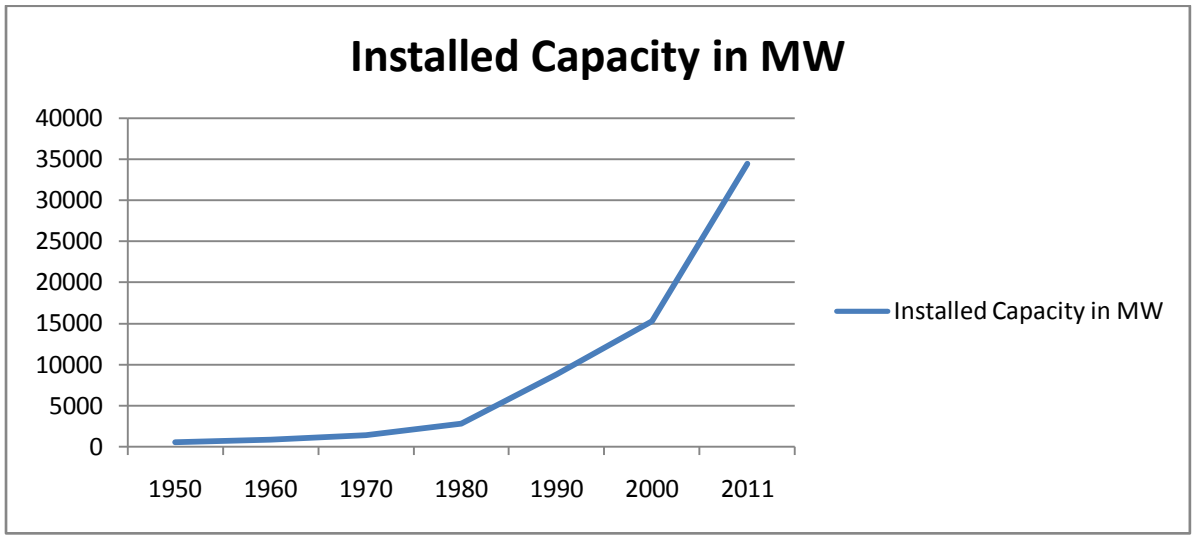
Also, tariffs for industrial power are higher than those for other consumers and the level of cross-subsidization is high, especially in states like Andhra Pradesh, Gujarat, ORISSA and Uttar Pradesh. Moreover, industrial power tariffs have increased significantly since 2009 and the trend is likely to continue due to rising fuel prices, the shift to a competitive bidding regime, utilities' poor financial health and build-up of regulatory assets. In addition, states like Punjab, Tamil Nadu and ORISSA impose a high cross-subsidy surcharge to discourage the procurement of cheap power through open access. These factors make captive generation a preferred solution for meeting power requirements. Captive generation has a strong business sense in view of the huge opportunity cost of reliable power supply and the opportunity cost of reliable power supply and the opportunities in power trading to sell surplus production.

PLANS AND INVESTMENTS

To tackle the fuel supply issue, leading players across industries are planning to use non-conventional options. On the economic growth front, a GDP growth of 7-8 per cent is expected in the future. Growth in the industrial and service sectors is expected to be moderate to strong. With these developments, we expect most of the planned capacity to get commissioned.

The majority of the upcoming capacity will be contributed by captive projects of 100 MW and above. Most of these projects are being set up by the metals and minerals industry. Group captive projects would also contribute a significant share. Other industries that are setting up captive capacities include cement petrochemical units. The service sector is also emerging as a key demand segment for captive generation.

Being the dominant fuel for captive generation by the metals and minerals industry, coal will contribute the bulk of the upcoming capacity. Natural gas has the second largest share .



GUIDELINES FOR SETTING UP OF CAPTIVE POWER PLANT

(1)PERMISSION AND APPROVAL

Permission for installation of Captive Power Plant is to be obtained from SEB under Section 44 of Electricity (Supply) Act, 1948. For captive power generation exceeding 25 MW, SEB will accord permission under Section 44 of Electricity (Supply) Act, 1948 only after consulting the Central Electricity Authority as per Section 44 (2A) of Electricity (Supply) Act, 1948.

The following would be eligible to install a Captive Power Plant:-

a. A consumer of electricity

b. A group comprising more than one consumer as a joint venture.

c. An actual user of power but not a consumer.

d. A group of actual users of power, but not consumers, as a joint venture.

e. A group comprising both consumers and actual users of power as a joint venture but excluding A Generating Company@ as defined under Section 2(4-A) of Electricity (Supply) Act 1948.

(2) <u>CONDITIONS BASED ON FUEL USED</u>

a) If the captive plant falls under the category of hydro or co-generation plant, such plant, irrespective of its size and status of power supply position in the State, may be permitted liberally.

b) If the Captive Power Plant is based on coal or liquid fuel or gas and if the State is deficit in power supply, the installation of such captive power plant could normally be allowed and the capacity of the plant permitted up to 200% of the requirement of the industry for its own use.

c) If the Captive Power Plant is based on coal, liquid fuel or gas and the State is surplus in power, the installation of such captive plants can still be **considered in the following cases:-**

i) If the industry requires uninterrupted power supply due to the nature of the industry and if the State/SEB or Successor entities are not able to guarantee supply of such requirements, the proposal for setting up of such a captive power plant for the uninterrupted power supply requirement of the industry can be considered.

ii) If the industry requires quality power supply (within the stipulated variations in voltage and frequency) and if the State/SEB or Successor entity are not in a position to guarantee the power supply of such stringent requirements, the proposal for installation of the captive power plant of the required capacity can be considered.

iii) If the cost of generation from the captive plant is found to be lower compared to the tariff of the power supply from the grid, the proposal may be considered after thoroughly examining the cost and tariff aspects.

d) Banking facilities may also be provided to the Captive Power Plants so that available capacities are utilized to the extent possible and when required. The rates for banking may be determined on mutually agreed terms.

e) Units in Special Economic Zones (SEZ) and industrial estates may be allowed to set up CPPs liberally.

f) If the CPP is of co-generation in nature, and the capacity exceeds 25 MW, the proposals shall be forwarded to CEA for consultation under Section 44(2A) of Electricity (Supply) Act, 1948 duly certified by the concerned Utilities that the proposal qualifies for the status of co-generation. (In this regard, MOP Resolution No.A-40/95-IPC.I, dated 6th November, 1996 may be seen for reference).

g) Permission of State Electricity Board is required to synchronize and operate with the Grid.

h) All statutory clearances for setting up the CPP have to be obtained by the owner of the CPP of his own accord.

(3)CONDITIONS FOR USAGE OF CAPTIVE POWER

Energy generated from captive power generating units:

i) Can be used by the owner of the captive power generation plant.

ii) Can be used by sister concern (s) of the owner of the captive power generation plant.

iii) Balance power after usage in items (i) and (ii) above can be sold to SEB, if required by them.

iv) Third Party sale is also permissible, with the approval of SEB.

v)The surplus power can be traded on the exchange.

Vi) Captive generator could be asked not to draw power from the grid during peak seasons/hours.

(4)WHEELING CHARGES & RULES

Prior approval of SEB has to be obtained for wheeling of power. Captive generated power may be wheeled only where interface for synchronization with the grid exists. Wheeling will be done to any service (High Tension or Low Tension). The cost of interfacing lines, switchgear metering and protection arrangement may be met by the CPP and/or the Board as per mutual arrangement. Similarly, the wheeling charges may be worked out based on pooled rates of wheeling charges worked out by the Central, State Transmission Utility of that Region and the amount of energy wheeled.

(5)PRICING OF THE BALANCE POWER SOLD TO SEB

For the FIRM POWER, the pricing for the Captive Power Generation could be in single part i.e. rate for units alone. The tariff for sale of power from thermal CPPs to SEB may be fixed after mutual discussions between SEB & CPP and could be based on pooled variable charge of thermal power stations operating in the SEB plus some percentage of the pooled variable charges as an incentive to CPP generator.

In case of hydro CPPs also, the tariff for sale of power to SEB may be fixed after mutual discussions between SEB & CPP and could be based on pooled variable charge of thermal power and incentives. To attract more power from CPPs into the Grid, tariff could also be based on the highest variable cost in the system or the actual variable cost of CPP, whichever is lower, and some percentage of the variable cost as an incentive.

The rate for INFIRM Power could be at 75% of the normal rate. Tariffs for purchase of power from captive plants may be determined by SERCs wherever they have been established .

(6)BILLING METHODS

Separate billing may be carried out for export and import of power by the Captive Power Generator. Import of power may be billed according to the Tariff Notifications of Government from time to time . Export billing may be done for the units exported as per the mutual agreement between SEBs & CPP.

OPEN ACCESS TO CPP

According to electricity Act 2003 a Captive generator can avail open access for the purpose of transmitting electricity from the Captive Power Plant to the destination of its own use however the availability of adequate transmission facility is to be determined by Central Transmission Utility or State Transmission Utility. Any dispute regarding the availability of Transmission facility should be dealt by the appropriate Commission.

Section 40 and Section 42(2) of Electricity Act 2003 deals with Duties of Transmission & Distribution Licensee respectively, states that the surcharge is to be levied on the consumer under open access and such surcharge is to be used to meet current level cross subsidy. Such surcharge is not levied in case open access is provided to a person who has established a captive generating plant for carrying the electricity to the destination of his own use.

OPEN ACCESS FOR CAPTIVE POWER GENERATION

Sec. 9(2) : Captive Generating Plant shall have right to have open access for the purpose of carrying electricity from Captive Generation Plant to destination of his use.

Section 38(2)(d) : In case of Central Transmission System, surcharge shall not be leviable in case of open access is provided to Captive Generating plant for carrying electricity to destination of his use.

Section 39(2)(d) : In case of State Transmission System, surcharge shall not be leviable in case of open access is provided to Captive Generation plant for carrying electricity to destination of his use.

Section 42(2) : For use of Distribution System, surcharge shall not be leviable in case open access is provided to a CPP for carrying electricity to destination of his use.

ROLE OF RENEWABLES IN CAPTIVE POWER

The expansion of renewable capacity has primarily been on account of the favorable cost economics of captive power generation, coupled with a host of policy and regulatory incentives provided at the central and state levels to drive investments in renewable energy-based capacities for captive generation.

Self-generation of power offers significant benefits for industrial consumers, who often find grid power inadequate for their needs. According to the Central Electricity Authority, the energy deficit stood at 8.7 percent and peak deficit at 9 percent during 2012-13. Captive generation also makes sense from the cost economics point of view, especially for those industries where the cost of energy constitutes a significant portion of production costs. In such

cases, finding the most economical energy source assumes significance in order to improve overall productivity and competitiveness.

BENEFITS

i) Renewable energy-based captive projects are eligible for a number of incentives such as direct and indirect tax benefits, capital subsidies, wheeling and banking facilities, and carbon credits.

ii) For captive power plants that are connected to the grid, enterprises get opportunities to earn additional revenues through the export of surplus power to the grid at preferential tariffs or sell directly to another industrial customer through the use of open access or participation in power trading.

iii) Since many captive power producers are also obligated to meet a part of their energy consumption through renewable sources as a part of the renewable purchase obligation, setting up a captive plant using renewable fuel makes business sense.

ISSUES AND THE WAY FORWARD

Renewable energy-based capacities offer a promising solution for meeting the captive energy requirements of industries by reducing the dependence on costlier fossil fuels. However, these technologies are site and process specific. So, the lack of non-discriminatory access to the grid, for self-use and to sell either to the grid or third parties, is a major challenge and impacts returns.

Besides, these are the industry-specific issues. For instance, the industry structure for biomass is largely unorganized and only informal arrangements exist for fuel intake, transportation, storage and other related activities. Biomass fuel costs are volatile and availability is seasonal, which add to the uncertainty of investments. Agro-residues depend on crop patterns, which in turn, are influenced by an altogether different set of factors unrelated to energy concerns. Husk-based plants have recently received a setback due to a steep increase in rice husk prices. Also, since biomass energy caters mainly to the captive power segment, research and development by business enterprises has been negligible. Further, there is a need to connect with a large number of farmers to ensure timely fuel supply.

The non-availability of bagasse during the off-season is an issue for bagasse-based captives. This poses a huge challenge for the industry because the captive plants need to depend on fossil fuels or some other form of bio-residue during the off-season period. The units that resort to the use of fossil fuels in the off-season lose some of the renewable energy benefits. Thus, the use of other agro-residues with biomass is a probable solution for the off-season. In many cases, the technologies deployed in captive plants are becoming obsolete, especially in the case of bagasse-based plants which have low efficiency. The logistics of biomass procurement and storage are another significant challenge.

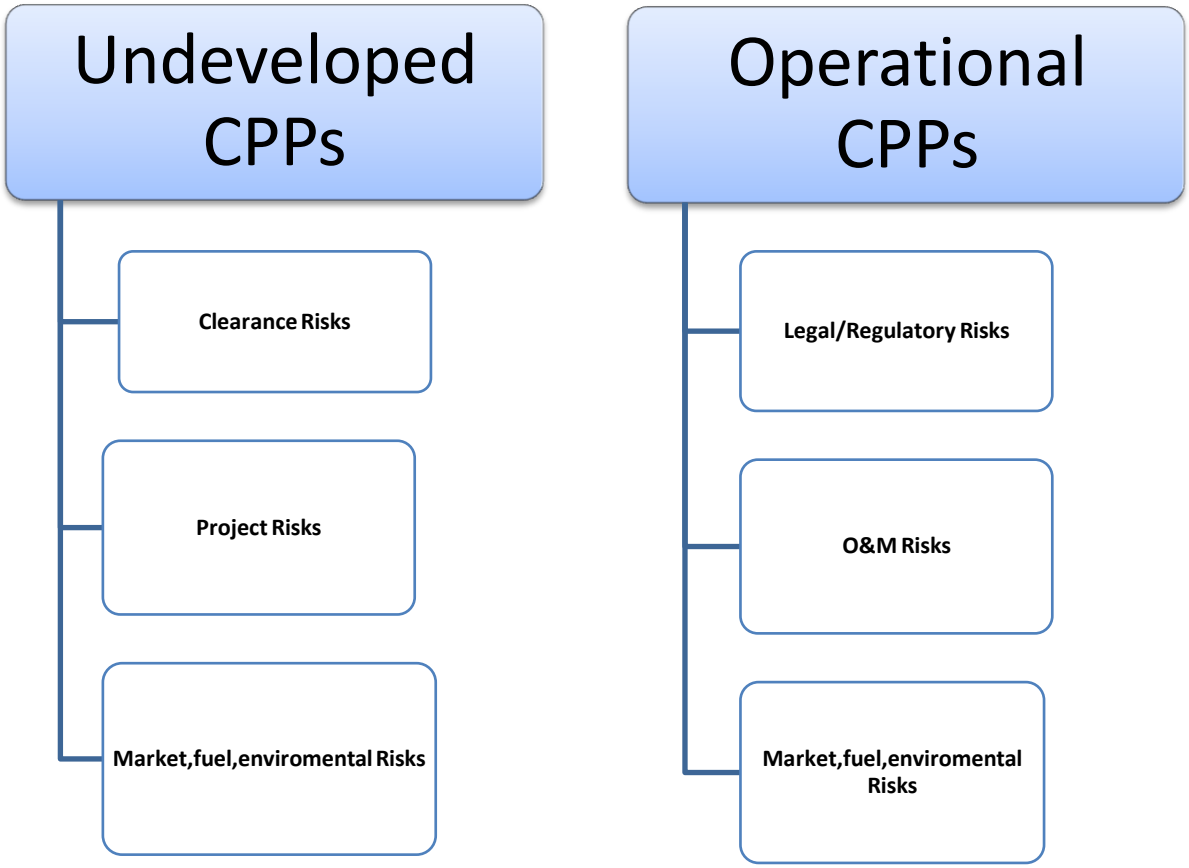
Wind power is yet to be adopted widely like other conventional fuels as it is dependent on wind flow patterns and hence is feasible only for a limited time of the year. Thus, uptake, will remain limited unless technologies that link wind-based projects to other source of generation are deployed. Also, the high potential wind sites have already been exploited. Moreover, since the government does not extend GBIs to wind farms availing of AD, there is a reluctance to invest in them.

Many large companies have resorted to having their own captive power plants. Many smaller businesses and commercial institutions rely to a large extent on diesel for backup power. To the latter and to some extent to the former, solar PV based power production could be an attractive option .

Notwithstanding these challenges, policy and regulatory support to the renewable energy sector remains strong and will continue to attract captive power producers.

MANAGING RISKS IN CPPS

Captive power projects face many risks prior to commissioning and during commercial operation. It is of immense importance to pre-identify these risks before any substantial capital investments are put. Some of the risks are independent of the stage of the project (operational/under development), while some are common to both as detailed below.



Market Risk

Market risk is one of the major risks when it comes to evaluating the concept of captive power plants (CPPs) in terms of cheap and reliable power. The challenge for a captive plant is to produce electricity at a cost less than the avoided cost of the Grid tariff over the life cycle cost of the project to keep its goods production unaffected of the unreliable grid supply. Market risk can be further distributed in the form of demand risk, fuel risk and transmission risk.

Demand-Supply Risk

The CPPs are primarily set up to stand against the unreliable/low quality power supply of the SEB, suffering huge energy and peaking shortages. The shortages are as high as 10-15 per cent during summers and industries are impacted by long power cuts in states.

The very purpose of setting up a CPP fails, if the demand-supply gap tapers down considerably. Though the demand-supply gap reduction would result in the improved power supply position and the social development of the state, it would have an adverse impact on the investments made by the industries on captive power plants. In a near surplus scenario, the CPPs would run at low PLF leading to sub optimal utilization of assets and blocking of investment.

Risk of Tariff rationalization

Besides the reliability of the power supply, the SEB tariff has a considerable role in deciding setting up of a CPP. As per the analysis by Infraline, industrial tariffs are generally on the higher side as it absorbs the cross-subsidy burden of other domestic and agricultural consumers. Biggest price risk faced by a CPP is the process of tariff rationalization. Most of the utilities are planning a roadmap for cross-subsidy reduction leading to safe guard the interests of industrial and commercial consumers in the long run. Though tariff rationalization would reduce the industrial tariff/burden, but any industry would only suffer from loss of investment made on its operating CPP. This would result into CPP running at low PLF, suboptimal utilization of investments and blocking of investments in partially useful asset.

Fuel risk

As per the existing fuel (coal/gas) allocation policies, CPPs are given the lowest priority only above MPPs (Merchant Power Plants). Due to the existing allocation policy, not all CPPs get long- term fuel allocation, and are forced to rely on short-medium term fuel arrangements at considerably higher prices coupled with unreliability of fuel supply. Even long-term

arrangement does not guarantee 100 per cent supply and there are issues relating to sub-optimal supply of fuel leading to lower PLF affecting the plant output. Also, at times of fuel shortage, the first victims are captive units as the government prefers to divert any additional / surplus coal to deficit plants of central generating stations or state generating units. Some of the captive developers rely on importing coal but the feasibility of importing coal for a captive unit of small size is always questionable and they also have to face other bottlenecks like infrastructure constraints in port availability and in-land transportation availability And as the economy of scale is not in favor of these small CPPs they have to rely on fuel traders to procure fuel from the international markets.

CPPs are least preferred in terms of getting a captive coal block for their internal use as they do not have the financial power nor they have the large size to operate and maintain a captive coal block and also they do not have that kind of expertise to run a captive coal block. The only option they have to get a captive coal block and to secure fuel supply for their plants are to make bid for captive coal block in a JV partnership or jointly. But these do have their own share of problems as the other developers do have conflicts of interest in other issues so this is one grey area for the captive developers. An association may be formed taking all small captive developers to bid for captive coal blocks and to operate and supply the required fuel on the basis of equity participation may be a good viable solution but the concept is at an infant stage and it will take some time to mature enough to bid for such projects.

Also, many CPP are experimenting with mixing various fuels like pet-coke, imported coal, husk and wastes etc. with coal to reduce cost and increase efficiency for their sustenance. Where ever possible, they are using co-generation and waste heat recovery processes. Industries have also started investing in non-conventional and renewable energy sources to diversify some risks.

CHALLENGES

There are many points that become very important in the current turmoil for CPP. Approximately 70 per cent of CPP generation and 50 per cent of installed CPP capacity use coal as fuel and face extreme pressure from the government and independent power producers for coal availability.

Since February 2011, CIL started charging 35 per cent higher discriminatory prices from CPP than to other power producers by flouting the responsibility as a monopoly. While no one disputes that CIL needs to earn reasonable profit for commercial prudence, but CIL should not

be allowed to simply set aside government policies. This is pushing industries to shut down CPP or buy costlier imported coal at exorbitant price from traders because most CPP are small and can't import vessel load. Many state governments are charging higher taxes and duties from CPP, though the national policies clearly and very specifically define such actions as invidious.

Based on Supreme Court orders, the New Coal Distribution Policy, 2007 (NCDP) was painstakingly made after due deliberations. The NCDP clearly defines equitable distribution of this nationalized resource to all coal consumers at reasonable and equitable price. However in last 6-7 years, coal supplies and linkages are delayed and denied to CPP while facilitating coal linkages to IPP and Utilities. It is important to note that due to constant government encouragement, industries have been investing substantially in CPP for meeting power demand of country using their own resources but are now at a receiving end.

However, more than `200,000 crore invested in CPP, and its mother plants are either going bad or are underperforming based on time our quick calculation for more that 434 CPP applications for 34,000 MW capacity pending in Ministry of Coal in 2011 (and further addition since then). In addition, you can easily calculate the chain of losses in economic value creation, new employment generation and government revenue from taxes and duties.

While power availability is important for masses and nation, but it is the industrial growth (and efforts to prevent sickness) that ensures employment generation and ability to spend. Most industrialized nations, now thriving on services also get hit hard whenever the natural base for mankind, i.e. agriculture is impacted due to calamities. In a corollary, India should not forget that it can't survive by boosting services and trade of cheap imported goods but without its own basic underlying industry competitiveness.

Unlike petroleum products, no subsidy is provided by government on coal. On the contrary, in the absence of equitable distribution of coal and using its monopoly status, CIL has idle reserves of `60,000 crores, i.e. more than GDP of many Indian states.

CPP is also excluded from taking up captive blocks or at least CPP should be given excess production of coal from other's captive blocks. Other issues that are troubling industry are related to quality of coal and huge shortages in dispatches from CIL subsidiaries. It is common to get 25-10 per cent lower quality than declared GCV band.

This situation of idle freight and shortages in supplies has worsened with railway constantly increasing carrying capacity reaching to CC+8, i.e. 8 tones more than safe design capacity and reducing loading tolerance to just 1 tone while loading has to be done with eye estimation.

In the absence of any significant addition in rail network and spare lines, with increasing passenger traffic and pressure from newer power houses, CPP is at receiving end.

POWER SCENARIO IN ORISSA

The power supply situation in Orissa is now passing through a critical stage. The hydro reservoirs in the State which are the backbone of the power supply system in Orissa are in depleted condition. The thermal power stations are not able to deliver the full potential due to various factors like **non-availability of coal** etc. Some of the IPPs (Independent Power Producers) who were supposed to start operation by this time have not yet come up due to various inherent problems like land acquisition etc. The CPPs (Captive Generating Plants) in the state are also unable to deliver their surplus power to the State as per our requirement. The **Retail Supply Tariff in Orissa is low** compared to those in other States. The power required to meet the deficit from outside the state is charged with exorbitant rates of tariff which the general consumers of the State are not able to afford as they were enjoying low tariff for several years in the past. The power situation in Orissa in the post reform period was highly comfortable. OHPC (Orissa Hydro Power Corporation), OPGC (Orissa Power Generation Corporation), TTPS (Talcher Thermal PowerStation) and Central Sector shares made Orissa comfortable in the area of power availability at a particular period. Orissa then was in overall energy surplus situation, and there was generally no deficit even during the summer months in the State. However, the position has changed drastically over the period of time due to increases in demand, and **no significant addition** of any new generating units in the State. In summer months, the hydro reservoirs generally become dry and due to monsoon failure, the hydro power availability goes down. Added to this, due to problems in **coal supply and equipment trouble**, the thermal plants don't run to their full capacity. As a result of this, the State faces shortage of power for

which the licensees resort to load shedding. This is the inevitable situation of the present generation system.

INSTALLED CAPACITY & NORMATIVE ENERGY AVAILABILITY OF ORISSA

	HYDRO	**THERMAL (STATE+IPP)**	**CENTRAL HYDRO**	**CENTRAL THERMAL**	**TOTAL**
Capacity(MW)	2142	1880	189	895	**5106**
Energy (MU)	5843.36	12417.31	921.42	7039.33	**26221.42**

Also the state availing energy from other sources like surplus power from CPPs & Co-generation plants, UI over drawl & from power exchanges.

According to LGBR report 2013-14 the peak demand & energy requirement position for the state during 2012-13 of Orissa as mentioned below:-

Energy	Requirement (MU)	Availability (MU)	Surplus(+)/Deficit (-) (MU)	(%)
	25155	**24320**	**-835**	**-3.3**

Peak Demand	Requirement (MW)	Availability (MW)	Surplus(+)/Deficit (-) (MW)	(%)
	3968	**3694**	**-274**	**-6.9**

Anticipated month wise power supply position for 2013-14

Energy	Requirement (MU)	Availability (MU)	Surplus(+)/Deficit (-) (MU)	(%)
	27130	**26911**	**-219**	**-0.8**

Peak Demand	Requirement (MW)	Availability (MW)	Surplus(+)/Deficit (-) (MW)	(%)
	3800	**4238**	**438**	**11.5**

MAJOR PROBLEMS

(1)Hydro Power Station

Due to weak monsoon the water level at various reservoir get depleted, which force the various hydro stations in the state to operate at lower PLF. But due to industrialization the water consumption level is rises subsequently but the people in the state protesting in order to ensure that there must be sufficient water level should be maintained in order to meet the requirement of the agricultural need.

Also due to inadequate maintenance & Up gradation of various Hydro stations they are not being able to operate up to their full potential.

(2) **Thermal Power Plants**

(a) Non-availability of coal:

In some corner, there is a general feeling that our country doesn't have adequate stock of coal. For which reason, the thermal projects are unable to get the required raw material and the thermal power generation is gradually dwindling to a considerable extent day by day. CIL (Coal India Limited) is also unable to supply even 80% of the requirement needed by various coal-based thermal power plants, because of lack of investment in infrastructure(Rail connectivity) in order to supplement the need for various power plants.

(b) The other constraint in this regard is timely maintenance of the power plants at regular intervals. This should be properly ensured at the low demand period so that the breakdowns of the plants can be avoided during high demand period. This calls for a proper foresighted plan.

(c) Here are two basic reasons like Land acquisition and other procedural delays creating resistance which in turn cause the delay in commissioning of various projects of IPPs.

(d) The CPPs (Captive Generating Plants) are unable to deliver the surplus power to the grid because of non-availability of coal/suitable grade coals to the plant sites of the CPPs.

(e) Also the tariff structure not being supportive to various CPPS & IPPs.

GRIDCO is the authority which now purchases bulk power and sells the same to distributors and other states. There are certain important things to be noted in this connection. Although there was tariff rise in 2012- 13 as per the orders of OERC due to various factors like increase in generation cost and power purchase cost, increase in the number of electricity consumers, inadequate generation of hydro and thermal power etc., the phenomenal rise in the tariff is still low compared to analogous State of affairs in other states. GRIDCO, under these circumstances, is still succumbed to colossal loss in all its deals including deals with the power supply organizations and retail distributors. GRIDCO meets the loss by borrowing from other sources with the State Government guarantee. This apart, due to fall in generation of hydro and thermal power in the State, GRIDCO is confronted with a serious power distribution problem.

Due to rise in coal price and furnace oil, there is similarly a derogatory scenario in the area of thermal power generation. These factors have increased the cost of thermal power to GRIDCO. Inadequate supply of coal to different thermal power plants have periodically led to closure of several units of thermal generating stations resulting in a significant fall in thermal power generation.

When there is acute power shortage and chances of meeting the situation becomes far-flung from the side of power-generation units of the State, GRIDCO is compelled to hold negotiations with other States to make up the shortfall in power by way of purchase deals under power banking system. Most unfortunately, their power rates being higher, they help us by selling their surplus power at higher rates followed by imposition of their terms. The peculiar factor in this connection is that the surplus States actually purchase coal from Orissa. GRIDCO very often purchases power from theses States at rates much higher than the rates approved by the Commission. This entails an additional burden on the fiscal position of the GRIDCO while meeting the requirement of the consumers of the State.

So creating awareness among the people of the state, promoting more non-conventional sources of power generation, Demand side mgmt, measures must be taken to prevent power theft/pilferage, proper maintenance of sub stations ,T/Ls helps in solving then various issues regarding rise in acute power shortages.

CAPTIVE POWER SCENARIO IN ORISSA

Total Installed Capacity

The total installed capacity of various captive power plants in Orissa was around 5628 MW. The detail is mentioned in the below table:-

SL NO	NAME OF CPPs	INSTALLED CAPACITY	TOTAL CAPACITY(MW)
1	AARATI STEEL GHANTIKHAL, CUTTACK	1 X 40	40
2	ACC, Bargarh	1 x 30	30
3	ACTION ISPAT & POWER PVT. LTD.	1 X 12 + 1 X 25	37
4	ARYAN ISPAT & POWER PVT. LTD.	1 X 18	18
5	BHUSAN STEEL LTD.,MERAMUNDALI	1 X 33+1 X 77+ 2 X 150	410
6	BHUSAN POWER & STEEL , JHARSUGUDA	1X60 + 1X40 + 2X130 + 2 X 8	376
7	EMAMI PaperMills Ltd.	1 X 15 + 1 x 5	20
8	FACOR	1 X 45	45
9	HPCL(HINDALCO),(HIRAKUD)	1 X 67.5 + 3 x 100	367.5
10	ICCL(CHOUDWAR)	2 X 54 + 1 X 30	138
11	IFFCO (PARADEEP)	2 X 55	110
12	JINDAL STAINLESS LTD., DUBURI	2 X 125	250
13	JINDAL STEEL & POWER LTD., ANGUL	4 X 135	540
14	NINL (DUBURI)	2 X 19.25 + 1 X 24	62.5
15	MAHAVIR FERRO ALLOYS PVT. LTD.	1 X 12	12
16	MAHESWARI ISPAT PVT. LTD.	2 x 12	24
17	Maithan Ispat Nigam Ltd., Jajpur	1 x 30	30

	Road		
18	MSP Mettallics Ltd.	1 x 25	25
19	NALCO(ANGUL)	10 X 120	1200
20	NARBHERAM POWER & STEEL PVT. LTD.	1 x 8	8
21	NBVL (MERAMUNDALI)	1 X 30 + 1X 65	95
22	Orissa Sponge Iron & steel LTD.	1 X 24	24
23	PATTANAIK STEEL, (KEONJHAR)	1 X 15	15
24	Rathi Steel & Power Ltd.(Katapalli)	1 X 20	20
25	RSP(ROURKELA)	2 X 60 + 4 X 25	220
26	SHYAM DRI, (PANDOLI, SAMBALPUR)	1 X 30	30
27	SMC POWER GENERATION LTD.	1 X 8 + 1 X 25	33
28	SREE GANESH	1 X 32	32
29	TATA SPONGE IRON (JODA)	1 X 18.5 + 1 X 7.5	26
30	VEDANTA (JHARSUGUDA))	9 X 135	1215
31	VEDANTA (LANJIGARH)	3 X 30	90
32	VISA STEEL LTD., (NEW DUBURI)	3 X 25	75
33	YAZDANI Steel & Power Ltd.	1 X 10	10
TOTAL		**5628 MW**	

REGULATORY FRAMEWORK FOR CPPs

The Commission through a consultative process followed by Public Hearing on 03.01.2008 had issued a Policy on harnessing of Surplus Power from Captive Generating Plants.

(a)Firm Power

Those captive generators who give a commitment for supply of power for a period of more than 3 months & up to 1 year shall be considered as supplier of firm power of electricity form their Captive Generating Plants.

The firm supplies may be procured form CPPs by GRIDCO/ Distribution Licensees through the Competitive Bidding route as per provision under Section- 63 of Electricity Act, 2003. To avoid cartelization of a few large CPPs artificially boosting the pricing of surplus power from CPPs, the Commission has capped that the acceptable cost determined through the competitive bidding route should be within 10% of the maximum of cost of generation which can be certified by reputed firm of CAs to be appointed & approved by the Commission for consumption by State Utilities. The State Utilities are free to purchase Power at a higher rate than 110 % of the cost of generation through the competitive route for purpose of trading.

(b) Non-firm Power

Those of the captive generators who are capable of giving day ahead schedule but are not in a position to give supply continuously for a period up to three months shall be treated as non-firm supplier of electricity. As an example, if a CPP is in a position to give its day ahead schedule for 21 days, 35 days, 40 days etc. during a period of three months shall be considered as non-firm supplier of electricity in a block period of 3 months.

Non-firm supplier of electricity has to declare at the beginning of the period of three months about the volume of energy that they would be supplying to the state grid. In case of failure to supply the declared volume, they may have to pay penalty at double the rate so that the supplier will be in a position to provide power to the consumers even by purchase of high cost power if need arises. This rate has to be decided through the process of competitive bidding.

(c) **Inadvertent Power**

Other than the firm and non-firm power as stated above, any kind of injection by the Captive Generating Plants to the State Grid will be treated as purely inadvertent injection of power to the Grid. In other words power injected by the Captive Generators without giving day ahead schedule would be treated as inadvertent injection of power and would be priced equal to the pooled cost of

hydro power of the State. However, there shall be no payment for any kind of injection firm, non-firm or inadvertent at frequency of 50.2 HZ or more as a matter of grid discipline.

The CPPs are, however, at liberty to sell their power or avail Open Access as envisaged in the Act. If the CPPs are given the facilities like land at concessional rate, water supply and other benefits by the state for setting up the industries and have entered or will enter into an agreement for sale of their surplus power to the state, then the enforcements of the contractual provisions have to be addressed by the state.

Once the pricing of the surplus power from the CPPs to be sold to GRIDCO which is a State Govt. designated agency is determined through transparent bidding process, this has to be placed before OERC for taking into account the same while determining the ARR for the relevant year/ years. There is no need or scope for approval for fixation of price by any other authority for supply of surplus power from CPPs to GRIDCO meant for supply to DISTCOs. The Captive Generating Plants are free to sell their power through Open Access if they do not want to participate in a bidding process for determination of tariff for sale of power inside Orissa to GRIDCO.

The Commission has also decided to review the present order on Pricing of Surplus Power from CPPs at appropriate time based on feedbacks from different stakeholders and consistent with the legal provisions prevalent at that point of time.

In order to harness of surplus power from the Captive Generating Plants of the State which are stated as under:-

(a)GRIDCO is functioning as the State Designated entity declared by Govt. of Orissa for procurement of power from generating stations and for bulk supply of power to DISCOMs in the ambit of Single Buyer Model prevalent in Orissa.

(b)GRIDCO is procuring surplus power from various CPPs of the State to meet the State consumption.

(c) GRIDCO has been procuring scheduled surplus power from different CPPs of Orissa at the graded rates approved by:-

(i) The price of supply up to 7.3 MU per month (~ 10 MW Avg. and below) would be Rs.2.75 per KWh.

(ii) The price for supply of incremental energy above 7.3 MU/month and up to 36 MU/month (above Avg. 10 MW and up to Avg. 50 MW) would be Rs.3.10 per KWh.

(iii) In respect of supply of incremental energy beyond 36 MU/month (above ~ 50 MW) the incremental energy would be priced at Rs.3.25 per KWh.

(iv) If the CPPs are supplying 60% of their surplus power after transferring 40% of their surplus power through OPEN ACCESS then they will be paid at a slab rate of Rs2.75/3.00/3.20 per KWh.

GRIDCO in its wisdom has decided not only to limit scheduled power at 90 to 100% of the day ahead schedule and any power injected below this range in the day ahead schedule is now being treated with discrimination i.e. in the event of any fall in power injection below 90% of the schedule the power rates are proportionately reduced up to a floor limit of 62.51 p/KWh.

Also GRIDCO has **unilaterally** decided not to give this slab rates of power as directed by the Commission, but has decided to give only Rs.2.75 /unit for power injected within 90-100% of the day ahead schedule for which net receivables have been as low as Rs.1.19/unit and with a maximum of Rs.2.75/unit only for Vedanta. In certain cases it has come down to Rs.1.04/unit. The market scenario in today's power market is such that if power is injected beyond schedule, CPPs should have been granted UI rate from the ERLDC as per the CERC guidelines. However, in a situation where we are captive to the State without having right of open access and almost forced to inject power to the State in a day ahead schedule basis because of necessity, the CPPs are subjected to severe financial stress.

Also previously in the past the captive power plants are not being paid by GRIDCO on regular interval of time ,which is a violation of the agreements, the Commission's directions and also in violation of the LOI of GRIDCO earlier issued.

According to LOI GRIDCO can claim 2% rebate if payment is made within 4 days as ordered by the Commission. 1% rebate is being claimed if payment is made within 30 days of the day of presentation of the bill. However, in case due to some inadvertent reasons if payment cannot be released within 30 days then the dues are paid to the CPPs without any rebate after 60 days from the date of presentation of the bill. Also a penalty @1.25% of the remaining unpaid bill amount ,if the payment is made after 30 days.

The Commission had also directed that CPPs may be allowed open access and a different tariff was supposed to be made applicable in such cases, However, GRIDCO in its interest to avail **"unscheduled tariff benefits"** restricted open access quantum from the CPPs. Further as Industries owning fossil fuel based CPPs have to buy **RPOs/RECs**, this mandates open access for RPO has to be permitted by GRIDCO.

Also in the order given by OERC it has been clearly mentioned that the rates quoted in the said order are **"ceiling price".** It is optional for the CPPs whether to supply their surplus to GRIDCO as per the commercial & technical terms. The cost incurred by the GRIDCO for procuring surplus power from CPPs ultimately is passed on to the tariff to the paid by the consumers of the State. Therefore, GRIDCO always looks forward & gives priority for procuring cheaper power from various generating **sources at a negotiable tariff**. As increase in rate of the energy is being procured from captive power plants will have an adverse effect on tariff which is fully passed on to the consumers. But also the revenue earned by CPPs from selling surplus power is a bonus to them.

Also the basic fact is that in the state 4 DISCOMs AT&C losses also high, also they are not able to recover the cost of the energy which they are selling to the various category consumers. Also which in turn affect the revenue of the GRIDCO, because as a single entity buyer in the state it purchases power from various sources to meet the growing demand of the consumers & also to wipe out the energy shortage situation in the state. But in order to protect the consumers interest the regulator doesn't allowing for the rise in tariff, which ultimately increases the gap in the cost of supply & annual revenue requirement. So the a huge arrear is being created, which keeps on building up over the period of time, ultimately affects the financial health of the GRIDCO.

Also another major issue is that Captive plants having higher capacity have to purchase a considerable amount of coal/fuel through e-auction, import etc. at a higher price, which also cause an uneven rise in their cost of production, if there is no subsequent rise in price based upon type of fuel used by the captive power plants, so they are feeling reluctant to sign any sort of agreement with GRIDCO in order to provide power on a long term basis based upon the need of the consumers of the state.

In such matter also the commission directed that if those captive power plants are not being satisfied with the provision then they can sell their power through "OPEN ACCESS" without any sort of discrimination. But in the fear of losing the any industrial consumer who basically cross-subsidize the revenue loss incurred by DISCOMs by paying higher tariff on power purchase. So Nodal agency while protecting the interest of Discoms & Gridco is not allowing OPEN ACCESS in the state for CPPs, if they are selling their surplus power to any other than GRIDCO. But these captive can be allowed for open access in the case they are wheeling their power for the consumption in their sister concern group of companies. Also in order to minimize the revenue loss gap Gridco purchases the surplus power from the Captives, sell them at exchange /through UI to various category consumers in/out of the state.

Also the Commission clarifies and reiterates that the rate fixed by the Commission for sale of surplus power by the CPPs/Co-generating plants to GRIDCO from time to time is the rate at which GRIDCO is to pay that it cannot pay at a rate higher than the ceiling rate fixed by the Commission and it can purchase at rates mutually negotiated and agreed rate between the parties within the ceiling price. In case the minimum rate offered by CPP is higher than the ceiling price or not acceptable to them, then GRIDCO should not purchase and open access should be allowed to CPP. However, if the GRIDCO has purchased the surplus power from the CPPs without any formal agreement or prior negotiation, the rate fixed by the commission from time to time will prevails.

Also another major issue is that it also extremely difficult to make appropriate cost allocation of the different cost components of the industries between the CPP and its main products and other bi-products.so it also not being easy for commission to raise tariff for captive power plants ,so that they can sell their surplus power comfortably but at the same time it is extremely difficult for GRIDCO to purchase power at such hiked rate where the commission is not allowing for the raise in ARR of Gridco & protection of consumers interest is being given the most important

priority. Also Gridco procure power to meet the demand of the state consumers as per merit order form various CPPs, also the remaining power (if any) can be procured for the purpose of trading.

Also there is provision that If the State Govt. or GRIDCO insist upon the owner of CPP to supply more electricity to the State Grid for public interest, and thereby CPP's total sale (including sale under Open Access) increases more than 49% of its total generation, then the issue to be addressed with mutual satisfaction in the PPA, or special agreement before such supply is effected. The existing PPA is to be suitably amended. The rate of purchase of surplus power by GRIDCO from the CPPs has been fixed by the Commission from time to time depending on the market condition. When the rate at power exchange and UI rate was substantially higher, for the benefit of the consumer, the Commission had fixed the purchase price of surplus power by GRIDCO from CPPs.

Also commission allows all the CPPs to operate as "must run" plant, because the contribution of the captives in the eastern grid is so low that any deviation will not impact on the grid frequency. Any injection over 105% of the implemented schedule by the CPPs/co-generating plants within the Operating Frequency Band of 49.50 HZ to 50.18 HZ shall be treated as inadvertent power or infirm power. Such over injection beyond the 105% of schedule and within the operating frequency band of 49.50 HZ to 50.18 HZ shall be paid at pooled cost of the State hydro power as approved by the Commission for respective years.

Also the Intra state ABT mechanism isn't being implemented for Captives, So the CPPs are not being paid as per the frequency linked rate of un-scheduled interchange (UI) principle.

Also the Commission directs that the injection of surplus power by CPP/Co-generation plant below the schedule, (but not lower than 1 MW) below the frequency of 50.2 Hz shall be paid as under:-

(i) Injection of Surplus power by CPPs/Co-generating Plants between 100% and up to 80% of the schedule would be paid as per the rate approved bythe Commission.

(ii) Injection of surplus power by CPPs/Co-generating Plants between 60% and above and up to 80% of the schedule, the rate fixed by the Commission

in their order will be reduced by 10% subject to the minimum that it should not be below the pooled cost of hydro power of the State approved by the Commission for the respective years.

(iii) Injection of surplus power by CPPs/Co-generating Plants below 60% schedule would be paid at the pooled cost of hydro power of the State approved by the Commission for the respective years.

In case the consumption of captive power plants in the year is less than 51% of the power generated, then they will be paid at a price which is equal to the average cost at which Gridco procured power from NTPC in the Eastern region. If the procurement cost is higher than the "SLAB RATE" then captives will be paid at the slab rate fixed by the commission.(Basically being paid which one is lower).

MAJOR HURDLES FOR CAPTIVES IN ORISSA

As we know Gridco is a "single entity buyer" in Orissa. Which basically purchases energy from various sources in order to meet the demand of the state. The price at which it supply power to various Discoms is known as "Bulk Supply Price"(BSP),Which is basically regulated by commission because any change in the Bulk supply tariff will put direct impact on the "Retail supply tariff"(RST) which is ultimately going to put burden on the consumers of the state. While there is determination of ARR by commission BSP is the major part of concern.

Because in the Average Tariff component of DISCOMs ,which basically constitute

COMPONENTS	**PERCENTAGE(%)**
Power Purchase cost	74.70%
Transmission & SLDC charge	6.9%
Distribution cost	18.30%
TOTAL	**100%**

Gridco basically procures 80% of total power through Merit order basis from OHPC, OPGC, TTPS,Central Generating Stations, IPPs etc.

Sl No	Particulars	2011-12	2012-13	2013-14
1	Avg. cost of supply	**408.87**	**460.51**	**466.68**
	Overall tariff	**404.01**	**451.84**	**457.71**
2	**Break up**			
a	Power Purchased from Generators by Gridco	210.32	236.17	229.01
b	Debt servicing and other expenditure of Gridco	21.33	34.57	36.26
c	**Total Bulk supply price of Gridco payable by Discoms**	231.65	270.74	265.27
d	Transmission charges	25	25	25
e	SLDC charges	0.18	0.18	0.16
f	Distribution cost borne by the Discoms	147.18	155.92	167.28

From the above table we come to see that ARR of Gridco which is equal to total Bulk supply price of Gridco payable by Discoms. If there is any sort of variation in the power purchase cost which an subsequently creates changes in the overall tariff structure, if this will not pass through by commission in the next year ARR then ARR loss gap will keep on building up over the period of time. In the above power purchase cost has been reduced in view that there will be power available at a cheaper rate (if hydro output rises due to better monsoon etc.),but at the same time distribution Cost has been increases in the view that R&M of various transmission lines, S/Ss, augmentation of new lines ,T/F s expecting the rise in demand of load in the upcoming period.

Financial Year	ARR approved by OERC (Cr.)	Surplus(+)/Deficit(-)(Cr.)	Avg. BSP(Approved) (PU)	Approved Avg. Power Purchase(PU)
2008-09	2486.53	(-) 94.93	122.15	127.4
2009-10	3123.1	(-) 637.69	122.2	148.27
2010-11	4242.44	(-) 806.15	170.25	174.58
2011-12	5952.92	(-)746.05	231.65	210.32
2012-13	6950.64	(-)700.58	270.74	236.17
2013-14	5509.51	-NA-	265.27	229.01

In the above as we can see that there is deficit situation persists throughout various financial year. This can be possibly happen due to rise in difference in the Revenue requirement as compared to ARR approved & Revenue earned by sale of power(to DISCOMs) against ARR approved, the deficit situation is keep on piling up over the period of time. As the commission is not passing all the deficit amount in the upcoming year ARR, so it keep on building up over the period of time.

(a)As we can see in the above that as BSP < Avg. power purchase cost for 2008-09,2009-10,2010-11 the deficit is likely to rise up over the period of time.

(b)But as we can see in the above that in 2011-12,2102-13 although BSP> Avg. power purchase cost but still the deficit situation is there .It happens when there is variation in the power purchase cost (i.e deviation in power purchase cost as compared to the approved amount by the commission).

This situation happens when there fall in output from hydro resources (cheaper source) as expected, also now-a-day due to fuel crisis & rise in price of fuel the thermal output price also increases, also there is situations like unexpected rise in demand & various govt. development schemes cause the escalation in power purchase cost than anticipated.

But as we know the commission regulate both BSP(equal to ARR of Gridco),which on the other hand has major contribution towards control of any sort of variation in RST.As the power purchase cost seems to be vary as compared to approved ones but the approved tariff which seems to be fixed throughout the year.

YEAR	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**
AT&C LOSS(%)(At LT Level)	66.18%	61.68%	63.87%	63.78%	63.80%
Overall AT & C loss(%)	43.28%	41.73%	43.34%	40.28%	36.84%

But as we can see from the table that due to high AT&C loss level ,the DISCOMs are unable to recover the revenue from the consumers in the state. So that they are unable to pay the due amount to Gridco, as a result Gridco is overburdened with the current as well as the past liabilities because Gridco is unable to clear its dues like interest on loan, other financial expense

etc. The deficit has ballooned because of the fact that the DISCOMs are not paying the BSP Bills and the outstanding dues which stands at about Rs.4600Crore as of September, 2012.

Also as less revenue being realized by Gridco from DISCOMs as compared to the amount paid by Gridco to various generators towards power purchase. That's why Gridco also had taken loan for discharge its obligation towards various Gencos & also to pay the UI bills, as a result Gridco's payment towards various Debt service also being pilled up. As a result the cash deficit was around 873.87 Crore in the FY 2012-13. As on 31.03.2012 the outstanding was around 1248.34 Cr. Which was going to be payable by discoms to Gridco. Also the BSP DUEs & UI DUEs are mentioned below:-

-	**BSP DUES (Rs. Cr.)**		**UI DUES(Rs. Cr.)**
DISCOMs	**FY 2011-12**	**FY 2012-13**	
WESCO	238.86	223.1	60.98
NESCO	89.05	167.01	31.77
SOUTHCO	31.3	0	13.36
CESU	75.12	0	40.77
TOTAL	**434.33**	**390.11**	**146.88**

Also the approved amount of power to be purchased in the FY 2013-14 by commission is given below:-

ENERGY (MU)	**TOTAL RATE (Pu.)(AVG.)**	**TOTAL COST (Rs. Cr.)**
24,058.40	229.01	5,509.51

Also keeping in view the statutory requirement to protect the interest of the consumers and the need for adequate attention to refurbish the fragile network of the DISCOMs, the Commission, has therefore, decided that w.e.f. 1.4.2013 there will be release of fund from the Escrow account by Gridco in order to minimize the deficit situation.

Due to the above deficit situation a huge arrear being created ,as a result GRIDCO has failed to clear the **dues of the CPPs** allowed large arrears to continue and has also unilaterally reduced the tariff approved by the Commission but also buying costlier power from outside the State.

Also due to transmission constraint & lack of planning by Gridco the surplus power also not being evacuated properly. GRIDCO in its filing has proposed to procure 1092.04 MU of energy from the CPPs at a rate of Rs 2.75/Pu for 2013-14. In 2012-13 the commission had given approval for procurement of around 696.10 MUs from various CPPs But the quantum of procurement basically regulated by state commission approval, state demand pattern for that year, availability of any cheaper source of power, actual ARR deficit situation (where surplus power procured & traded through Bilateral & through UI exchange).

By looking at above situations we comes to conclusion that why not the CPPs in orissa aren't able sell their power more economically & profitably. The detail is mentioned as under:-

(1)As there is a huge Gap in ARR of Gridco is being left by Commission ,that's why to minimize the loss gap Gridco itself purchase the surplus capacity from the available sources (like CPPs) & trade the power through UI & energy exchange in order to reduce its loss gap.

That's why in the state of Orissa as there is delay in implementation of Intra-state ABT mechanism, till that time CPPs will not able to trade their power through UI in order to maximize their revenue from their surplus capacity.

As in various Govt. schemes like RGGVY,BGVY there is likely to be addition of new consumers ,as a result load demand rises but at the same time as there is no full recovery of revenue from the DISCOMs due to high AT & C loss, also due to poor hydrology condition the output is being reduced from 57% to 22%,power purchase cost from various thermal stations also rises. If under these circumstances if the CPPs are allowed to trade their surplus power by their own without any purchase by Gridco, then its loss level will be rise to a significant level. Because basically Gridco fill its ARR gap by selling the Surplus power at a better trade margin to minimize its Revenue Losses.

That's why this year due to availability of surplus power around 200 MW this year, that's why Gridco has float a tender to evacuate the available energy at Rs 800 crore ,where the per unit(1 KWh) price is being fixed at Rs 4/KWh. So that it can able fill the deficit gap in its ARR easily.

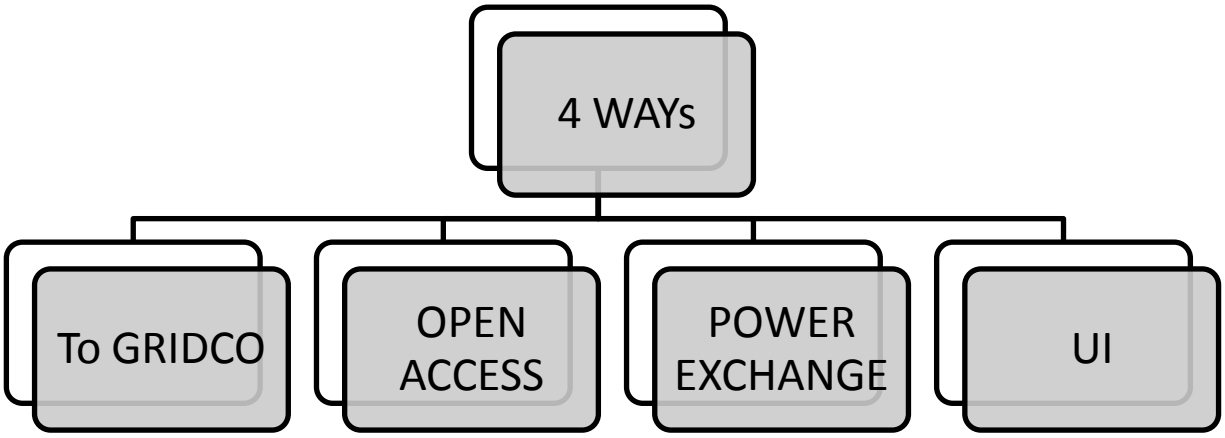
(2)Also another main problem is that the state nodal agency (SLDC) is feeling reluctant to give OPEN ACCESS to various CPPs to sell their power to any EHT & HT consumer. The main reason is that if the OPEN ACCESS is allowed ,then the Discoms will likely to lose their industrial consumer base (generally HT & EHT category),as a result their revenue is going to fall as the industrial consumers cross-subsidize the losses of the Discoms.

At the same time the Discoms are unable to clear the dues of Gridco on time because they are already suffer through huge AT &C loss level ,as a result a huge arrear gap will keep on building up. So the financial health of Gridco will be more worsen.

A CASE STUDY OF VAL

SWOT ANALYSIS

WAYS TO HARNESS THE SURPLUS POTENTIAL



(1)**To GRIDCO**

The surplus power can be fed to Gridco at slab rate fixed by commission. But as now Gridco unilaterally gives only Rs2.75/KWh.

But the CPP during calendar year 2012 & 2013 is able to fed only few percentage of its surplus capacity. It is because of due to maintenance & some modification one of the 135 MW unit is being on shut down throughout the year. Also its switchyard capacity is 550 MW, out of which 530 MW is being reserved for evacuation of power from IPP so only 20MW is being left out for evacuation of surplus power from CPP. In case output from IPP when reduced at that time the CPP can able to fed its surplus to the grid based on the approval & requirement of GRIDCO.

(2)**OPEN ACCESS**

In this method the CPP can able to sell its surplus power to any bulk consumer on mutual negotiation for any sort of period.

Here the consumer has to pay Cross subsidy surcharge, wheeling charge, transmission loss, wheeling loss, transmission charge, SLDC charge etc besides the energy cost. If in today's scenario the captives are allowed to sell their power through OPEN ACCESS ,then although the HT & EHT consumers can avail the power in more cheaper rate but at the same time Discoms

lose their consumer base which ultimately affect the revenue of Discoms as well as Gridco. So there is feeling of reluctance to allow open access. whyn't allowing that mentioned below:-

Licensee	**Cross subsidy (EHT)(paisa)**	**Cross subsidy (HT)(paisa)**	**Wheeling Charge(paisa)**	**Transmission line charge(paisa)**	**Sldc charge(paisa)**
WESCO	158	76	61.3	25	0.18

If VAL supplies power direct to any industrial consumer in the western region in Orissa then the consumer has to pay the charges around Rs4.68/KWh(for EHT consumer),Rs4.72(for HT consumer) assuming the energy charge per unit Rs.2.75,at the same if they are procuring power from Discom then they will have to pay Rs.5.51/Pu. on an average(for an EHT consumer) ,Rs.5.52/Pu. on an average (for a HT consumer).Here transmission loss at EHT is being taken at 3.80% & wheeling loss at HT is being taken at 8%.(for 2012-13)

So in the above situation Discom likely to lose revenue around Rs0.83/Pu.(from a EHT consumer) & Rs. 0.80/Pu.(from a HT consumer),which ultimately affects the revenue loss level for both Discom & Gridco. So if the OPEN ACCESS is being allowed to Cpp to sell its surplus power through this path, then the Cpp can easily utilize its current surplus capacity & able maximize its revenue.

(3)**Through POWER EXCHANGE**

As IEX has divided the whole country into 12 zones ,They are named as E1,E2,A1,A2,N1,N2,N3,S1,S2,W1,W2,W3.Out of which Orissa comes in E2 zone. So the energy price detail during various periods of a day for the fy 2012-13 & fy 2013-14 mentioned below:-

for 2013-14	
Summary	**E2**
Average (RTC)	2217.53
Peak	2415.04
Non Peak	2151.69
Day	2384.4
Night	2094.87
Morning	1843.9

for 2012-13	
Summary	**E2**
Average (RTC)	2909.8
Peak	3355.21
Non Peak	2761.33
Day	3020.01
Night	2631.09
Morning	2536.55

Also the average price during various month in calendar year 2012 & 2013 mentioned below:-

Year	**Month**	**E2**
2012	Apr	2726.64
	May	3205.03
	Jun	3951.53
	Jul	4148.17
	Aug	3321.06
	Sep	2160.45
	Oct	3315.47
	Nov	2830.8
	Dec	2702.34

Year Month	**Month**	**E2**
2013	Jan	2628.49
	Feb	1712.49
	Mar	2113.5
	Apr	2604.16
	May	2314.49
	Jun	1939.75
	July	2017.38

As we can see from the above tables that there is variation in the price /KWh in different period of time. So here the scope is that the CPP can trade its surplus at exchange during various periods of a day (specially during peak hours), because as the COP(cost of production) for CPP during fy2012-13 & fy2013-14 is around Rs.2.48 &Rs.2.16 respectively. So based upon the required revenue margin & through past trend analysis CPP can sell its surplus power to maximize its revenue. But as the CPP is a intra-state entity, so it need to obtain "No Objection" from the SLDC prior to participate in Trading through power exchange.

(4)**Through UI**

In this method the CPP can inject its surplus power to grid based upon Grid frequency prevails at that period. As we know UI means drawl or injection of power excess/below the schedule. Also the payment basically regulated by the Grid frequency.

Higher the Grid frequency lower the payment will be made ,as the demand of power is low at the grid. But at the peak period where there is high load demand the frequency at the grid is low ,so any injection made during that period above the schedule will make better revenue as the per unit price of energy is high at that time.

FY	**UI RECEIVABLE FROM ER POOL**	**UI RECEIVABLE FROM DISCOM**	**UI PAYBALE TO DISCOM**	**NET UI RECEIVABLE**
2012-13	-246,960,830	1,724,240,698	401,619,994	**1,075,659,874**
2013-14	35,545,688	1,039,437,917	97,438,733	**977,544,872**

The above table shows the detail regarding the net UI receivable by the SLDC, Orissa UI pool account. As we can see from the above table that during fy 2012-13 there is payment to be made to the ER pool, because Gridco had drawn excess power to meet the demand of the state, but in 2013-14 there is payment to be received from the ER pool, because Gridco has injected power during this period. So looking at the above situations where CPP can take the advantage of UI & inject power to the grid in order to meet the excess requirement either in the Eastern region/in the state itself. As the CPP is not a regional entity (i.e not connected to CTU grid),so any power they inject without schedule will be considered as Inadvertent & As the Intra-state ABT mechanism for CPPSs is going to be implemented soon, then after they can able to take the advantage of UI.

CONCLUSION

As current power scenario of India is shackling India's growth story. The lack of affordable and quality power is impeding the potential that the Indian industry can achieve. The key issues with the current state of power. First, the installed capacity in the country is clearly lacking. The demand outweighs the supply and thus the country's industry as well as its general society is riddled by frequent power shortages.

The impact on the micro level is a relatively obvious picture. The impact of the lack of quality and affordable power is proving difficult for the bulk of the industry made up largely by small and medium enterprises. Firms are facing cost escalation, losses in revenue, increased consumption of fuel, increased investment in captive facilities, higher inventory costs and loss in competitiveness and many other issues that are seriously detrimental to the health and stability of the Indian industry.

So captive generation is a cost effective &reliable option for various industries to prevent dependency upon the unreliable inferior quality of power supply of the state grids.

RECOMMENDATIONS

Captive generation is an important means to making competitive power available. Appropriate Commission should create an enabling environment that encourages captive power plants to be connected to the grid.

Such captive plants could inject surplus power into the grid subject to the same regulation as applicable to generating companies. Firm supplies may be bought from captive plants by distribution licensees using the guidelines issued by the Central Government under section 63 of the Act.

The prices should be differential for peak and off-peak supply and the tariff should include variable cost of generation at actual levels and reasonable compensation for capacity charges.

A frequency based real time mechanism can be used and the captive generation can be allowed to inject into the grid under the ABT mechanism.

Wheeling charges and other terms and conditions for implementation should be determined in advance the respective State Commission duly ensuring that the charges are reasonable and fair.

Grid connected captive power plants could also supply power to non-captive users connected to the grid through available transmission facilities based on negotiated tariffs. Such sale of electricity would be subject to relevant regulations for open access.

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