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THIRTY FOURTH REPORT

COMMITTEE ON PUBLIC UNDERTAKINGS

(2008-2009)

(FOURTEENTH LOK SABHA)

PHYSICAL AND FINANCIAL PERFORMANCE OF POWER GENERATING PSUs. – A HORIZONTAL STUDY.

MINISTRY OF POWER
DEPARTMENT OF ATOMIC ENERGY
MINISTRY OF NEW & RENEWABLE ENERGY

Presented to Lok Sabha on 22.12.2008
Laid in Rajya Sabha on 22.12.2008

LOK SABHA SECRETARIAT
NEW DELHI

December, 2008 / Agrahayana 1930(S)

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COMPOSITION OF THE COMMITTEE ON PUBLIC UNDERTAKINGS
(2007-2008)

Chairman
Shri Rupchand Pal

MEMBERS

Lok Sabha

2. Shri Ramdas Bandu Athawale
3. Shri Ramesh Bais
4. Shri Gurudas Dasgupta
5. Smt. Sangeeta Kumari Singh Deo
6. Shri Francis K. George
7. Dr. Vallabhbhai Kathiria
8. Ch. Lal Singh
9. *Dr. Rameshwar Oraon
10. Shri Shriniwas Patil
11. *Kunwar Jitin Prasada,
12. Shri Kashiram Rana
13. Shri Mohan Rawale
14. Shri Ramjilal Suman
15. Shri Ram Kripal Yadav

Rajya Sabha

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17 Shri R.K. Dhawan
18 Shri Mahendra Mohan
19 **Shri Ajay Maroo
20 Shri Pyarimohan Mohapatra
21 Shri K. Chandran Pillai
22 **Shri Dinesh Trivedi

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* Elected w.e.f. 17.5.2004 Dr. Rameshwar Oraon and Kunwar Jitin Prasad ceased to be Members of the Committee consequent on their appointment as Ministers of States w.e.f. 6.04.2008.
** ceased to be Members of the Committee consequent on their retirement from Rajya Sabha w.e.f. 02.04.2008 and 09.04.2008.

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8. Shri Kashiram Rana
9. Shri Mohan Rawale
10. Shri K.C. Singh "Baba"
11. Smt. Pratibha Singh
12. Shri Bharatsinh Madhavsinh Solanki
13. Shri K.V.Thangkabalu
14. Shri Rajesh Verma
15. Shri Ram Kripal Yadav

Rajya Sabha

16 Shri Rahul Bajaj
17 Shri R.K. Dhawan
18 Shri Sharad Anantrao Joshi
19 Shri K. Chandran Pillai
20 Shri Vijaykumar Rupani
21 Shri Arjun Kumar Sengupta
22 *Shri Amar Singh

Secretariat

1.	Shri J.P.Sharma,	Joint Secretary
2.	Smt. Anita Jain,	Director
3.	Shri N.S.Hooda	Deputy Secretary
4.	Shri H.Ram Prakash,	Under Secretary

* Ceased to be Member of the Committee consequent on his retirement from Rajya Sabha w.e.f. 25.11.2008.

INTRODUCTION

I, the Chairman, Committee on Public Undertakings having been authorized by the Committee to present the Report on their behalf, present this Thirty fourth Report on the Physical and Financial Performance of Power Generating PSUs "

2. The Committee were concerned with the energy security of the country and wanted to know the role and contribution of CPSUs in the power sector. In this background the subject was selected for examination by the Committee on Public Undertakings (2007-08) and was continued by the next Committee (2008-09).

3. The Committee had gone through the Report of Integrated Energy Policy of the Planning Commission and had also invited experts from the energy sector for hearing their views. The Committee had the benefit of the views of Shri Kirit S.Parikh, Member, Planning Commission, and Chairman, Expert Committee on Integrated Energy Policy. The Committee also heard the views of the experts Ms. Leena Srivastava, ED, TERI and Shri S.P.Gon Choudhary, MD, WBGEDCL Kolkata, an expert on renewable energy on 19th August, 2008 and 18th September, 2008 respectively to have an indepth understanding of the subject.

4. The Committee on Public Undertakings (2007-2008) took the evidence of the representatives of PSUs NTPC, NHPC and IREDA on 11th March, 2008 and 19th March, 2008 respectively. The oral evidence of representatives of NPCIL was held on 18th September, 2008. They further took evidence of the representatives of Ministry of New and Renewable Energy on 3rd September, 2008 and Ministry of Power and Department of Atomic Energy on 20th October, 2008.

5. To have better understanding on the working of PSUs in Power Sector, the Committee undertook the study tour in October, 2007 to visit the Lower Subansiri Project being constructed by National Hydroelectric Power Corporation Limited (NHPC Ltd.). and in January, 2008 visited the Tarapur Atomic Power station and Kakrapar Atomic Power station being operated by Nuclear Power Corporation of India Limited. The Committee had discussions with NTPC and NPCIL officials during these tours to understand the challenges faced by them.

6. The Committee on Public Undertakings (2007-2008) considered and adopted the Report at their sitting held on 19-12-2008. They would also like to place on record their appreciation for the valuable assistance rendered to them by officials of Lok Sabha Secretariat attached to the Committee.

7. The Committee wish to express their thanks to the Ministry of Power, Ministry of New & Renewable Energy, Department of Atomic Energy, the public sector companies and experts who gave evidence and placed their valuable views before them and also provided necessary inputs and information they required in connection with examination of the subject.

New Delhi……
19 December 2008
28 Agrahayana 1930(S)

RUPCHAND PAL
CHAIRMAN
COMMITTEE ON PUBLIC UNDERTAKINGS

List of Abbreviations

APDRP	ACCELERATED POWER DEVELOPMENT AND REFORM PROGRAM
APM	ADMINISTERED PRICE MECHANISM
BHAVINI	BHARTIYA NABHIKIYA VIDYUT NIGAM LTD.
BWR	BOILING WATER REACTOR
CEA	CENTRAL ELECTRICITY AUTHORITY
CERC	CENTRAL ELECTRICITY REGULATORY COMMISSION
CKM	CIRCUIT KMS
CWC	CENTRAL WATER COMMISSION
DAE	DEPTT. OF ATOMIC ENERGY
EIA	ENVIRONMENTAL IMPACT ASSESSMENT
EIA	ENERGY INFORMATION ADMINISTRATION
FBTR	FAST BREEDER TEST REACTOR
GCV	GROSS CALORIFIC VALUE
IEA	INTERNATIONAL ENERGY AGENCY
IREDA	INDIAN RENEWABLE ENERGY DEVELOPMENT AGENCY
KWH	KILOWATT HOUR
LNG	LIQUIFIED NATURAL GAS
LWR	LIGHT WATER REACTOR
MMSCMD	MILLION METRIC STANDARD CUBIC METRE PER DAY
MNRE	MINISTRY OF NEW AND RENEWABLE ENERGY
MOC	MINISTRY OF COAL
MOEF	MINISTRY OF ENVIRONMENT & FORESTS
MOP	MINISTRY OF POWER
MOPNG	MINISTRY OF PETROLEUM AND NATURAL GAS
MW	MEGA WATT
NELP	NEW EXPLORATION LICENSING POLICY
NHPC	NATIONAL HYDROELECTRIC POWER CORPORATION LTD.
NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD;
OECD	ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT
PFBR	PROTOTYPE FAST BREEDER REACTOR
PHWR	PRESSURISED HEAVY WATER REACTOR
PLF	PLANT LOAD FACTOR
RET	RENEWABLE ENERGY TECHNOLOGIES
RLNG	REGASIFIED LIQUIFIED NATURAL GAS
SLC	STANDING LINKAGE COMMITTEE FOR COAL

PART A

CHAPTER 1

INTRODUCTION

1.1 Energy is the most important factor to lead India to higher growth rate in our Agriculture, Industrial and other sectors of economy. The country is facing serious challenges in meeting its energy needs in a sustainable manner and at affordable costs. Per capita consumption of energy in India is one of the lowest in the world. Even those who have access to electricity suffer from shortages and poor quality of supply.

1.2 Electricity is one of the most convenient and widely used forms of energy by humankind. Electricity is a secondary source of energy, which means it is generated from the conversion of other primary sources of energy. The main sources of generating power in large scale namely coal, oil, gas, nuclear power, hydro etc are known as conventional sources of energy. Other sources of electrical power are wind power, solar, tidal, biomass and wastes etc., which are known as Renewable energy sources.

1.3 In order to address the issue of energy security along with reliable availability of power and petroleum products, the Planning Commission set up an Expert Committee under the Chairmanship of Dr. Kirit S. Parikh, Member, Planning Commission in August, 2004. The Committee brought a Report on Integrated Energy Policy in August 2006, where in the entire energy sector has been analyzed and many policy options presented to the government. The Report states that:-

> "By 2031-32, the power generation capacity must increase to nearly 8,00,000 MW from the current capacity of around 1,60,000MW to meet our national energy requirements."

A. ENERGY OUTLOOK - GLOBAL SCENARIO

1.4 Electricity is one of the key sectors that has the attention of most of the global countries. Due to scientific development and applications, new gadgets and equipments are developed and used by people thereby driving an increase in the energy demand.

1.5 According to the International Energy Outlook 2008 brought out by the Energy Information Administration (EIA), it is stated that:-

> "….world marketed energy consumption is projected to grow by 50 percent over the 2005 to 2030 period. ……Global energy demand grows despite the sustained high world oil prices that are projected to persist over the long term.

The most rapid growth in energy demand from 2005 to 2030 is projected for nations outside the Organization for Economic Cooperation and Development (non-OECD nations). Total non-OECD energy demand increases by 85 percent in the *IEO2008* reference case projection, as compared with an increase of 19 percent in OECD energy use.

China and India—the fastest growing non-OECD economies—will be key contributors to world energy consumption in the future. Over the past decades, their energy consumption as a share of total world energy use has increased significantly. In 1980, China and India together accounted for less than 8 percent of the world's total energy consumption; in 2005 their share had grown to 18 percent. Even stronger growth is projected over the next 25 years, with their combined energy use more than doubling and their share increasing to one-quarter of world energy consumption in 2030 in the *IEO2008* reference case. In contrast, the U.S. share of total world energy consumption is projected to contract from 22 percent in 2005 to about 17 percent in 2030.

High prices for oil and natural gas, which are expected to persist in the reference case, also encourage expanded use of renewable fuels. Renewable energy sources are attractive for environmental reasons, especially in countries where reducing greenhouse gas emissions is of particular concern. Government policies and incentives to increase the use of renewable energy sources for electricity generation are expected to encourage the development of renewable energy even when it cannot compete economically with fossil fuels.

In the absence of national policies and/or binding international agreements that would limit or reduce greenhouse gas emissions, world coal consumption is projected to increase from 123 quadrillion Btu in 2005 to 202 quadrillion Btu in 2030, at an average annual rate of 2.0 percent. Coal's share of world energy use has increased sharply over the past few years, largely because of strong increases in coal use in China, which nearly doubled between 2000 and 2005 and is poised to increase strongly in the future. With its large domestic base of coal resources and continuing strong economic growth, China alone accounts for 71 percent of the increase in world coal consumption in the IEO2008 reference case. The United States and India—both of which also have extensive domestic coal resources—each account for 9 percent of the world increase."

1.6 According to the statistics available in the 'Key World Energy Statistics, 2008' published by International Energy Agency, fuel wise shares in the world energy generation are given below:

Fuel	%
Hydro	16.4

Nuclear	14.8
Coal/Peat	41.0
Gas	20.1
Oil	5.8
Others	2.3
Total	100

1.7 Amount of electricity consumed per capita is one of the measures of a nation's progress and standard of living of its people. According to the data given by the Ministry of Power, the per capita power availability of electricity in respect of some of the countries for the year 2005 is as follows:-

Countries	Per capita availability of electricity (in KWh)
United States	13640
Australia	11439
Canada	17307
France	7707
Germany	7111
Korea	7779
United Kingdom	6254
Russia	5786
Japan	8233
South Africa	4848
Italy	5676
China	1781
Brazil	2013
India	**619**
World	**2596**

*Note: I MW-Hour = 1000 KW Hour = 1000*1000 Watt-hour.*
1KW hour is called I unit.

B. ENERGY OUTLOOK - INDIAN SCENARIO

1.8 The Indian economy has been growing at around 8 per cent during the last few years. The Government is also looking at setting targets of double-digit growth for the economy in the next few years. This growth of the economy causes a corresponding effect in the infrastructure sectors. One of the key infrastructure sectors is power. This has put pressure on the govt to produce more power. Hence the need for capacity addition in the power sector is of paramount importance. The government and the citizens are also concerned about energy security.

1.9 Electricity is concurrent subject at entry number 38 in the List III of the Seventh Schedule of the Constitution of India. The Ministry of Power is primarily responsible for the development of electrical energy in the country. The Ministry is concerned with perspective planning, policy formulation, processing of projects for investment decisions, monitoring of the implementation of power projects, training

and manpower development and the administration and enactment of legislation in regard to thermal & hydro power generation, transmission and distribution.

1.10 One of the declared policy objectives of Ministry of Power is to provide power for all by 2012 and to increase the annual per capita availability of electricity to 1000 units by 2012 from the present level of 631 units. National Electricity Policy envisages that power shortages are to be fully eliminated and adequate spinning reserve to be available by 2012.

1.11 As per the information furnished by the Ministry of Power, the all India installed power generation capacity as on 31.10.2008 was as follows:-

A.	Fuel-wise Installed Generating Capacity in MW as on 31.10.08						
	1	Thermal				92892.64	
	2	Hydro				36497.76	
	3	Nuclear				4120.00	
	4	RES				13242.41	
		Total All India				146752.81	

B.	Sector-wise Installed Generating Capacity in MW as on 31.10.08						
	Sector		Thermal	Hydro	Nuclear	RES.	Total
	Central Sector		33538.99	4572.00	4120.00	0.00	42230.99
	State Sector		47112.13	26675.76	0.00	2247.68	76035.57
	Pvt. Sector		10021.52	1230.00	0.00	10994.73	22246.25
	Joint sector						
	a)	Central & State	2220.00	4020.00	0.00	0.00	6240.00
	b)	Public & Private	0.00	0.00	0.00	0.00	0.00
	Total All India		92892.64	36497.76	4120.00	13242.41	146752.81

1.12 When asked to give the demand –supply position in the power sector, the Ministry in their written reply stated the following: -

> "As for the Demand - Supply Scenario during April – June, 2008, the energy requirement in the country was 1,88,056 Million Unit (MU) against which the availability was 1,69,117 MU, which represents a shortage of about 10%. The energy shortage was more than 15% in many regions of the country."

1.13 When asked whether the Power Ministry has prepared any document setting out objectives and plan for the next 10/20 years in the power sector, the Ministry in a reply to the Committee stated the following:-

> "1. The National Electricity Policy notified on 12.2.2005 aims at laying the guidelines for accelerated development of the power sector, providing supply of electricity to all areas and protecting interests of consumers and other stakeholders keeping in view availability of energy resources, technology available to exploit these resources, economics of generation using different resources, and energy security issues.

2. The National Electricity Policy aims at achieving the following objectives:

Access to Electricity – Available for all households in next five years

Availability of Power – Demand to be fully met by 2012. Energy and peaking shortages to be overcome and adequate spinning reserve to be available.

Supply of Reliable and Quality Power of specified standards in an efficient manner and at reasonable rates.

Per capita availability of electricity to be increased to over 1000 units by 2012.

Minimum lifeline consumption of 1 unit / household / day as a merit good by year 2012.

Financial Turnaround and Commercial Viability of Electricity Sector. Protection of consumers' interest.

3. In pursuance of provisions of Electricity Act, Central Electricity Authority has prepared a National Electricity Plan which covers the capacity addition in the 10th plan and perspective planning for the 11th & 12th plan periods. The National Electricity Plan is further sub divided into two volumes, (i) Generation Plan and (ii) Transmission Plan.

4. For demand projection, the Electric Power Survey Committee conducts periodic surveys of electricity demand and holds discussions with all the stakeholders to bring out demand forecast for use in planning exercises of all key sectors of economy i.e. coal, rail, manufacturing, infrastructure, research, industries, etc.

5. The 17th EPS report has projected electrical energy demand of 969 Tera Watt Hours for 2011-12 and peak electric demand of 153 Giga Watts entailing capacity addition of 78,000 MW by 2011-12. The electrical energy demand for 2021-22 has been estimated as 1915 Tera Watt Hours and peak electric demand of 298 Giga Watts. The demand projections have been made assuming that the utilities would be able to make rigorous efforts in containing T&D losses and adopting Demand Side Management Techniques to achieve high load factors.

6. The demand projections of EPS on all India basis for the year 2011-12, 2016-17 and 2021-22 are given below:

Year	Electrical Energy Requirement at Power Station Bus Bars (GWh)	Annual Peak Electric Load at Power Station Bus Bars (MW)
2011-12	968659	152746

2016-17	1392066	218209
2021-22	1914508	298253

1.14 When asked about the capacity addition plan to achieve the objectives of the power for all by 2012, the Ministry stated the following in their reply:-

"1. National Electricity Policy envisages that power shortages are to be fully eliminated and adequate spinning reserve to be available by 2012. The Central Electricity Authority has estimated that in order to achieve the this objective, a capacity of over 1,00,000 MW will be require to be added during 10th & 11th Plans. Government has worked out the capacity addition programme in accordance with this objective.

2. Keeping in view, the projection of electricity demand during the 11th Plan as contained in the report of 17th Electric Power Survey, Central Electricity Authority has worked out that capacity addition of nearly 80000 MW through conventional sources including large hydro and nuclear sources and another 14000 MW through renewables, it is expected that power shortages would be eliminated by 2011-12:

Year	Peaking Shortage/Surplus	Energy shortage/ Surplus
2006-07 (Actual)	-13.8%	-9.6%
2011-12 (Anticipated)	+0.7%	+5.6%

The paradigm shift brought about by Electricity Act 2003, has increased the investors confidence in the power sector. During the last two years ordering of generation projects have assumed a record scale. Over 24000 MW capacity was ordered in 2007-08 itself. Out of the proposed capacity addition during the 11th Plan, 10833 MW has been commissioned and another 62957 MW is under construction. Besides, additional projects of 4794 MW are under construction and are also likely to fructify during the 11th Plan. In addition utilizing the liberal frame work available for setting up of captive power plant, ordering of captive power plant has picked up substantially in the recent past. So far in the 11th Plan captive power plants of 1100 MW have commissioned and another 8300 MW are under construction."

The details of National Electricity Policy are placed in **Annexure – I.**

C. CAPACITY ADDITION PROGRAMME

1.15 To fulfill the objectives of New Electricity Policy, a capacity addition of 78,577 MW has been proposed for the 11th Plan, The break up of the capacity addition target is given as under: -

(in MW)

	HYDRO	THERMAL	NUCLEAR	TOTAL
CENTRAL	9685	26800	3380	39865

STATE	3605	24347	0	27952
PRIVATE	3263	7497	0	10760
TOTAL	16553	58644	3380	78577

1.16 The capacity addition in the power sector during the year 2007-08 was 12039 MW and the break up of the same is given below.

	Central sector MW	State sector MW	Private sector MW	Total
Thermal	3490	4767.20	750	9007.2
Hydro	690	1682	0	2372
Nuclear	660	0	0	660
Total	4840	6449.2	750	12039.2

1.17 During the 12th Plan, a tentative capacity addition of 94,500 MW has been planned comprising of 20,000 MW (21%) hydro, 70,000 MW (74%) thermal (67,000 MW coal and 3,000 MW lignite) and 4,500 MW (5%) nuclear.

D. ORGANISATIONS IN THE POWER SECTOR

Power Sector PSUs

1.18 There are a number of PSUs involved in various areas of power sector namely generation, transmission, financing, consultancy services, etc. The PSUs which are involved in power generation and related administrative ministries are given below:

Sector	Name of PSU	Name of administrative Ministry concerned
Thermal	a. NTPC Ltd.	Ministry of Power
Hydel	a. Damodar Valley Corporation; b. Bhakra Beas Management Board c. National Hydroelectric Power Corporation Limited; d. Tehri Hydro Development Corporation; (Joint Venture) e. Satluj Jal Vidyut Nigam Limited;.(Joint Venture) f. North Eastern Electric Power Corporation Limited	Ministry of Power
Nuclear	a. Nuclear Power Corporation of India Ltd. b. Bhartiya Nabhikiya Vidyut Nigam Ltd (BHAVINI)	Deptt. of Atomic Energy
Renewable energy	a. Indian Renewable Energy Development Agency (IREDA)- Financial Institution	Ministry of New and Renewable Energy

1.19 The Committee chose one PSU from each sector for detailed examination to understand the opportunities and challenges being faced by PSU's in the Power Sector. The details of examination are given in the succeeding chapters.

CHAPTER - 2

PERFORMANCE OF THERMAL SECTOR

2.1 Out of the installed capacity of 146753 MW as on 31.10.2008, thermal source accounts for 92983 (63.3%). Out of this, coal accounts for 76989 MW, gas accounts for 14704 MW and diesel for 1200 MW.

2.2 According to the Integrated Energy Policy:-

> "Coal accounts for over 50% of India's commercial energy consumption and about 78% of domestic coal production is dedicated to power generation. This dominance of coal in India's energy mix is not likely to change till 2031-32. Since prices were de-controlled, the sector has become profitable primarily as a result of price increases and the rising share of open cast production. India would need to augment domestic production and encourage thermal coal imports to meet its energy needs."

2.3 There are a number of Central Public Sector Undertakings in the power sector. Of them, NTPC Ltd. is the most dominant player with 28% of power generation capacity in the thermal sector. The detailed examination of NTPC Ltd. is given in the succeeding paragraphs.

A. PHYSICAL PERFORMANCE OF NTPC LTD.

I). Background of NTPC Ltd.

2.4 NTPC Limited (formerly National Thermal Power Corporation Limited) was incorporated on November 7, 1975 in Union Territory of Delhi. NTPC Limited is a Government Company within the meaning of section 617 of the Companies Act, 1956 as the President of India presently holds 89.5% of the total paid-up share capital.

2.5 The main object of NTPC at the time of its incorporation was to plan, promote and organize integrated and efficient development of Thermal power. With the passage of time, NTPC has enlarged its business portfolio by entering into development of Hydro power. It is also on the look out for opportunities in the areas of non-conventional energy sources with a view to improve fuel security. NTPC has further entered into the business of coal mining. It is also pursuing for entry into Gas/LNG value chain. It also envisages entering into nuclear power generation business, for which necessary amendments have been made in Memorandum of Association of the Company. Besides, it has, through its wholly owned subsidiaries, has developed business interests in the "Power Value Chain" from distribution to trading.

II). Share of NTPC Ltd. in the Power Generation

2.6 With approximately 1/5th of capacity, NTPC contributes to over 1/4th of nation's power generation.

As on 31.3.2007

	All India	NTPC	% share
Capacity (MW)	132329	26350	19.91%
Generation (BU) (2006-07)	659.419	188.674	28.61%
Capacity incl. JVs (MW)	132329	27904	20.71%
Generation incl. JVs (BU) (2006-07)	659.419	192.862	29.25%

2.7 When asked by Committee about efforts being made to augment the share, the company stated as under: -

> "India's generation capacity can be expected to grow from the current levels of about 130 GW to about 225-250 GW by 2017. NTPC currently accounts for about 20% of the country's installed capacity and almost 60% of the total installed capacity in the Central sector in the country. Going forward, in its target to remain the largest generating utility of India, NTPC would be encouraged by extending necessary supports to maintain or improve its share of India's generating capacity. Accordingly, NTPC targets to build an overall capacity portfolio of over 75,000 MW by 2017. This power generation portfolio would continue to reflect high share of coal-based capacity and would include around 9,000 MW in Hydro and about 2000 MW in Nuclear."

III). Installed Capacity

2.8 The Company's installed capacity is 27904 MW (including JVs with SAIL – which consist of CPPs at Durgapur, Rourkela and Bhilai aggregating 314 MW, Ratnagiri Gas and Power Pvt. Ltd (RGPPL) JV-740 MW). The power plants of NTPC Ltd. consists of coal based plants, gas/liquid fuel based plants and projects under Joint Ventures.

2.9 The Committee was given following information by NTPC Limited regarding the capacity installed and utilisation thereof of its various power plants.

Station	Capacity(MW) Design/Installed as on 31/01/08	Capacity(MW) Operating as on 31/01/08	(Apr. 2007 to Jan. 2008)	
			Gen.(MU)	PLF(%)
COAL BASED POWER PROJECTS				
Singrauli	2000	2000	13479	91.77
Korba	2100	2100	14665	95.09
Ramagundam	2600	2600	16879	88.40
Farakka	1600	1600	9662	82.23
Vindhyachal	3260	3260	20814	91.77
Rihand	2000	2000	13797	93.94
Unchahar	1050	1050	7456	96.69
NCTPP (Dadri)	840	840	5974	96.84

			(Apr. 2007 to Jan. 2008)	
Kahalgaon*	1340	1340	5577	90.41
Talcher (Kaniha)	3000	3000	20414	92.66
Talcher (Thermal)	460	460	2837	83.97
Tanda	440	440	2933	90.78
Simhadri	1000	1000	6331	86.21
Badarpur	720	705**	4487	86.68
Sipat*	500	500		
GAS / LIQUID FUEL BASED POWER PROJECTS				
ANTA	413	413	2237	72.67
AURIAYA	652	652	3362	69.01
DADRI	817	817	4304	70.64
FARIDABAD	430	430	2111	66.62
KAWAS	645	645	2870	59.55
GANDHAR	648	648	3227	66.84
KAYAMKULAM	350	350	1366	51.74
NTPC (Coal+Gas)	26865	26850	164782	

** Sipat U-4 and Kahalgaon U-5 yet to be declared commercial*

***3 Units of 100 MW derated to 95 MW each.*

The following is the installed capacity of power projects under joint ventures:-

S. No.	Project (Fuel)	State	Installed Capacity (MW)
1.	Rourkela (Coal)	Orissa	120
2.	Durgapur (Coal)	West Bengal	120
3.	Bhilai (Coal)	Chhattisgarh	74
4	RGPPL (Gas)	Maharashtra	740
Total (JV)			1,054
GRAND TOTAL (Coal + Gas + Hydro)			27,904

2.10 When asked regarding the targets and actual achievements on capacity utilization of the plants, the company in a written note stated as under:-

> "The capacity utilization (Plant Load factor) target set by Central Electricity Authority (CEA) for NTPC coal stations for 2006-07 was 86.09% against which NTPC coal stations have achieved a capacity utilization of 89.59% thereby surpassing the target by 3.50%. Including Badarpur Thermal power station, which was taken over on 1st June '06, NTPC' capacity utilization for the year was 89.43% in 2006-07.
>
> The target for NTPC gas stations set by CEA for 2006-07 was 71.0% against which NTPC gas stations have achieved a capacity utilization of 71.04%."

2.11 When asked to explain steps taken for improving PLF in power stations operated by NTPC Limited, the Company. furnished the following in a written reply:-

"During the year 2006-07, NTPC Coal plants had registered a PLF of 89.43% at 91.12% availability. Out of 14 coal stations, 7 stations had achieved PLF of more than 90.

Planned shut down for NTPC during the year was 7.23%.
NTPC has taken various measures for optimizing planned shut down and minimizing Forced Outages so that PLF can be improved. Some of the steps envisaged/taken are:

a) Modular replacement of spares to minimize outage time.
b) Improvement in planned maintenance strategy
c) Inter-regional trading of power.
d) Import of coal to mitigate domestic coal shortages,
e) Reliability Centre Maintenance (RCM) and Risk evaluation and prioritization (REAP).
f) Develop and Operationalise Specialty Repair facility(ies) etc.

The PLF of NTPC for the year 2007-08 (April – 20th March'08) has improved to 92.06 % at 93.70% availability. Planned shutdown has reduced to 6.02%. PLF could have been much higher but for lower dispatch schedule from beneficiaries. Dadri Coal and Unchahar have achieved > 97.50 % of PLF during this period. Following NTPC stations have achieved > 100 % monthly PLF in the last 4 months.

Station	Dec.'07	Jan.'08	Feb.'08	March'08 (upto 20th March)
Dadri Coal	103.87	103.73	104.90	102.51
Unchahar	104.38	103.07	104.13	101.26
Korba	101.91	100.82	100.32	102.13
Talcher_Kaniha	102.74	101.72	100.84	
Simhadri	103.12	103.63		104.78
Singrauli	102.69			
Rihand		102.82	103.31	102.81
Tanda		100.06		
Ramagundam			101.72	
Vindhyachal				100.86

As regard comparison of PLF with private sector, NTPC stated:-

Private power stations have following advantages over NTPC stations in terms of generation.

a) The IPPs have single beneficiary (like Dahanu, AE & Co. etc.) or is a Captive Plant (like Renusagar) thus having committed load / demand.
b) The private power plants are not governed by Availability Based Tariff system."

2.12 When asked by the Committee regarding the potential and technological constraints, for setting up of Thermal Power plants in India, NTPC Ltd. in the written reply stated the following:-

"The National Electricity Policy (NEP) stipulates power for all by 2012 and annual per capita consumption of electricity to rise to 1000 units from the present level of 631 units. To fulfill the objectives of the NEP a capacity addition of 78,577 MW has been proposed for the 11th Plan. Out of this, thermal power constitutes 58,644 (74.6%). NTPC has plans to add 22,430 MW (Thermal – 20,510 MW and Hydro 1920 MW) during the XI Plan which constitutes 28.54% of total and 34.97% of thermal capacity addition in the country during the XI Plan.

So far as NTPC is concerned there are no technological constraints in setting up thermal power projects."

IV). Diversification Plan

2.13 When asked to furnish details about the progress on the diversification plans, NTPC Ltd. submitted in a written reply the following: -

"The progress made by NTPC in the area of hydel power, renewable energy and nuclear power is given below: -

a) Status of Hydro Projects

Sl. No.	Project/Location	Capacity	Commissioning Target	Project Stage
	Projects by NTPC LTD			
1.	Koldam, Himachal Pradesh	800 MW	11th Plan	On going
2.	Loharinag Pala, Uttarakhand	600 MW	11th Plan	On going
3.	Tapovan Vishnugad, Uttarakhand	520 MW	11th plan	On going
4.	Rupsibagar, Khasiabara, Uttarakhand	260 MW	12th Plan	DPR submitted to CEA in Oct.'07. Land acquisition is in progress.
5.	Etalin, Arunachal Pradesh	4000 MW	12th Plan	Site specific studies are under award.
6.	Attunli, Arunachal Pradesh	500 MW	12th Plan	- do -
	Projects by NTPC HYDRO LTD.			
7.	Lata Tapovan,	171 MW	12th Plan	Land acquisition in process.

	Uttarakhand			NIT for EPC done.
8.	Rammam-III, West Bengal	120 MW	12th Plan	Land acquisition in process. NIT for EPC done.
	Total	6971 MW		

b) Renewable Energy

- NTPC has formulated its business portfolio to become a 75000 MW plus Company by 2017 which includes 1000 MW through renewable energy sources. Portfolio of renewable energy are as follows: -

- Wind energy 650 MW
- Hydro Energy 300 MW
- Solar Energy 15 MW
- Biomass Energy 15 MW
- Geothermal Energy 30 MW

An MOU with Asian Development Bank (ADB) has been signed in Jul.'07 for Establishment of Power Generation of about 500 MW through Renewable Energy Sources. "

c) NTPC's Foray into Nuclear Power Generation

NTPC has set a target for itself for commissioning a 2000 MW Nuclear Power Plant in the twelfth plan period."

V). <u>Capacity Addition Target</u>

2.14 In an information furnished to the Committee on the projects and capacity added in the Tenth and Eleventh Plan, NTPC Ltd. gave the following information:-

"<u>X Plan</u>
During the X Plan period (2002-2007) NTPC added 7155 MW capacity Including 705 MW Badarpur Thermal Power Station taken over from Govt. of India w.e.f 1-6-2006 and 740 MW capacity addition under Joint Venture at Ratnagiri Gas and Power Pvt. Ltd. (RGPPL)."

2.15 Giving details about the capacity addition programme of XI Plan, the Company furnished the following information:-

"<u>XI Plan Programme</u>
A capacity addition of about 22,000 MW has been envisaged for the XI Plan period (2007-2012).
500 MW has already been commissioned in May, 2007 (Sipat-II – Unit 4).
13,360 MW capacity is under construction.
Main Plant Bids have been invited for 7,990 MW capacity.

Feasibility Report is under finalisation of 500 MW capacity (Rihand-III).

Details of On-going projects including commissioning schedule/anticipated commissioning dates and present status are given as under.

A Completed Capacity (500 MW – Sipat II Unit-IV)
B On going projects(under construction)

Sl. No.	Project/Capacity (MW)	Benefits during XI Plan (MW)	Commissioning Schedule/Anticipated	Status
I	Coal Projects			
1	Kahalgaon-II – 1500	1000 (2x500)	U6- 10/07 U7 –12/07	Unit VI by Oct.'07 and Unit VII by Dec'07. Commissioning Delayed due to delay in supply of material by BHEL.
2	Sipat-II – 1000	1000 (2x500)	U4- 05/07 (Actual) U5 – 12/07	Unit IV Commissioned in May'07. Equipment erection and commissioning works are in Progress. Unit Commissioning expected as per schedule.
3	Sipat-I - 1980	1980 (3x660)	U1- 04/08 U2- 02/09 U3 – 12/09	Civil and Equipment erection works are in Progress. Unit Commissioning expected as per schedule.
4	Barh- 1980	1980 (3x660)	U1- 03/09 U2- 01/10 U3 – 11/10	Civil works are in Progress. Unit Commissioning expected as per schedule.
5	Bhilai Exp. Power project - JV with SAIL – (500)	500 (2x250)	U1 - 12/07 U2- 03/08	Boiler pressure part erection is in progress. There is delay in supply of sequential supplies from BHEL.
6.	Korba-III (500)	500 (1x500)	02/10	Main Civil Works are in progress. Unit commissioning expected as per schedule.
7	NCTPP-II - 980	980 (2x490)	Best effort Schedule U5- 09/09 & U6- 12/09 Schedule U5- 04/10 & U6- 10/10	MOEF Clearance for Unit#5 obtained in Oct`06. Piling work commenced in Feb`07. Unit commissioning expected as per schedule.
8	Farakka-III - 500	500 (1x500)	08/10	Unit commissioning expected as per sch.edule.
9	Simhadri-II - 1000	1000 (2x500)	U1- 11/10 U2- 05/11	Main Plant award placed in March'07. Coal linkage for Unit-2 awaited.
10	Aravali STPP - JV 1500	1500 (3x500)	U1, U2 & U3 2010	Main Plant Award placed in July, 2007. About 1500 acres of land acquired out of 2200 acres.
11	Ennore-JV -1000	1000 (2x500)	U-1 11/10, U2- 05/11	Investment approval accorded by NTECL Board on 14-7-07 Main Plant award targeted in Aug'07.

II	Hydro Projects			
12	Koldam - 800	800 (4x200)	U-1 11/08, U2-01/09 U3- 03/09 & U4-04/09	Civil works are in Progress. Unit Commissioning expected as per schedule.
13.	Loharinag Pala - 600	600 (4x150)	U-1 04/11, U2-06/11 U3- 08/11 & U4-10/11	Major packages like HRT, Power House, Barrage and Desilting chamber pkgs. have been awarded and civil works is under progress.
14.	Tapovan Vishnugad - 520	520 (4x130)	U-1 12/11, U2-01/12 U3- 02/12 & U4-03/12	Major packages like HRT, Barrage and Desilting chamber have been awarded. Civil works are under progress.
	Total B (I+II)	13360 MW (Excluding 500 MW Sipat-II unit IV already commissioned in May, 2007		

C New projects (8490 MW)

Sl. No.	Project/Capacity	State	Capacity in XI Plan (MW)	Status
III	Projects for which Main Plants Bids have been invited (7990 MW)			
1	Bongaigaon (3x250 MW) 750 MW	Assam	750	Various clearances except AAI clearance & CWC clearance available which are expected shortly. Main Plant tendering is in process and award targeted in 2007-08
2	Barh-II (2x660 MW) 1320 MW	Bihar	1320	Various clearances except Environmental clearance available. Main Plant tendering is in process and award targeted in 2007-08.
3	Mauda (2x500 MW) 1000 MW	Maharashtra	1000	Land/Water, Coal linkage & AAI clearances available. Public Hearing for SPCB held. MOEF clearance awaited. Main Plant tendering is in process and award targeted in 2007-08.
4	Nabinagar – JV with Railways (4x250 MW) 1000 MW	Bihar	1000	All clearances available. CCEA approval for JV project with 76% equity by NTPC & 74 % equity by Railways obtained. Main Plant tendering is in process and award targeted in 2007-08.
5	North Karanpura (3x660 MW) 1320 MW	Jharkhand	1320	All clearances available for the project. Main Plant tendering is in process and award targeted in 2007-08. Forest clearance for Dam to be expedited & Construction of Dam/Reservoir matching project schedule to be ensured by State Govt.
6 & 7	Kawas-II & Gandhar-II (1300 MW each) 2600 MW	Gujarat	1300 1300 s.t signing of GSPA	• RIL to sign GSPA. Matter sub-judice.
IV	Projects for which Feasibility Report is under preparation (500 MW)			
8	Rihand-III – (2x500 MW) 500 MW	Uttar Pradesh	500	Feasibility Report is under preparation. Land, Water available (from State Govt.)
	Total C III +IV (in XI Plan) 8490			
	Grand Total A + B + C (22350 MW)			

2.16 When the Committee enquired on the monitoring mechanism followed for ensuring completion of projects by NTPC Limited, the company furnished the following written reply to the Committee: -

> "NTPC is following the system of 'Integrated Project Management and Control System' (IPMCS) for ensuring timely completion of the projects. The brief of the IPMCS is as follows:
>
> - NTPC has an elaborate and efficacious Project Management System, known as IPMCS (Integrated Project Management & Control System), IPMCS covers a spectacularly wide range: Project conceptualization, Proactive planning process, Aggressive & visionary engineering and contacting management & meticulous monitoring mechanism.
>
>   Preparation of exhaustive planning tools like Master Network (MNW), L2/L3 schedules etc, so as to have a time bound plan of entire work processes from beginning to end (Main Plant foundation to Commissioning /Commercial Operation of the Unit).
>
> - A very rigorous monitoring mechanism to check any activity/process deviation. The actual progress vis-à-vis schedules are discussed in multiple forums like CRM (Contract Review Meeting), TCM (Technical Coordination Meeting), Executive Director/Director level meeting. Regular progress review meetings are held at manufacturer's works to assess the progress.
>
>   In every month, PRT (Project Review Team) meeting is held at project site, chaired by GM of the project to review progress and constraint of the entire project. Empowered participants from all functional areas like Engineering, Contracts, Project site and Corporate Project Monitoring Group meet to resolve all demanding/pending requirements across the table. Director (Project) regularly takes review meeting to ensure timely Implementation of the project.
>
> - CMD/NTPC also takes periodic review meetings including at Site and with the Major agencies for critical areas.
>
> - AS per DPE's Navratna guidelines, Ministry of Power reviews performance of NTPC on quarterly basis which also includes review of projects."

2.17 When the Company was asked by the Committee as to what is the average construction period for a thermal power project for NTPC and can it be shortened by better project management techniques, the Company in its written note gave the following reply: -

"The average construction period of Thermal Power Plants is based on the unit capacity. For 200-250 MW unit sizes, NTPC created a benchmark in 1982 by commissioning its 1st 200 MW unit at Singrauli in 48 months against the prevailing time period of 60-72 months. The time taken by NTPC in commissioning its latest 210 MW unit at Unchahar has been 33 months. This has been possible by applying better Project Management techniques and learning over the year from its own experience.

Similarly, in case of 500 MW, the 1st 500 MW unit of NTPC was commissioned in 59 months at Singrauli in the year 1986. This was improved to 48 months in the year Mar'99, when Vindhyachal unit no#7 was commissioned. This was further improved at Simhadri (Green Field Project) when the 1st unit was commissioned in 39 months in Feb'02. Further Ramagundam unit no#7 was commissioned in 36 months in August '04. The International norm for synchronization of the Thermal Unit of similar sizes varies from 32-37 months from the construction start. If we take period from start of construction to synchronization for NTPC units, it is observed that NTPC units have taken 33 to 36 month against international period of 32-37 month.

International Project management Association (IPMA), an international body having member associations in 37 Countries across continents, has instituted an international award for excellence in project management that is given annually and is declared during their annual world congress.

NTPC Simhadri was declared as award winner in a tough competition amongst 09 finalists comprising of Siemens AG, Germany; T-Systems International, Germany; Volkswagen coaching, Germany; Telekom Austria AG, Austria, Leica Geosystems, Switzerland; CVIC software engineering co. China, HAL India, ONGC India & NTPC Simhadri. This is a special achievement for NTPC as it has become the first Indian company to have won this award. All earlier awards were taken by European companies. This has established NTPC's name in the field of excellent project management."

2.18 The Committee enquired the Ministry on the monitoring mechanism for the power projects. Responding to this during the oral evidence, the Secretary, Power stated the following: -

"Project management and monitoring during project execution is an area that is engaging our attention. We are trying to introduce a monitoring mechanism for thermal and hydro power projects, which could be virtually online, that is, all activities going on simultaneously in project construction are captured on that particular monitor. Therefore, right from the engineering drawing; giving work phases; the various aspects like major supplies or what is their status; whether everything is coming up in the scheduled fashion or not; what is slipping etc. is captured in one particular module. We are attempting it for the

Dadri project for NTPC. I will be very happy if this Committee -- which is into more focused areas of study -- gives the NTPC an opportunity to present that very complex kind of monitoring activity in which a few thousand activities are going to be captured."

VI). NTPC Power Plants in Foreign Countries

2.19 The Committee asked whether NTPC is looking at power plants in foreign countries, the Company in their written reply furnished the following information:-

"International Cell- Consultancy Wing of NTPC is presently pursuing following two proposals pertaining to NTPC's Power Plants in foreign countries:

1. 2x250MW Coal Based Plant in Sri Lanka at Trincomalee

Based on advice from Government of India, NTPC explored possibility of setting up of thermal power generation project in Srilanka. In this regard, NTPC had entered into a Memorandum of Agreement (MOA) with Govt. of Sri Lanka (GOSL) and Ceylon Electricity Board (CEB) to set up a 2x250 MW Coal Based Power Plant in the Trincomalee region of Sri Lanka in joint venture with CEB in December 2006.

The site for Power Plant has been identified at Veloor and informed to CEB who are "in-principle" agreeable to this location.

A NTPC delegation visited Sri Lanka from 25 Feb. 2008 to 27 Feb. 2008 to take stock of the present status and to discuss issues in the draft Joint Venture Agreement and the draft Power Purchase Agreement and other related matters pertaining to development of the Project.

2. 500 MW Coal Based and 700MW Gas Based Power Plants in Nigeria

An MOU was signed between NTPC Limited and Ministry of Energy, Federal Government of Nigeria (FGN) on 22nd May 2007 for energy cooperation. As per MOU, FGN has agreed to provide, subject to availability, three (3) million tons per annum of LNG at a reasonable price for a period of 25 years from its existing/future LNG terminals to NTPC for use in NTPC's plants in India. Upon successful tie-up for LNG supply, NTPC has agreed to build, own and operate a 700 MW Gas Based Plant and a 500 MW Coal Based Power Plant in Nigeria, subject to techno-economic feasibility.

On invitation of the Hon'ble Minister of State for Energy (Power), FGN, a NTPC delegation visited Nigeria from 11 Feb. 2008 to 15 Feb. 2008. NTPC team visited a prospective site near Geregu Power Station in Kogi State and found the site to be suitable for setting up a 700 MW Gas Based Power Plant and a 500 MW Coal Power Plant. Necessary data/ information for preparing Pre- Feasibility Reports were also collected from various agencies in Nigeria.

Minister of State for Energy (Power) was apprised about the outcome of visit and was requested to steer the matter regarding supply of LNG for NTPC station in India to facilitate NTPC's initiative in the Power Sector in Nigeria.

NTPC team also met the Minister of State for Energy (Gas), FGN who agreed to constitute a separate group, which would deal with NTPC on issues pertaining to LNG supply.

In the meantime, NTPC is preparing the pre-feasibility reports for setting up a 500 MW Coal Based and a 700 MW Gas Based Power Projects at Gerugu which will be forwarded to FGN for their perusal and further actions.

VII). <u>Equipment Supply to Power Projects – Role of BHEL</u>

2.20 When asked whether any power project of NTPC are getting delayed due to non-supply of important equipments from suppliers, the NTPC Ltd. in their written reply to the Committee submitted the following:

"Following ongoing Power projects of NTPC are delayed due to delay in supply of equipments particularly from BHEL: -

Sl. No.	Name	Capacity	Present status as on 1/04/08
1.	Kahalgaon Stage-II (3x 500 MW) Schedule Unit V :: Nov'06 Unit VI : May'07 Unit VII ::Mar'07	1500 MW	First unit of 500 MW (Unit V) was commissioned in Mar.07 (Sch: Nov'06). 2nd unit of 500 MW (Unit VI) is commissioned on 16th Mar.08. (Sch: May'07) Works of 3rd unit were hampered due to delayed supplies and also delay in erection by M/s BHEL. 3rd unit of 500 MW (Unit VII) is now anticipated to be commissioned during FY 2008-09.
2	Sipat stage-II (2 X 500 MW) Schedule Unit IV :: June'07 Unit V :: Dec'07	1000 MW	Unit IV was commissioned in May'07 (Sch: June'07). The work of Sipat Stage –II Unit IV (500 MW) and Unit V (500 MW) were hampered due to delay in supply of material of SG, TG and Piping packages. BHEL also delayed the finalization of erection agency for Sipat Unit V critical Piping Works, which resulted in subsequent delay in erection of the piping/equipments. Unit V is expected to be commissioned by June.'08.
3.	Bhilai TPP (2x250 MW) JV with SAIL Schedule Unit 1 :: Oct'07 Unit II :: Jan'08	500 MW	Unit-I Steam Blowing is completed in Mar.08. Unit commissioning is delayed due to delay in supply of SG, TG and Piping material by BHEL. Unit is now expected to be synchronized in Apr.08 (Sch. : Oct.07) Unit II is now expected by May.08 (Sch. : July.08)

2.21 When asked by the Committee on the situation regarding the supply of equipments for Power Sector, the Ministry furnished a written reply as under:-

> "Thermal generation units upto 500 MW are being indigenously manufactured by BHEL and most of the thermal units installed in the country have been made indigenously. With a view to improve the generation efficiency and increasing the pace of capacity addition, large sized super-critical units of 660/800 MW are being introduced. BHEL have already entered into collaboration with M/s Alstom and M/s. Siemens for manufacturing of super-critical boilers and turbo-generators respectively.
>
> Already L&T have tied up with MHI to form Joint Venture company to manufacture super-critical boilers and turbines in India. Mandatory conditions of the suppliers taking up manufacture of super-critical units in the country is being stipulated in the bids for bulk ordering of 660 MW super-critical units of NTPC and DVC to be invited shortly. As a result, more international manufacturers are showing interest to set up manufacturing base in India for power generation equipment. The Government has initiated a strategy for placing bulk order for super critical units based on programme indigenous manufacturers of generating equipment. "

2.22 Elaborating on the subject of equipment manufacturers for the power sector, the Secretary Power during the oral evidence stated the following:-

> "Sir, I am glad that you are taking interest in these areas because these are ultimately going to impinge upon how soon we can deliver and what we can deliver. We have been dependent only on one major equipment manufacturer so far in this country. The manufacturer has served us well as it has brought us some world-class technology, but I think that the country is now too large to be catered to by only one manufacturer. Having a single manufacturer -- however good he may be -- does not bring about competition or pressure for performance. It has been our considered view that we should have adequate number of suppliers of equipment.
>
> The demand in the country that is coming, Sir, about 80,000 mw for each Plan, at least, for the next 10-15 years, does provide an opportunity for us to have more players so that employment avenues improve in the country. And this country can even become a hub for manufacture of the best available technologies anywhere in the world today. We have the chance; we have been talking to equipment manufacturers, and the enthusiasm and response has been good and encouraging. We are today in a situation where for manufacture of turbines, we could be having four international class players operating in this country itself. That will give a choice of vendors to the customers. It would induce competition in terms of completion of projects and also quality of performance. If the manufacture is done here, then the repair,

maintenance, overhaul, spares would also become available locally. We have been working on that. I think we should meet success on that.

We are working on ordering, bulk ordering, for super-critical technology for coal-based thermal power projects, for projects of the NTPC and DVC in the coming months. We are trying to finalise the legal and technical parameters. In fact, just this weekend, we had a very extensive meeting with the NTPC and the CEA on this subject. We hope to be able to finalise this soon."

VIII). <u>Ultra Mega Power Plants (UMPP)</u>

2.23 Explaining the need for large capacity power plants, the Ministry of Power in a written reply furnished to the Committee stated the following:-

"For meeting the growing needs of the economy, generation capacity is to double itself in every ten years in next three decades at least. As such there is need to develop large capacity projects at the national level to meet the requirement of different States. Development of Ultra Mega Power Projects (UMPPs) is one step in that direction. The projects will substantially reduce power shortages in the country. The Central Government has accordingly taken the initiative for facilitating the development of a few ultra mega power projects of about 4,000 MW capacity each under tariff based competitive bidding route using super critical technology on build, own and operate basis. The projects could be at coal pit head or coastal locations."

2.24 When the Committee asked the Ministry to spell out the reasons for the UMPP initiative, the Ministry in their post evidence written reply have stated the following:-

"Accelerated capacity addition programme has been launched to meet the objective of eliminating shortages and creation of spinning reserve in the system as mentioned in the National Electricity Policy. Large size projects being envisaged under the initiative would help in creation of required capacities to overcome energy and peaking shortages and to sustain this momentum in 12th Plan and beyond.

The tariff from large size generation projects would have the benefit of economies of scale and thus the cost of electricity generated from these projects is expected to be reasonable.

With mitigation of risks relating to tie up of land, fuel, water and other statutory clearances envisaged in the initiative, time for completion of these projects is expected to reduce considerably and the expected competition should result in lower tariff of electricity from these projects.

The size of these projects being large, they will meet the power needs of a number of States through transmission of power on regional and national

grids. Several rounds of discussions have been held with States who have agreed to support Ultra Mega Power Projects. Experience of this initiative has facilitated development of State specific projects in the range of 1,000 – 2, 000 MW through competition on similar lines."

2.25 When asked to give the salient features of the UMPP Scheme, the Ministry have *inter-alia* stated the following in its reply:-

"**Project Locations** - In view of the inadequate availability of gas for gas based power projects in the near future and the constraints in stepping up domestic coal production rapidly there has been a consensus that power project developers be given captive coal mining blocks for development of coal mines along with the power projects as a composite project. Some coastal stations may also be developed using imported coal.

Through a preliminary scrutiny by CEA/State agencies, a number of potential sites were identified in the country. In the first phase, four projects at pithead sites and five projects at coastal locations have been proposed for development of Ultra Mega Projects. The projects at pithead locations will be based on domestic coal whereas those at coastal sites would use imported coal as fuel.

Bidding Process - Guidelines on competitive bidding for determination of tariff for procurement of power by distribution licencees framed under the provisions of the Electricity Act stipulate that tariff based bidding can be invited by distribution utilities or their authorized representative. This concept of authorized representative has been forming part of Standard Bidding Document as well.

Further, Competitive Bidding Guidelines provide that a Special Purpose Vehicle (SPV) may be constituted for this purpose for carrying out the bidding process. SPV shall be a company established under the Companies Act 1956, authorized by the distribution licensee(s) to perform all tasks for carrying out the bidding process in accordance with the Guidelines. The distribution licensee(s) may also entrust initial project preparation activities (proposed to be undertaken before completion of the bid process) to the SPV. The SPV would be transferred to the successful bidder selected pursuant to the bid process.

Role of States - From the initial step to the final commissioning of the UMPPs, the role of concerned State Governments is of immense importance. In fact, no major activity can be started without a clear identification of a suitable site by the State Government concerned (including water linkage in case of a pit head project).

After the site identification, the host State and the other power procuring States are required to continue to play a highly pro-active role. In particular, some of the activities in which the concerned States are required to play a decisive role include implementation of the R&R Plan, provide authorization to the PFC/SPV to carry out the bidding process on behalf of the distribution utilities, participate through its representatives in various Committees set up for undertaking the competitive bidding process, facilitate signing of the Power Purchase Agreement, ensure proper payment security mechanism with the distribution utilities etc."

Role of the Ministry of Power:- The Ministry of Power is playing a crucial role for the development of the UMPPs by coordinating between various concerned Ministries/Agencies of the Central Government, and with various State Governments/Agencies. Some of the key areas requiring the Ministry of Power's intervention include -

- ✓ Coordination with Central Ministries / Agencies for ensuring:
    - Coal block allotment/ coal linkage
    - Environment/forest clearances
    - Water linkage
- ✓ Required support from State Governments and their agencies
- ✓ Working out allocation of power to different States from UMPPs in consultation with the States.
- ✓ Facilitating PPA and proper payment security mechanism with State Governments/State Utilities.
- ✓ Monitoring the progress of Shell Companies with respect to predetermined timelines."

2.26 Asked to comment on the progress made on the UMPP projects, the Secretary, Power, during his deposition before the Committee made the following observations: -

"We are committed to UMPP programme and are fine-tuning it to the extent we can. The progress of this programme is that three projects have already been allotted and the fourth is about to be allotted. We are in the final stages of evaluation. I mean to say that submission of bids will come and towards the end of the year, we should be able to evaluate and allot this project. Since it involves a large area of land and water availability as well as people's acceptability to the project there, the other sites largely depend on the enthusiasm that is shown by the host State. We have had situations in one or two States where for almost two years, there has been indecision on freezing of sites. But Sir, we are pursuing this programme regularly."

2.27 In regard to Adoption of Super Critical Technology by UMPP, the Committee were informed that :-

"Higher size super critical units are planned for integrated coal based thermal power projects with captive mining in the states. This technology will not only result in improvement of thermal efficiency but also reduce emission of greenhouse gases significantly. Such integrated plants shall have benefit of fuel availability at lower cost and low project cost due to economy of scale."

2.28 When asked by the Committee as to why NTPC has not been successful at the competitive bidding recently floated for the Ultra Mega Power Plants (UMPP), NTPC Ltd. in their written reply furnished the following :-

"NTPC submitted the bid for Sasan UMPP as per the schedule mentioned in the bid documents. Total nine bidders had submitted the bid. NTPC constructed the bid for the Sasan UMPP based on the cost input of the similar equipments previously awarded through the process of competitive bidding for NTPC projects and submitted bids for 660 MW units, the performance parameters and the financial parameters considered for working out the levellised tariff were generally in line with the existing norms and regulations and NTPC's past experience.

The bid construction for Sasan UMPP also included the applicable Taxes, Duties, Cess and royalty associated with the development and operation of the integrated power plant and the coal mine as well as the assessment of the risks involved in the development and subsequent operation of the integrated Power Project and the captive coal mine for the contract period of 25 years.

Subsequent to the request by Sasan Power Limited for extension of the bid validity period only four bidders out of the nine responsive bidders extended the bid validity. NTPC was one of the bidders who did not withdraw from the bidding process and extended the bid validity period.

Subsequently after the decision of the Empowered Group of Ministers (EGoM) to cancel the LoI issued to the Globeleq-Lanco Consortium, the remaining three bidders (NTPC, Reliance & JP) were asked to submit the best revised lower tariff offers. NTPC submitted that the original offer, which was submitted as part of the bid, was the best offer and their earlier offer would hold.

The original offer of NTPC had been formulated keeping in view the commercial policies and long- term business strategies of the company. Since there was no change in the basis considered for the original offer, so there was no reason to revise the earlier offer submitted as part of the bid and NTPC continued with the same in the revised round of bidding."

2.29 When asked to give suggestions to overcome the problems being faced by NTPC Ltd. in bidding for ultra mega power projects (UMPP), NTPC Limited in a written note submitted to the Committee stated the following:

> "The existing system in project procurement adopted by NTPC is that the project is divided into number of workable size packages which are then put through a transparent competitive bidding process for procurement of equipment / contracts or through EPC route. When NTPC has to procure projects through competitive bidding route, it has to arrive at a project cost for the purpose of bidding against tenders that will be floated by procurers / group of procurers or their authorized representative. The main requirement in such procurement will be to maintain confidentiality of the cost and to arrive at the most competitive price to enable NTPC to win the project. In the current system of procurement process, the cost of each of the element (system /package) of the project awarded will be in public domain whereby NTPC will be put to disadvantage by disclosing the sensitive and confidential commercial information to other bidders making NTPC vulnerable to losing the bid for the project under competitive bidding route.
>
> Alternatively, NTPC follow the e bidding / e-tendering process as per the provisions of the existing policies / systems. In this process also the costs of the packages tendered shall become public (even though the lowest bidder's name is not known) and the confidentiality of the commercial information cannot be maintained. In this scenario also, NTPC is vulnerable to losing to competitors for the projects procurement through tariff based bidding route.
>
> The procurement policy of NTPC is subject to the guidelines issued by CVC from time to time. The requirement of opening of the quoted price by the various manufacturers/suppliers for the Boiler/TG and coal in presence of representatives of all the vendors causes quoted prices to go into public domain which is a major concern as the levelized tariff to be quoted by NTPC shall be determined on the basis of the same. Accordingly the existing system does not allow the commercial secrecy of the offers submitted by the bidders.
>
> In order to obtain the competitive price for the power project equipments, it is essential to have a pre tie up for the same with the provision that in the event of NTPC being declared the successful bidder for the development of the project, the equipments shall be sourced from the tied up parties. However CVC guidelines and procurement system allow purchase of equipment only through transparent, open and competitive process. The same is not the case with non PSU bidders. This affects the seriousness of the prospective bidders and consequently the competitiveness of the prices quoted by them.
>
> For imported coal, in case L1 bidder is not in a position to meet the requirement of total quantity, negotiations for price may be required with more than one bidder, L-1 bidder included, to mitigate the risk of fuel supply. Such negotiations are not permitted under the present CVC guidelines.

The existing guidelines require PSUs to follow an open tendering process to obtain the sub-vendor quotes forming cost components of the bids to be submitted under competitive process. Since open tendering procedures invariably involve longer time, which many a time does not match, with the time bound schedules indicated in the competitive bidding documents of the projects.

NTPC has approached CVC raising the above issues being faced during participation in the competitive bids for the projects. The matter is under discussion.

It may be also be worthwhile to mention that NTPC being a PSU is also at a disadvantage due to lack of level playing field vis-à-vis private bidders as regards cost of equity."

2.30 The Committee asked the Ministry as to whether the matter has been taken up with CVC. In their written reply, the Ministry have stated the following: -

"The issues raised by NTPC with CVC and response thereto from CVC in brief is as mentioned below:

1. The existing procurement system does not allow flexibility of negotiations with all the vendors / contractors whose bids have been obtained.

CVC has rejected NTPC's suggestion of obtaining competitive price through negotiations with different vendors and has maintained that the lowest bid only can be obtained in a competitive bidding with all the parameters pre-disclosed.

CVC has also indicated that Commission's guidelines allow negotiations with L-1 bidder with valid and logical recorded reasons.

2. The existing procurement system does not allow giving a commitment to the pre tied up party to obtain serious and competitive quotes.

CVC has suggested NTPC to transparently prepare panels of various vendors / manufacturers and obtain tariff quotations from these empanelled vendors through the process of inviting limited tenders as and when required for competitive bidding on case to case basis. This panel is required to be updated on yearly basis. Tenders so received have been allowed to be opened confidentially by a high level Committee. CVC has commented that an MOU can be entered into with the lowest bidder as a token of commitment to source the supply from such vendor only in case NTPC emerges as successful bidder.

3. The existing procurement policy of NTPC is subject to the guidelines issued by CVC which does not allow the commercial secrecy of the offers submitted by the bidders as it requires opening of the quoted price by the various vendors (manufacturers / suppliers for the Boiler / TG and Balance of Plant equipments) in presence of representatives of all the vendors.

CVC has suggested that tenders can be opened confidentially by a high level Committee to maintain the secrecy of rates, if required. Tender opening register should be maintained in this regard duly signed by the officers opening the tender and kept confidentially. This should be available for perusal when required by audit / vigilance.

The above suggestions of CVC would be considered by the Group of Directors constituted by NTPC Board of Directors for increasing competitiveness."

IX). <u>Fuel Availability and Linkages</u>

2.31 Giving out the role of coal in the power sector, the Integrated Energy Policy have made the following comments:-

"Coal has been the mainstay of India's energy supply for many years. Coal consumption increased from 140 Mt in 1984 to over 400 Mt in 2004 with a growth rate of 5.4%. Thermal power plants using coal today account for 57% of our total generation capacity. Indian coal has a high ash content and low calorific value – an average of 4000 kcal/kg compared to 6000 kcal/kg in imported coal. The average calorific value of coal burnt in India's power plants is only about 3500 kcal/kg. The high ash content also results in higher emission of suspended particulate matter (SPM). However, the sulphur content of Indian coal is very low, and emission of SO2 during combustion is also low. Since SPM is comparatively easy to trap, Indian coal is relatively clean. Despite large reserves of coal domestic supply is tailored to barely meet domestic demand for thermal coal with small quantities being imported. India is not self-sufficient in metallurgical coal and over 65% of the demand is met through imports……More importantly, the quality of thermal coal has been deteriorating over the years. The increasing share of opencast mines is one of the contributing factors for the deterioration in quality. Clean coal technologies for improving the efficiency of energy conversion and limiting emissions; research and development initiatives for establishing additional sources of energy such as coal bed methane; in-situ gasification of un-mineable and deep seated coal reserves; and the liquefaction of coal are promising areas for action but are still in their infancy."

X). <u>Coal Based Stations – Role of Coal India Limited</u>

2.32 NTPC has thermal power plants based on coal, gas or liquid fuel. Fuel tie up for coal- based plants is done through long term linkage before investment approval

of the project. long-term linkage is a notional linkage accorded by the Standing Linkage Committee (Long Term) under the aegis of Ministry of Coal. Based on the long -term linkage, other infrastructural creations are decided. After the project is completed and the station starts operation, short term coal linkages on a three monthly basis is accorded to the plant depending on its generation targets and coal availability in the supplying mines.

2.33 The long-term linkages for existing and new NTPC plants are as under:-

A. EXISTING STATONS			
S. No.	Station	Capacity (MW)	Long Term Linkage (MTPA)
1	Singrauli STPS	2000	9.8
2	Korba STPS	2100	11.70
3	Ramagundam STPS	2600	12.70
4	Farakka STPS	1600	11
5	Vindhyachal STPS	3260	15.41
6	Rihand STPS	2000	9.28
7	Unchahar TPS	1050	7.16
8	Dadri TPS	840	4.45
9	Kahalgaon STPS	840	5.80
10	Talcher STPS	3000	14.65
11	Talcher TPS	460	2.30
12	Tanda TPS	440	2.70
13	Simhadri STPS	1000	5.10
14	Badarpur	705	4.00
B. EXPANSION/ NEW PROJECTS			
1	Kahalgaon-II	1500	8.82
2	Sipat-I & II	2980	15.04
3	Barh STPS	1980	10.00
4	North Karanpura	1980	10.24
5	Nabi Nagar	1000	5.00
6	Bhilai CCP	500	2.5
7	Farakka-III	500	2.2
8	Mouida	1000	5.00
9	Bongaigaon	750	2.62
10	Simhadri-III (Unit-1)	500	2.31
11	NCPP Expansion	980	4.62
12	Indira Gandhi STPS (Jhajjar)	1500	6.94
13	Vallur TPS	1000	4.62

2.34 Information furnished to the Committee by NTPC on coal supply is as follows:-

> "Coal requirement for NTPC stations for the year 2007-08 is projected as approximately 125.73 million tones. Out of the total requirement of 125.73 MMT for the year 2007-08, 121 million tones is expected to be met by coal supply from domestic sources & gap of 4.73 million tones is being met by importing 2.6 million tones coal (Equivalent to 4.73 Million Tonnes domestic coal). The anticipated coal requirement in year 2011-12 is approximately 212 million tones. Coal supply to NTPC's power stations shall be based on long-

term coal linkages accorded by Standing Linkage Committee (Long Term) (SLC-LT) that works under the aegis of Ministry of Coal. It is expected that the coal requirement by 2011-12 shall be met through supplies from CIL."

2.35 Elaborating on the steps taken to ensure supply of coal to the plants, NTPC stated: -

"One of the main reasons for coal shortage for NTPC stations is mismatch in development of mines and construction of NTPC units. While NTPC units are commissioned on schedule, the mines are delayed on account of various reasons. The linked mines for NTPC stations such as Vindhyachal-III, Rihand-II, Talcher Kaniha-II, Kahalgaon-II are far from producing coal whereas units at these plants are operational. It is of utmost importance that necessary measures are taken by Government of India / Ministry of Coal to ensure that there is no mismatch between commissioning of power plants and development of linked mines."

2.36 When asked to indicate the extent / nature of loss of power generation witnessed in NTPC projects in each of the last three years on account of erratic / inadequate supply of coal, the company gave the following reply to the Committee: -

"Generation loss on account of erratic/ inadequate coal supply and gas to NTPC stations during last three years is as under:

Year	Loss of Generation (MU)	
	Due to in adequate supply of coal	Due to in adequate supply fof gas
2004-05	812.1	32.4
2005-06	Nil	40.8
2006-07	Nil	22.4

During the year 2004-05, NTPC stations at Farakka, Talcher Kaniha and Rihand suffered loss of generation on account of coal shortage.

Imported coal

Year wise imported coal received at NTPC stations is as under:

Year	Imported coal Recd (Million Tes)
2005-06	3.10
2006-07	2.34
2007-08	2.04 (till Jan '08)

Considering the scenario on date when coal projects are getting delayed on account of various factors coupled with increasing PLF of NTPC stations vis-à-vis long term linkage norms, it seems likely that NTPC may have to continue with some quantity of import for another 2 /3 years.

NTPC has made a foray in captive coal mining as a measure of backward integration to lend stability to its fuel security. The allotted coal block at Pakri Barwardih at Jharkhand is expected to start coal production by 2009-10 and

by the end of XIth plan, it is targeted to produce 15 MTPA of coal. Coal from this block will be used as a basket reserve to meet the requirement of NTPC stations."

2.37 When asked by the Committee as to whether NTPC Ltd. is interested in captive mining of coal for its power plants and problems faced by it in getting coal blocks, NTPC Ltd. in their written reply to the Committee submitted as under:-

"Yes, NTPC is interested in captive mining of coal for its power plants. NTPC had been applying to Govt. of India – in phases, for allocation of eighteen coal blocks, starting from the year of 2003.

As per prevailing practice, Ministry of Coal notifies the list of captive blocks on their website, for allocation. Against that notification, application in prescribed formats is being made to MOC through Administrative Ministry. The problems, associated with allocation of coal blocks are:

- There is no rationale in sizing / demarcation of coal blocks.

For instance, there has been a case, where a coal block namely Chatti Bariatu (South), was offered for captive allocation. Since this block was on the dip side of the Chatti Bariatu coal block, already allotted to NTPC, it cannot be developed on stand-alone basis. This aspect was also on display at MOC's official website. Accordingly, NTPC approached MOC to allot this block as an integral part of Chatti Bariatu block, in case there is no other applicant for this block. However, this block has been allotted to NTPC as an independent block with all stipulations like standard time frame for its development, furnishing of bank guarantee, etc. NTPC's request for considering development of this block as integral part of Chatti Bariatu has not been agreed to. For all practical purposes, such a kind of allocation is redundant."

2.38 The Committee had invited experts from the energy sector for having their views on the subject. The experts furnished their views in written format and also appeared before the Committee.

2.39 When the Committee asked the expert Dr. Leena Srivastava, E.D., TERI, New Delhi to give her views to the problem of coal availability to the thermal power stations, Dr. Leena Srivastava of TERI gave the following in a written note:-

"Coal is expected to continue accounting for a high share in total commercial energy use (around 50%) over the next couple of decades. A multi-pronged approach should be adopted to enhance coal production by:-

a) Technological up-gradation of mining technologies
b) Opening up of the coal sector to private investors. A policy similar to the new exploration policy of the Ministry of Petroleum and Natural

Gas may be adopted after modifications to suit the coal sector requirements.

c) Strengthening Central Mine Planning and Design Institute Limited (CMPDIL) to undertake greater R&D efforts and scale up its efforts to improve coal extraction technology and methods, especially beyond 300m depth.
d) Undertaking joint ventures for extraction of coal from deep coal seams with a view to upgrade technology and improve productivity."

2.40 Adding further on the difficulties in sourcing of coal, the expert stated the following: -

"With regard to domestic coal, the monopolistic structure of the Indian coal industry has made the coal sector rather inefficient and unresponsive to market forces. Problems such as delays in delivery and shortfalls with regard to promised quality etc. create a problem for consumers. Shortages in domestic coal production are due to underestimation of domestic demand by the Planning Commission (which sets coal production targets) and also on account of the low investment in new mining capacities. Technologically, the current coal mining technology being followed is not conducive to exploitation of reserves beyond 300 m depth. There is a need for technological upgradation in this area to make the extraction of the deep seated reserves economically viable.

Adequacy of infrastructure is another concern related to sourcing of coal. Accordingly, there is a need to upgrade and scale up infrastructure for coal handling, movement and imports. Most of the coal bearing areas are located along the congested trunk routes. Day-to-day movement of coal, therefore, becomes operationally difficult with the high level of existing traffic. There is a need for establishment of dedicated freight corridors and feeder lines that link the coal production centres with large consumers. While some progress has been made in upgrading port infrastructure, much remains to be done to be able to handle large level of coal imports. Less congestion at ports would allow for quicker turn-around times and consequently greater efficiency and lower costs."

2.41 The issue of quality of coal was an area of concern to the Committee. This issue was posed to another expert namely Shri Kirit S. Parikh, Member, Planning Commission. Responding to this, the expert made the following comments:-

"Fortunately, Indian coal is full of particulates. It is of low quality and it has lot of suspended particulates, but it is a very good coal in terms of having very low amount of sulphur in that. So, it is a low sulphur coal. The emission problem is largely the problem of particulates and now, we know how to deal with particulates captured through electrostatic precipitators and other things. So, if we really want, we can make use of domestic coal relatively less

polluting in the local environmental sense. But when you use carbon, you are surely going to make carbon dioxide emission or greenhouse gas emission and the same amount will happen whether you use imported coal or domestic coal."

2.42 As the Committee was concerned with the supply of coal and gas to the thermal power plants, it decided to enquire with the Ministry as to steps being taken to tackle this important requirement of NTPC. When asked what policy does the Ministry have regarding availability of fuel like coal, gas etc. for the PSUs like NTPC for their current and planned power plants, the Ministry furnished the following reply to the Committee:-

"Supply of Coal to Existing Thermal Power Stations:

At present, the coal supply position of the existing thermal power stations (TPSs) in the country is not satisfactory and the coal stock at power stations is at all time low. As on 04.08.2008, out of total 77 Thermal Power Stations (for which daily coal supply position is being monitored), 43 TPSs were critical having coal stock less then 7 days. Out of these critical Power Stations, 23 TPSs were super critical i.e. coal stock less then 4 days. All India coal stock at TPSs was 6.19 Million tonnes against the normative stock requirement of 22 Million tonnes. The reduction in coal stock is due to fact that while on one hand coal is not being allotted and supplied to power stations in adequate quantity, on the other hand plenty of coal is made available for E-auction by CIL for additional profit.

NTPC has 10 pit-head stations. Of these, 7 power stations have critical/super critical coal stock. They also have 5 rail fed stations and all the power stations have critical/super critical coal stock.

The following steps have been taken by the Government to meet the shortages of gas and coal for power stations:

(i) Rigorous monitoring of supply of coal to thermal power stations for optimizing coal supply to the power stations from various sources.
(ii) Ministry of coal is being insisted upon to enhance the production of coal in the country.
(iii) Import of coal to meet the shortfall in domestic availability of coal.
(iv) Arranging spot Regasified Liquefied Natural Gas (RLNG).
(v) New coal blocks are being allocated by the Ministry of coal to power producers/utilities for captive mining to meet requirement of their power plants.

Coal Based Stations

Linkage Mode :

For New Project

- For new projects, Power utility makes application to MOC through MOP for Letter of Assurance (LOA) for coal availability.
- On the recommendation of MOP, MOC/CIL issues LOA. This enables financial closure for the project.
- Within a period of 24 months from the issuance of LOA based on accomplishment of certain milestones by the Power Utility, Fuel Supply Agreement for supply of coal has to be signed between the seller and purchaser.

For running plant

- For a running plant, fuel security was tied up through long-term linkage accorded at the conception stage of the plant by Standing Linkage Committee (Long Term) under the Ministry of Coal. This long -term linkage was subject to conclusion of Fuel Supply Agreement.

Power Plant with Integrated coal block

- Consequent upon change in policy of the GOI, some power projects are being conceived with integrated coal-mine block. This is largely to expand the coal mining activity to non-mining companies to increase coal availability.

Coal Import

- As a short-term measure to reduce the gap between coal demand and availability, coal import is being resorted to. In the current year, MOP contemplates import of about 20 million tonnes by Power Utilities to meet their coal requirement.

  Out of 56670 MW, coal based power projects envisaged for commissioning during the 11^{th} Plan period, long term linkages / dedicated coal blocks have already been granted by the Ministry of Coal for 51640 MW capacity. Recommendations for long term coal linkage to the remaining 5030 MW capacity have already been sent to the Ministry of Coal. Through vigorous monitoring of the supply of coal to the power stations at all levels, efforts are being made to ensure that utility power stations in the country do not suffer generation loss due to shortage of coal."

2.43 When asked to give the views regarding the issue of pricing of coal, NTPC furnished the following in their written reply:-

> "Review the proposed method of mining and choice of equipment (Technology) by an expert group. The expert group could be created either on the lines of CEA or the ambit of Mining plan Committee may be expanded to under take such role.
>
> Each proposal for developing a new coal mine, irrespective of ownership, shall be thoroughly scrutinized and changes required if any be enforced to ensure optimal choice of technology and equipment configuration commensurate with the geological conditions of a mine such as seam thickness, No. of seams including No. of splits, presence of faults and their throw, nature of overburden, stripping ratio, gradient of seams, coal reserve and other latent conditions that will affect the input parameters being used for removal of overburden and extraction of coal.
>
> The expert group could lay-down normative efficiency parameters for various types of equipment i.e availability factors, capacity utilization factors, maintenance philosophy of the equipment, life of the equipment and manning of equipment and services, for determining the equipment and manning requirements to be allowed for costing of coal considering the overall mining efficiency to be achieved.
>
> Pricing formula shall take into account all capital related costs including capital additions & replacements during the mine life
>
> Price could be based on levellizing the cost on 14% Post Tax return on equity
>
> Costs could be split into escalable and non-escalable portions.
>
> Escalable portion could be allowed periodic adjustments, which may be linked to certain indices for various input parameters.
>
> The quality based costing may be worked out based on the weighted average quality of different seams of coal available in a mine. The initial price linked to pre-defined guaranteed quality parameters such as Minimum Volatile matter% and Heat Value, Maximum Ash and Moisture percentages etc. could be based on the available geological data. Quality data for the subsequent years could be established between the buyer and the seller, based on data gathered through advance in fill drilling, an action that could be made mandatory. Since the coal is intended to be sold through long term FSTA, the buyer can be given the right to associate/monitor the infilling and determination of annual quality data/plan.

Since the price of coal is based on the mine specific investments and efficiency parameters, therefore same could still be valid on per tonne basis for the modified quality parameters in respect of that mine. Appropriate bonus/penalties can be in built for variations in quality beyond the pre agreed parameters on year to year basis. Such an arrangement will capture the inaccuracies of initial data if any and provide adequate coverage to both the parties on account quality variations.

A suitable provision could also be made for effecting adjustment in the price of coal due to change in law.

The mine operator could be allowed to recover its costs at a predefined efficiency levels."

2.44 The issue of coal imports, cost of imported coal vs domestic coal was an area of concern to the Committee. This issue was posed to expert Shri Kirit S. Parikh, Member, Planning Commission. Responding to this, the expert made the following comments:-

"If we are importing coal, we will have to create import infrastructure and if we count for the cost of infrastructure, is imported coal cheaper? I think, if we use domestic coal, we have to invest in railway infrastructure and we have to count railway cost and so on. The best way to do is to think in terms of what the port charges are and if the port charges are properly set to take care of the cost of construction of port infrastructure, then that should really reflect in the landed cost of coal. If we properly price port infrastructure and if we properly price railway service, then we can just compare the cost of delivered coal, say, in Chennai against the cost of imported coal in Chennai or of delivered coal in the West Coast or in Southern India. There, you can see today that imported coal was slightly cheaper a year ago but in the last year the prices of coal have all gone haywire. But I think it is a bubble and it will settle down. We are saying that wherever it is possible and economical and imported coal cost is cheaper than the domestic coal, then you encourage the imported coal. That was the idea."

2.45 During the oral evidence, the Secretary, Power in his reply on the same issue stated the following:-

"We have not had full satisfaction of the desired linkages of coal and gas. In fact, the present linkages have received a satisfaction level of only about 83 per cent. We wish this to be 100 per cent of all the linkages provided. We are moving into times where we need to certainly import coal for power. I do recognise that. I try to convince and educate my clients, please get into the habit of getting coal and acquiring assets abroad. In fact, right now NTPC is engaged in a very advanced exercise of trying to acquire coal assets abroad

because these assets are not going to be available after a while like the oil assets disappeared. Now is the time, I think, to go and get these assets.

Procurement of coal from these assets is going to be more expensive because it entails transportation cost which is again dependant on sea transport. But I think for reasons of energy security we should also not be particularly in a hurry to exhaust our internal reserves. They are not going to run away anywhere. We have to do this gradually. I think, plants which are located in the coastal region should be having a much higher ratio of imported coal, if not exclusively imported coal. We have started recommending linkage with 30 per cent imported coal and 70 per cent domestic coal for coastal location plants. Yes, coal mining should get more efficient. We should be extracting higher percentage of coal out of our assets. The quality of coal also is to be sustained at the given levels of heat values so that there is no decline in the efficiencies of operations. There has been a small decline in this value in the last three years. We can furnish those figures to the Committee.

Sizing of coal need more attention. Right sizing of coal is required otherwise big boulders arrive at power stations and hold up operations. One rake after another has to be evacuated. It disrupts the operations and in turn holds back the railway wagon movement. Then the production of power at that plant gets affected. These are the areas, which need to be addressed."

XI). Gas Based Power Stations

2.46 NTPC has six gas based power stations with total installed capacity of 3605 MW. The estimated gas requirement to operate the plants at 90% PLF is around 17.35 MMSCMD. There are long-term Agreements with GAIL for 12.93 MMSCMD of gas under APM category for the above six gas based operating stations. The gas requirement station wise is as below:

Sl. No.	Gas based Stations of NTPC	Capacity (MW)	Linkage from GOI (APM Pool) (MMSCMD)	Contracted Quantity with GAIL (APM Pool) (MMSCMD)	Gas Requirement at 90% PLF (MMSCMD)
1	Anta	413	1.75	1.75	1.99
2	Auraiya	652	2.49	2.49	3.15
3	Dadri	817	3.00	3.00	3.94
4	Faridabad	430	2.00	2.00	2.04
5	Kawas	645	2.25	2.19	3.11
6	Gandhar	648	2.25*	1.50	3.12
	Total	3605	13.74*	12.93	17.35

**includes 0.75 MMSCMD on fallback basis.*

2.47 The Committee sought the demand and supply of gas from NTPC Ltd. for its power stations and measures taken to meet the shortfall in gas to which NTPC Ltd gave the following in their written reply:-

> "However, owing to shortage of gas in India, the delivered quantities have fallen short of the contracted quantities. During April 2007 - February 2008, the average gas supplies under APM category for these stations have been 9.06 MMSCMD against the contracted quantity of 12.93 MMSCMD. Thus, there has been a shortage of more than 8 MMSCMD of gas for running these stations at 90% P.L.F.
>
> The above shortage has been partially mitigated by arranging Spot RLNG from major domestic suppliers, viz. GAIL, IOCL, BPCL, GSPC, Hazira LNG Pvt. Ltd.(HLPL) from time to time based on the requirement and the availability of Spot RLNG. During the period April 2007 – February 2008, the average Spot RLNG supplies have been 2.71 MMSCMD.
>
> Further, NTPC had entered in to contracts with GAIL, IOCL & BPCL (Offtakers of PLL) for supply of RLNG on fall-back basis to NTPC gas based stations at Dadri, Auraiya, Faridabad & Gandhar. The details are below:
>
> GAIL: 0.5 MMSCMD each for Faridabad & Gandhar
> IOCL: 0.2 MMSCMD for Dadri
> BPCL: 0.1 MMSCMD for Auraiya
>
> As the above contracts are on fall-back basis, the actual supplies during the current financial year 2007-08(April'07–February'08) has been Nil. Also, NTPC has been making efforts to meet the shortfall by exploring various possibilities of arranging various domestic gas / RLNG."

XII). <u>Gas Supplies From PMT Fields</u>

2.48 When asked sourcing gas suppliers from PMT fields, NTPC in a written note stated:-

> "It is understood that MoP&NG has taken some key decisions relating to PMT gases which inter-alia includes PMT JV to make available entire production of around 16 ~ 17 MMSCMD (except 4.8 MMSCMD till March'08) to GAIL at PSC price and terms. Further, for this purpose, PMT JV shall annul any new contracts entered (except that with RRUVNL) and the quantities shall be marketed by GAIL being the Govt. nominee and in accordance with the instructions of Ministry of Petroleum & Natural Gas(MoP&NG) on the basis of gas utilization policy. Accordingly, MoP&NG has been requested to allocate 7 MMSCMD of PMT gas to NTPC stations for meeting the shortfall. In view of large shortage of power in the country, this allocation would be in larger public

interest as it would facilitate making available more power from NTPC power stations.

Hon'ble Minister of Power has taken up this issue with Hon'ble Prime Minister and requested for allocation of 7 MMSCMD of PMT gas on priority to NTPC. NTPC has also been making efforts for tie-up of RLNG on long term basis. Presently, Gas utilization policy is being finalized by MoP&NG. Power Sector being the key economy driver needs to be given adequate priority while finalization of the above policy. NTPC has been pursuing this at various forums. Hon'ble Minister of Power has also taken up with Hon'ble Primer Minister for giving priority to Power sector in allocation of domestic gas at par, if not precedence over fertilizer sector. As a long-term fuel (gas) security measure, NTPC has also been exploring the possibility to participate in various elements of the LNG value chain viz. Exploration & Production (E&P), Liquefaction, Shipping and Regasification. Through NELP-V of GoI, NTPC along with its consortium partners have been allotted one petroleum block in Arunachal Pradesh. Exploration activities in the block are currently in progress."

2.49 The Committee wanted to know whether NTPC Ltd had any interest in participating in NELP bidding for oil and gas exploration in India, NTPC Ltd in the written note submitted to the Committee stated as under: -

"NTPC approached oil / gas PSUs, to explore the possibility of bidding jointly for mutually identified Oil / Gas exploration blocks in the bidding rounds announced by Govt, of India under NELP-V in 2005 and NELP - VI in 2006. Under NELP VI, NTPC participated in the bids with IOCL in one consortium and with BPCL in another consortium. In the current NELP-VII bidding round announced by Govt. of India, NTPC has approached oil / gas PSUs to explore the possibility of joint bidding in the mutually identified oil / gas exploration blocks.

NTPC has also been approaching oil PSUs in any identified opportunity for participation in bidding of oil / gas exploration blocks abroad."

2.50 Elaborating on the steps taken for gas imports, the Company stated:-

"NTPC had approached the International companies for supply of gas. During 2004, NTPC approached all the leading International LNG suppliers, Domestic Natural gas suppliers and also the regasification service providers for supply of gas/LNG to meet the shortfall of gas at NTPC gas based stations. However, the response had been lukewarm resulting in no significant quantity getting tied up. Further, it may be mentioned that earlier in 2002 NTPC had initiated a process of International Competitive Bidding for supply of LNG/natural gas for the expansion of two of its existing projects viz. Kawas and Gandhar for a period of 17 years. M/s. Reliance Industries

Limited (M/s. RIL) emerged as the L1 bidder and the award was placed on them. However, RIL has not yet signed the Gas supply and Purchase agreement (GSPA) and the matter is now subjudice in the Bombay High Court.

NTPC also approached the International Suppliers of Gas for supply of gas to Kayamkulam through the International Competitive bidding route in the year 2003. However, there was a poor response from the International as well as domestic suppliers for supply of gas to Kayamkulam.

NTPC has signed an MOU with the Federal Government of Nigeria (FGN) in the year 2007. MOU envisages that FGN shall provide at least three(3) million tons of LNG per annum on long term basis to NTPC subject to availability for a period of 25 years at a reasonable price. Upon successful operation of above obligation by FGN, NTPC shall set up and operate a 500 MW coal based power plant and a 700 MW gas based power plant in Nigeria subject to techno-economic feasibility."

2.51 When the issue of availability of gas for the power plants was raised before the Ministry by the Committee, the Ministry stated the following in their written reply to the Committee:-

"(i) The production and supply of gas has not been keeping pace with the growing demand of gas in the country, including for that of power sector. Gas requirement at 90% PLF and actual average supply of gas to gas based power plants during the year 2007-08 & 2008-09 (Apr – June 08) has been as below:

S. No.	Years	Capacity at the end of year (MW)	Gas Required* (MMSCMD)	Aver. Gas Supplied (MMSCMD)
(1)	(2)	(3)	(4)	(5)
1	2007- 08	13,408.92	65.67	38.14
2	2008 – 09 (Apr. June 08)	13,468.72 (As on 30.06.08)	66.09 (As on 30.06.08)	41.07

**Normative gas requirement at 90% PLF taking GCV of gas= 9000 K.Cal / SCM (except for Ramgarh CCGT for which GCV is 4150 K Ca l/ SCM), station heat rate – 2900K.Cal / kWh for open cycle and 2000 K.Cal / kWh for combined cycle*

MMSCMD – Million Metric Standard Cubic Meters per Day.

(ii) As regards NTPC, it is mentioned that NTPC has 6 gas-based power stations with total capacity of 3604 MW located in the northern and western region. The gas supply during 2007-08 was 11.79 MMSCMD (including 2.82

MMSCMD Spot LNG), against the requirement of 17.29 MMSCMD for operation of stations at 90% PLF, which has been sufficient to operate the stations at about 61% PLF. Loss of generation due to shortage in availability of gas based on possible operation of power plants at 90% PLF was 6.15 BUs during the year 2007-08. To meet the current deficit, NTPC has started taking gas at market prices on short-term basis, most of which is RLNG, at significantly higher prices than the domestic gas prices.

(iii) In the absence of any forecast for availability of domestic gas for any new gas based power plants, NTPC has not planned any gas-based plant on domestic gas in the near future. However, NTPC is considering expansion of its Kayamkulam plant based on imported LNG supplied through upcoming Kochi LNG terminal.

(iv) It is evident from the above that Gas supply for gas based power station is inadequate. Ministry of Power has taken up the matter several times with MoP&NG for priority in allocation of Natural Gas to the Power Plants including PSUs. The Empowered Group of Ministers (EGoM) in its meeting held on 28.05.2008 on commercial utilization of gas under the New Exploration Licensing Policy (NELP) has decided to prioritize allocation of 18 MMSCMD of gas to Gas Based Power Plants lying idle / under – utilized and likely to be commissioned during 2008-09, and liquid fuel plants, which are now running on liquid fuel and could switch over to natural gas, to meet the partial requirement of these plants."

2.52 Elaborating on the steps taken by the Ministry to address the issue of gas availability to the power plants, the Secretary, Power, during the oral evidence stated the following:-

"We know that gas reserves in the country so far are limited. Our Ministry has been of the view that power generation should get the highest priority in allocation of gas. At present we are behind fertilizers. It is profitable to convert fertilizer production from naphtha to gas. There is a lot of economic sense in it. But while fertilizers can be imported, power cannot be. If you do not have adequate power, it can only cause damage. The use of fertilizer requires assured irrigation. So, I would urge this Committee to kindly consider recommending the highest priority to power sector in the distribution of gas.

It will have to be a considered executive decision of the Government. There is no legislation at present on the subject. The point that I have made here, I have made before other fora also within the Government. We have been allocated some share of gas but I think that the share is not yet adequate. We still need a lot more for our stranded generation capacity that is already constructed or under construction. Sir, my continued effort is to try and get a higher allocation and a higher allocation on priority."

2.53 When asked to state the progress and present status on the legal dispute on the supply of gas to NTPC by Reliance Industries Limited, the Secretary in his reply during the oral evidence before the Committee stated:-

> "As far as the issue of litigation is concerned, NTPC is directly engaged in litigation with RIL over the issue. The issue is s*ub judice* and we would, as a responsible body like to settle this issue in Court, rather than through Media. We have been restrained in our comment but very firm in our submissions. The case has seen a number of hearings. It has been listed on 45 occasions in the Court. I have full faith in our Indian judiciary and I know that it is one of the best institutions. I am hopeful and confident that we shall get justice at the earliest."

XIII). <u>Clearances for Thermal Power Projects</u>

2.54 The setting up of a power plant is a very challenging task. The selection of site, technology, achieving of financial closure, etc. are to be finalized. Along with these the various clearances and approvals required are to be obtained from various agencies. In order to understand this issue, the Committee examined the topic.

2.55 When asked to give details of clearances/approvals required for setting up of a thermal power project, NTPC in a written note gave the following details:-

S. NO	Type of Clearance	Issuing Authority	Reason for its requirement	Procedure
I	<u>LAND</u> In – Principle Availability of Land	State Govt.	To ensure land availability.	Application to concerned State Revenue Department along with marked up drawing indicating location and land requirement is submitted
ii a)	<u>WATER</u> In – Principle Availability of Water	State Govt.	To ensure water availability.	Application indicating make up water requirement, source and drawal point is submitted to State Water Resources Department.
b)	Water availability concurrence	CWC	To ensure water availability free from any dispute.	Application is submitted to CWC subsequent to receipt of water commitment from State Govt. CWC internally takes clearance from MOWR where water source is from international river water.
iii	<u>FUEL</u> Fuel Linkage	Standing Linkage Committee Long Term (SLC-LT)	Fuel linkage are required to ensure the timely and continuous supply of fuel to power stations.	NTPC has to apply for Long Term Coal linkage in the prescribed format along-with necessary processing fee to SLC (Standing Linkage Committee) – Long Term which works under Ministry of Coal. Based on the recommendation of MOP, SLC-LT approves the linkages.

S. NO	Type of Clearance	Issuing Authority	Reason for its requirement	Procedure
iv	NOC from Airports Authority of India (AAI)	AAI	This is necessary to ensure that the project will not create any obstruction to the existing/ proposed fly paths.	Application in prescribed format, undertakings on Non Judicial Stamp Paper along-with vicinity plan, general layout plan, plant cross section indicating location of tallest structure, site elevation certificate etc. is submitted to AAI. The validity of original NOC is 4 years, which can be subsequently renewed subsequently for 2 years period.
v	TOR approval from MOEF	MOEF	Approval of TOR from MOEF is required under the act	Approval of TOR is to be granted within 60 days of application.
vi	Public Hearing by State Pollution Control Board (SPCB)	SPCB	Public Hearing is required under the Act and hence cannot be done away with.	Application along with draft EIA and its executive summaries in English and local language are to be submitted. SPCB to issue a notice in two local newspapers for Public Hearing at least 30 days in advance. Public hearing to be completed within 45 days including forwarding of proceedings of Public Hearing.
vii	Environmental clearance	MOEF	Obtaining environmental clearance is required under the Act and hence cannot be done away with.	Final EIA report incorporating comments received during Public consultation process is to be submitted to MOEF. The proposal is referred to Expert Appraisal Committee. Environmental clearance to be granted within in 75 days.
viii	Comfort letters from Beneficiaries	Concerned SEBs	Willingness of SEBs to buy power.	Letters are sent to SEBs / successor entities for giving their consent to buy power.
ix	Forest Clearance (if applicable)	Distt. Forest Officer	This is required as per law.	Application to be submitted to Forest Deptt. showing forest area involved in land acquisition. Presently it is issued in two Stages, first in-principle and once conditions stipulated are complied then formal clearance.
x	Defence Clearance (for green field projects)	Defence Authority	This is required to avoid infringement with Defence installations and activities.	Application giving location and other details is submitted to Defence Authority.
xi	Clearance from Archeological Survey of India (ASI)	ASI	This is required as per citing criteria of MOEF.	Application is submitted to Archeological Survey of India authority indicating location of project and other details.

2.56 When NTPC was asked, whether the present system is satisfactory and suggestion for obtaining timely clearances and approvals, the Company in a written note submitted to the Committee stated the following:

"Some of the suggestions in respect of expeditious clearances of thermal projects are given bellow:

1. Coal Linkages

Comfort of coal linkages should be available before Feasibility Report of the project is prepared.

Earlier Procedure of Coal Linkages:

Earlier the Standing Linkage Committee (Long Term) (SLC-LT) which works under the aegis of Ministry of Coal used to accord firm long term coal linkage based on the recommendations of Ministry of Power and the linkages such accorded were deemed to have the movement clearance of Railways.

Present Procedure:

Presently, SLC (LT) accords approval for issuance of Letter of Assurance by Coal India Ltd for the project on normative quantity basis without indicating coal quantity/ source etc.

Thereafter, the power utility has to approach CIL for issuance of Letter of Assurance, quantity of coal, source of coal supply, coal quality parameters etc. Further, the power utility has to also follow up with Railways regarding movement clearance and the type of wagons that would be deployed by railways for transportation of coal to plan for suitable unloading arrangements.

Further, in case of expansion projects the issuance of Letter of Assurance is approved only for one unit which further delays the process of FR and financial closure of the project.

The present procedure of according firm coal linkages is time consuming and delays the process of FR and financial closure of the project.

As long term linkage is a very important milestone for a power project, single window service for long term coal linkage would go a long way in timely completion of activities."

2. Water Commitment

In case the drawal of water involves inter-state issues, concurrence from Central Water Commission (CWC) is required, which is time consuming.

3. Environmental Clearance:

Procedure for obtaining Environmental Clearance (EC) is a multi-step process, involving the following steps:-

- Step-I (Approval of Draft TOR): Minimum 60 days, as specified in Notification.
- Step-II (EIA Study): 8-9 months
- Step-III (Conduction of Public Consultation by SPCB): Minimum 45 Days, as specified in Notification.
- Step-IV (Appraisal of EIA Report): Minimum 60 Days, as specified in Notification.
- Step-V (Accord of Env. Clearance by MOEF): Minimum 45 Days, as specified in Notification.
- Total: Minimum 13-14 months.

Suggestion
In order to reduce the time taken for environmental clearance, following suggestions may be considered:

Notification of Model Terms of Reference for EIA Study by MOEF,eliminating the time required under Step-I. Site specific issues may be considered by MOEF and included by project proponent during the course of the study.

4. Defence Clearance (for Greenfield projects)

Though the Ministry of Defence is a nodal agency for according NOC/ Defence clearance prior to implementation of any project, it is understood that on receipt of application, they in turn have to take internal clearances from the concerned Wings of the Armed Forces and the whole process takes quite a long time

Suggestion
The system should be streamlined so that the clearances are accorded within a period of three months.

2.57 When asked to furnish a note giving details about the problems being faced in the implementation of the projects of NTPC which could not be made operational/commissioned due to requirement and promises made by various agencies at the time of finalization of projects. NTPC furnished the following in regard to Sipat Projects in its written reply:-

"The commissioning activities/operation of Sipat Projects of NTPC in Chhattisgarh is held up due to cancellation of water linkage by the State Govt.

Water available in NTPC reservoir is not sufficient to carry out the activity of Steam Blowing. Now, to enable start of steam blowing, release of water by Water Resources Department, Govt. of Chattisgarh is must.

Non-availability of water is depriving the State and the Western Region from the utilization of power at a time when the region is facing severe power shortage.

The implementation of the Sipat project was taken up based on firm source of water as cleared by both Chattisgarh Government and CWC. Therefore, Chattisgarh Government should release water unconditionally for operation/commissioning of the project. The demand of the Chhattisgarh Government at this stage, to make alternate arrangement for water is not justified."

2.58 When the Ministry of Power was asked to comment on clearances required for setting up a thermal power plant, the Ministry in their reply stated as under:-

"As per the EIA notification of 2006 it is mandatory to get the Terms of Reference approved by MOEF prior to conducting the EIA studies. The draft TOR along with pre feasibility report and duly filled prescribed proforma has to be submitted to MOEF and considered by the Expert Committee of MOEF before approval. It has been observed that the process takes about 2-3 Months. This action can be eliminated if a Model TOR based on the nature of the Project (coal, gas, hydro etc.) is provided by MOEF. The additional specific features, if any, for the location, will be added in the TOR by the industry prior to the commencement of EIA and can be discussed in the Appraisal Committee of MOEF prior to granting the environmental clearance. This Ministry has taken up the matter with MOEF."

XIV). <u>Relief and Rehabilitation Policy</u>

2.59 It has been stated by NTPC that State Governments and various stakeholders face hurdles during implementation of Relief and Rehabilitation Plan in various NTPC Projects.

2.60 When the Committee enquired of any relief and rehabilitation related problems being faced by NTPC, the Company informed :-

"NTPC addresses R&R issues in line with its R&R Policy. As per the Policy, a detailed Socio-economic Survey (SES) is conducted by a professional agency to create a baseline data of prospective Project Affected Persons (PAPs). This follows formulation of a 'Rehabilitation Action Plan' (RAP) after adequate consultation with stakeholders in Village Development Advisory Committee (VDAC), which comprises representatives of PAPs. Gram Panchayats, NTPC and District Administration.

On completion of RAP a Social Impact Evaluation (SIE) is carried out thru a professional agency to evaluate whether all activities identified in the RAP have been completed satisfactorily. Further, on completion of RAP need based community development activities are continued to be undertaken in the neighbouring areas of the project under NTPC's Corporate Social Responsibility Community Development (CSR-CD) Policy.

Problems faced by NTPC in discharging R&R obligation are as under: -

State Govts. at times insists on reopening of RAP finalized at the start of implementation process. This creates problems during implementation.

NTPC, as a CPSU is guided by its own R&R Policy and GOI's National Policy on R&R. However, some State which have come up with their own R&R Policies insist implementation of their Policies.

At times, different sector players in the same State are having different Policies which also results in problems during implementation.

There is a lot of insistence by various stakeholders for providing direct employment. NTPC using state-of-the-art technology has only limited jobs and is not able to meet the expectations of the stakeholders in this regard.

However, NTPC attempts to resolve such issues in an amicable manner."

2.61 When asked by the Committee as to what role and support does NTPC get from the Ministry in getting clearances for the projects pursued by NTPC, the Company in a written reply gave the following information:-

"Ministry of Power support NTPC in getting availability of basic inputs like land & water from State Govt., long term fuel linkage from Ministry of Coal. Ministry of Power through various inter-ministerial coordination help to get faster environmental clearance, land etc."

B. FINANCIAL PERFORMANCE OF NTPC

2.62 The shareholding pattern of the Company NTPC LIMITED as on June 30, 2007 is as follows.

Category	Total no. of shares	% to equity
GOI	7,37,96,34,400	89.50
FIIs	57,16,90,283	6.93
Indian Public	14,14,61,710	1.72
Banks & FI	6,59,80,446	0.80
Private Corp. Bodies	3,03,91,594	0.37
Mutual Funds	4,90,28,809	0.60
NRI / OCBs	26,88,053	0.03
Others	45,89,105	0.05
Total	8245464400	100.00

2.63 When asked for their views regarding proposed increase in public holding from 10% to 25% in NTPC by the Committee, the Undertaking furnished the following in its written reply:-

"Presently, 89.5% of the equity in NTPC is held by the government of India and balance 10.5% is held by FIIs and other retail investors. The present paid up capital of NTPC is Rs.8245.464 Crores, which is one of the highest paid up capital amongst the listed Companies.

An estimated capital investment to the extent of Rs.1,60,732 Crores is required during the next 5 years for capacity addition to be undertaken on our own and also by our Joint Venture Companies. For incurring this capital expenditure in the debt:equity ratio of 70:30, we need to deploy internal resources to the extent of Rs.56,349 Crores which, on an average, work out to Rs.11,270 Crores per annum.

The requirement of equity could be easily met from the available resources and also from anticipated internal resource generation. Although increasing the public float will unlock and create value for the organization, any dilution of equity from 10.5% to 25% will call for additional servicing of equity by way of dividend pay-out and will consequently reduce the internal resources thereby adversely affecting the capacity addition programme. Further increasing the equity-base will also result in reduction in earning per share.

Therefore, increasing the public float by issuing fresh equity from 10.5% to 25% may not be appropriate. Marginal increase in the float will help in better realization of organisation's potential and help in value creation."

2.64 When asked by the Committee to give details of borrowings from foreign agencies, status of repayments, the NTPC in its written reply furnish the following information:-

"Foreign currency loans outstanding as of March 31, 2007 amount to Rs. 72,537 million. The loan-wise details are as under:

(in million)

	Loan/Bonds		Outstanding Balance as on 31.03.2007	
		Currency	Foreign Currency	Equivalent INR
1.	Societe Generale	JPY	1629	608
2.	IBRD 3632-B	EUR	8	479
3.	IBRD 3632-O	USD	179	7867
4.	IBRD 3632-A	USD	9	377
5.	Asian Development Bank	JPY	8321	3105
6.	JBIC-I (IDP-120)	JPY	18888	7047
7.	JBIC-II (IDP-138)	JPY	12192	4549
8.	JBIC-III (IDP-140)	JPY	27294	10184

9.	JBIC-IV (IDP-144)	JPY	1251	467
10.	EUROBONDS 2011	USD	200	8772
11.	KEXIM-LOAN	USD	190	8350
12.	SWEDISH-CREDIT	USD	32	1390
13.	EUROBONDS 2016	USD	300	13158
14.	ADB II-TRANCHE A	USD	1	44
15.	ADB II-TRANCHE B	USD	140	6140
	TOTAL			72537

As per information furnished to the Committee Financial performance of Company during each of the last 5 years was stated as under:-

Rs. In millions

S.N.	Description	2006-07	2005-06	2004-05	2003-04	2002-03
i)	Turnover (Sale of Energy, excl ED)					
	Budgeted	260593	213588	185973	181549	177017
	Actual	308584	260701	225069	188178	190019
Ii)	Cost of Energy Sold to SEBs (Rs./kwh)					
	Budgeted	1.64	1.41	1.41	1.43	1.44
	Actual	1.75	1.64	1.52	1.47	1.47
Iii)	Net profit /Loss					
	Budgeted	46466	36224	34852	43653	32749
	Actual	68647	58202	58070	52608	36075
iv)	Net Paid up capital					
	Budgeted	-	-	-	-	-
	Actual	82455	82455	82455	78125	78125

The company achieved a Gross Revenue (including other income) of Rs. 35380.7 crore during 2006-07 as against Rs. 29339.3 crore for the year 2005-06, an increase of 20.59%."

2.65 When asked by the Committee as to whether NTPC avail the infrastructure status or any other tax benefits for its projects, the Company gave the following reply in the written note given to the Committee:-

"Infrastructure status defined under section 80-IA (4)(i)(c) of Income Tax Act, 1961 does not cover power projects and no income tax benefits are available to NTPC on this account.

However, section 80-IA(4)(iv)(a) of Income Tax Act, 1961 provides a deduction for an amount equal to 100% of profits and gains derived from business of generation or generation and distribution of power projects, for any ten consecutive assessment years out of fifteen years, if it begins to generate power at any time during the period beginning on the 1st day of April, 1993 and ending on the 31st day of March, 2010. Accordingly, NTPC avails the income tax benefits under this section."

2.66 When the Committee enquired as to whether the autonomy available for the Company under the navratna status is adequate, the Company in a written note stated:-

"Though the present powers available to NTPC under Navratna guidelines is adequate to great extent, however, with the increase in the quantum of business and opportunities due to growing economy, there is a need for further delegation of powers and autonomy as follows:

Enhancement in the Powers for investment in Joint Ventures and Subsidiaries

As per Navratna guidelines dated 5th August, 2005 issued by DPE, the power of Board of Directors for equity investment to establish financial joint ventures and wholly-owned companies in India and abroad, is limited to 15% of the net worth of NTPC in one project limited to Rs.1000 crore. The overall ceiling on such investment in all projects put together is limited to 30% of the net worth of NTPC.

NTPC has adopted multi-prolonged growth strategy to become 50,000 MW plus Company by the year 2012 and to have 75,000 MW plus installed capacity by 2017. This is a huge capacity addition programme. The strategy, inter alia includes capacity addition through green field projects, expansion of existing stations, joint venture and take over of stations.

The Company has so far set up six subsidiary companies including four wholly owned and eight joint venture companies. In addition to the above companies, the Board of Directors has already approved the Joint Venture Agreement for setting up a Joint Venture Company with UPRVUNL for 2x660MW Mega Project and for another Joint Venture Company with BSEB to establish a 3x660MW Power Project at Nabinagar, Bihar.

Since the power projects of the Company are being financed through debt equity ratio of 70:30, the limit of Rs.1000 crore for investment in one project is grossly inadequate and need to be enhanced to Rs.1500 crore.

In the past for setting up Nabinagar Thermal Power Project (4x250 MW) in Joint Venture with Railways since NTPC was to invest 74% in equity and Railways was to invest 26%, CCEA had granted one time relaxation of DPE guidelines dated 5.8.2005 by permitting equity investment of Rs.1188.26 crore by NTPC.

Again for setting up 3x660 MW Power Project at Nabinagar, Bihar in Joint Venture with BSEB the Company will have to seek special relaxation of DPE guidelines for investment in equity. This is because even assuming a project cost as approx. Rs.5 crore per MW (which is based on conservative approach) the total project cost of 3x660 MW project shall be Rs.9900 crore.

Taking into consideration 70:30 debt equity ratio in a 50:50 joint venture, NTPC would be required to invest Rs.1485 crore as equity.

The company is also bidding for ultra-mega power project, the equity investment in such project would also be over Rs.1000 crore, therefore special relaxation is sought from time to time.

It is, therefore, proposed that :-

(i) The ceiling on equity investment to establish financial Joint Ventures and wholly owned subsidiaries in India or abroad in one project be waived from existing limit of Rs.1000 crore subject to ceiling of 15% of net worth of NTPC in one project and overall ceiling of 30% of net worth of NTPC in all such projects put together.

(ii) Where the ultra mega power project is acquired through bidding from Central Government nominated agencies like PFC or other state PSUs, NTPC should be allowed to invest without any limit as in case of its own projects as the Company acquired through bidding shall ultimately be merged with NTPC.

In the meantime Ministry of Power has obtained CCEA's approval for waiver of ceiling of Rs.1000 crores for equity investments by NTPC Ltd. to establish financial Joint Ventures and wholly owned subsidiaries in India or abroad for participating in the bidding called by State Utilities and Distribution Licensees subject to the implementation of maximum 10 projects."

2.67 When the Committee wanted to know the functions and responsibilities assigned to the Directors who represent the Government on the Boards of the NTPC, the Ministry in their written reply stated the following:-

"Government Directors play a vital role in the affairs of the public enterprise. They act as the liaison and a channel of communication between Government and the PSU. This dual role of a Government Director has been clearly recognized as a Director of the company and as a representative of the Government. The Government Director should identify himself with the objects and goals of the enterprise, engage in joint thinking on equal terms. Reference to the Ministry for approval, sanction etc. should be addressed to the Government representative on the Board whose responsibility should be to process the matter and obtain the necessary Government approval promptly."

2.68 Asked to furnish the views of the Ministry regarding the performance of NTPC, the Ministry in their written reply submitted to the Committee gave the following :-

"NTPC Ltd. is one of the largest companies contributing to over 28% of the generation capacity addition in the country during the last 25 years. NTPC achieved a total generation of 200.864 BUs during 2007-08 as against 188.674 BUs during 2006-07, an increase of 6.46%. Company achieved a PLF of 92.24% in coal based power stations during 2007-08, as against 89.43% during 2006-07. Ten NTPC power stations achieved a PLF of more than 90% during the year 2007-08.

The company had achieved a turnover of Rs.32595 crore and net profit of Rs.6864 crore during the year 2006-07. The composite score of the company was 85 and the Inter-Ministerial Committee (IMC) had recommended continuation of Navratna status. NTPC has spearheaded development of thermal power generation in the Indian power sector. In this process, it has built a strong portfolio of coal and gas/liquid fuel based generation capacities. Developing and operating world-class power stations is NTPC's core competence.

NTPC has recently diversified into coal mining business primarily to secure its fuel requirements and support its aggressive capacity addition program. The company has made initial forays in the area of hydropower development and plans to have a significant share of hydro power in its future generation portfolio. NTPC is also giving thrust on diversification in the areas of power trading and distribution.

NTPC has been signing MoU with the Ministry every year since the inception of MoU system. The Company has been rated as "Excellent" for the MoU performance during 2004-05, 2005-06. The Company has been rated as "Very Good" for the year 2006-07."

CHAPTER-3

PERFORMANCE OF HYDRO-ELECTRIC POWER SECTOR

A. OVERVIEW

3.1 Of the total power generated in the country about 25% is from hydel power plants.In hydroelectric power plants, energy of water is utilised for power generation. Water collected in natural lakes and reservoirs at high altitudes are utilised or water may be artificially stored by constructing dams across flow in streams. The water stored in large dams are useful for generating electricity, for flood control and for irrigation purposes.

3.2 In India, there are many PSUs which are involved in generation of power by hydro-electric sources. Of them, some are Central PSUs. One of the major Central PSU involved in the hydro-electric power is National Hydroelectric Power Corporation (NHPC). The Committee have examined the Undertaking to understand the hydro-electric power scenario in the country.

3.3 Hydro power projects are classified based on installed capacity and type of development.

i) Classification based on installed capacity:

Hydro power projects are categorized in two segments i.e. small hydro and large hydro. Hydro projects upto 25 MW station capacity have been categorized as small hydro projects and projects having station capacity more than 25 MW have been categorized as large hydro projects.

Small hydro projects have been further classified as:

Class	Station Capacity in kW
Micro Hydro	Upto 100
Mini hydro	101 to 2000
Small hydro	201 to 25000

(ii) Classification based on type of development:

Run-of-River Plant:

A hydro electric power plant that uses the flow of the stream as it occurs and has no upstream reservoir or pondage.

Run-of-River Plant with Pondage:

A Hydroelectric Power Generating Plant with sufficient pondage for meeting the diurnal variation of power demand.

Storage Plant:

A Hydroelectric Power Plant with a reservoir of sufficient size to permit carryover from high flow season to low flow season to enable variation of generation of power according to demand.

B. POTENTIAL OF HYDROPOWER

3.4 The work of first assessment of total hydro power potentialities of all the rivers in the country by identifying specific schemes considered feasible for development was undertaken in 1953 by the erstwhile Central Water and Power commission, (Power Wing). The study was specially oriented to obtain the data essential for rational planning of future power development, selection of schemes for investigation and implementation under the various five year plans.

3.5 This study placed the country's total Hydro Electric Potential at 25.26 million kW (continuous) corresponding to about 42 million kW at 60% load factor and annual energy generation 222 TWH, from a total of about 250 hydroelectric schemes.

3.6 The next assessment (called re-assessment) of hydro electric potential in the country was done by Central Electricity Authority during the period 1978-1987. According to Reassessment Studies, the HE Potential is placed at about 84 million kW at 60% load factor from a total of 845 HE scheme sites. The probable installed capacity of these schemes would be about 1,48,700 MW. In addition, 56 Nos. sites for development of pumped storage schemes with likely aggregate installed capacity of about 93,920 MW (excluding 7 Nos. sites (2604 MW) under operation or construction at that time) were also identified in various regions of the country.

3.7 Out of the estimated hydro potential of the country, so far 36498 MW (including Pumped storage) has been exploited. It is expected that by the end of 14th Plan the entire feasible hydro potential would be exploited.

3.8 According to the Integrated Energy Policy :-

> "There is large unexploited hydel potential in the country. Development of this involves relatively long gestation lags. Moreover, storage schemes often involve displacement of people and submergence of land. Project affected people need to be resettled and rehabilitated. Also, storage schemes may have other environmental consequences such as adverse impact on aquatic life and downstream ecosystems. While these problems are not insurmountable they have not been adequately attended to in the past. There is, therefore, some opposition to the development of large storage schemes."

3.9 The expert, Dr. Leena Srivastava in a written note to the Committee on the need to tap the potential of hydropower in the country submitted the following:-

> "Concerted efforts are required to tap this hidden potential. There should be emphasis on public-private participation and R&R issues. The very few storage project sites should also be developed taking into account any likely concerns on bio-diversity and climate change induced impacts. This should be important in the larger interests of drinking water supply, flood control, etc as well.
>
> It also appears necessary to initiate a second reassessment of the economically viable potential using state-of-art investigation tools, updated hydrological data and economics of power generation. This may perhaps bring out a higher potential, which then could go a long way in mitigating India's on energy security concerns."

C. PHYSICAL PERFORMANCE OF NATIONAL HYDROELECTRIC POWER CORPORATION Ltd. (NHPC)

I). Background

3.10 NHPC was incorporated as a Private Limited Company in the year 1975 for the development of Hydro Power in the Country. Initially It was entrusted to construct the Hydro projects viz Salal, Baira Siul and Loktak of the Central Government. The Corporation has been converted as Public Limited Company in the year 1986. NHPC Ltd. is a schedule 'A' Enterprise of Government of India with an authorized share capital of Rs. 1,50,000 million and an investment base of over Rs. 2,50,000 million. In its existence of about 32 years, NHPC has become a major organization for hydro power development in India, with capabilities to undertake all the activities from "concept to commissioning" in relation to setting up of hydro projects. NHPC has ISO-9001 certification for the quality management system, ISO – 14001 for environment standard and certification for Occupational Health and Safety Standards (OHSAS).

3.11 NHPC has completed 11 hydroelectric projects with aggregate installed capacity of 4145 MW . In addition, 13 projects with aggregate installed capacity of 5652 MW are under active construction stage. NHPC is a profit-earning organization since becoming operational with profit showing an upward trend, has registered a net profit of Rs 925 crore with all time high sales turnover of Rs. 1963 crore during the year 2006-07. NHPC has been providing consultancy services in the area of hydro power development to the clients in India and abroad. NHPC is registered as a Consultant in the area of hydro power with International Funding Agencies like World Bank, Asian development Bank, etc.

3.12 The Committee sought to know from NHPC as to what are the advantages and limitations of hydel power stations and how the limiting factors can be removed, NHPC in a written reply to the Committee stated the following:

"**Advantages:**

- High potential (approx. 150000 MW) available in the country
- Will meet peaking shortages thus improving system stability
- Can control frequency excursions within specified limits
- A renewable and environment friendly source of energy
- Has a longer life span and is economical in the long run
- Leads to socio-economic development of remotely located backward areas
- Reduces dependence on fossil fuels

Limitations:

- Long gestation period & high construction risks
- High initial cost due to submergence
- Involves R&R and land acquisition problems
- Poor logistics due to remote locations of site

These limitations can be minimized by introducing time bound clearance procedures, better R&R policies for early disbursement of benefits to the PAP, using modern tools and techniques for survey and investigation and implementation of projects to minimize geological surprises and better project management tools."

II). <u>Percentage Share of NHPC Ltd</u>

3.13 As per the information furnished to the Committee, the percentage share of NHPC in the power generation is as follows: -

"1. Total Generation from the NHPC power stations during the year 2006-07 = 13048.76 MUs

2. Percentage share of NHPC in Power Generation out of total power generations in the country during the year 2006-07 = 1.97 %

Out of total power generation of around 134,000 MW, the share of hydro capacity of India is about 33000 MW and NHPC has so far added 4145 MW which is about 13% of total hydro share of India and 3% in terms of total power. NHPC has plans to add 5233 MW during XI Five Year Plan through 10 ongoing projects which will augment its share in the country's total hydro power to 20%."

III). Installed Capacity

3.14 When asked by the Committee to give details of the power stations under operation, NHPC in a written reply submitted as under: -

"NHPC since its inception in 1975 has added 4145 MW by commissioning 11 no. of Hydro electric projects. The list of these projects is given:

POWER STATIONS UNDER OPERATION				
Sr. No.	Power Station	State	Installed Capacity (MW)	
			Own Projects	In JV
1	Baira Siul	Himachal Pradesh	180	
2	Loktak	Manipur	105	
3	Salal – I &II	Jammu & Kashmir	690	
4	Tanakpur	Uttrakhand	120	
5	Chamera – I	Himachal Pradesh	540	
6	Uri	Jammu & Kashmir	480	
7	Rangit	Sikkim	60	
8	Chamera -II	Himachal Pradesh	300	
9	Dhauliganga –I	Uttrakhand	280	
10	Dulhasti	Jammu & Kashmir	390	
11	Indira Sagar *	Madhya Pradesh.		1000
		Total	3145	1000
		Grand Total	4145	

- *Joint Venture project between NHPC and Govt. of Madhya Pradesh*

3.15 Regarding projects under construction the Company stated:-

"At present NHPC has 12 projects with an aggregate installed capacity of 5132 MW under construction. Details of the projects are as below:

Sl. No.	Name of the Project	State/ UT/ Country	Installed Capacity (MW)	CCEA Approval date	Comm. date (as per CCEA)	Comm. date (Anticipated)
1.	TEESTA-V	Sikkim	510	11.02.2000	Feb.2007	Mar. 2008 *
2.	TEESTA LOW DAM-III	West Bengal	132	30.10.2003	Mar. 2007	Dec. 2009
3.	SEWA – II	J&K	120	09.09.2003	Sept. 2007	Jun. 2009
4.	PARBATI-II	H.P.	800	11.09.2002	Sept. 2009	Dec. 2010
5.	TEESTA LOW DAM-IV	West Bengal	160	30.09.2005	Sept. 2009	Aug. 2010
6.	URI-II	J&K	240	01.09.2005	Nov. 2009	Aug. 2010
7.	CHAMERA-III	H.P.	231	01.09.2005	Aug. 2010	Aug. 2010
8.	NIMOO BAZGO	J&K	45	24.08.2006	Aug. 2010	Aug. 2010
9.	SUBANSIRI LOWER	Arunachal Pradesh	2000	09.09.2003	Sept. 2010	Jan. 2012
10.	PARBATI-III	H.P.	520	09.11.2005	Nov. 2010	Nov. 2010
11.	CHUTAK	J&K	44	24.08.2006	Feb. 2011	Feb. 2011
12	KISHENGANGA	J&K	330	20.07.2007	July-2014	July 2024
		Total	**5132**			

**One unit put on commercial run on 25.2.2008*

3.16 When NHPC was asked by the Committee about their plan to tap the potential in North-Eastern region and Jammu & Kashmir, NHPC in a written note submitted to the Committee informed that: -

"At present NHPC is working on projects having installed capacity of about 10000 MW in NER. The development status of these projects is as under:

Projects in Arunachal Pradesh

Subansiri Lower HE Project (2000 MW)
At present this project is under construction stage.

Subansiri Middle (1600 MW) and Subansiri Upper (2000 MW) projects
S&I work for preparation of DPR of these two projects has been suspended due to non-availability of site clearance stage-II by MOEF.

Dibang Multi Purpose project (3000 MW)
Forest clearance proposal has been initiated by the project to obtain Forest clearance.

Tawang –I (750 MW) and Tawang-II (750 MW) Projects
S&I are under progress for preparation of DPR.
In addition to above, NHPC prepared the DPR of Siyom (1000 MW) and Siang Lower (2000 MW) projects However, these projects have been unilaterally allotted by the Govt. of Arunachal Pradesh to IPPs for development.

Survey & Investigation works for Siang Upper Project (11,000 MW) which was also entrusted to NHPC could not be carried out due to local resistance. Further, in the meeting held on 4.07.06/05.07.06 between Hon'ble Chief Minister, Government of Arunachal Pradesh and Hon'ble Minister of Power, Government of India, it was decided that the State Government shall carryout studies to determine optimum utilization of hydro potential and submersion, revised lay out through one or more professional agencies and prepare a Pre-Feasibility Report within six months.

Projects in Manipur

NHPC has one power station in the state namely Loktak (90 MW) power station under operation

J&K Projects

In regard to J&K Projects the Company informed that at present NHPC has following four power stations under operation with installed capacity of 1560 MW in J&K

1.	Salal-I (345 MW)	:	Commissioned in 1987
2.	Salal-II (345 MW)	:	Commissioned in 1996
3.	Uri-I (480 MW)	:	Commissioned in 1997
4.	Dulhasti (390 MW)	:	Commissioned in 2007

Also NHPC is working on following projects having installed capacity of about 2800 MW in J&K as under:

(i) Sewa – II HE Project (120 MW)*:*
(ii) Uri-II HE Project (240 MW)
(iii) Nimmo Bazgo HE Project (45MW)*:*
(iv) Chutak HE Project (44 MW):
(v) Kishanganga HE Project(330 MW):
(vi) Pakal Dul HE project(1000 MW):
(vii) Bursar HE project(1020 MW):"

3.17 The Committee asked NHPC as to how are the projects awarded to it and wanted to know as to any special mechanism to approve projects in place. In a written reply submitted to the Committee, NHPC made the following comments:-

"To set up a hydroelectric project, firstly consent of the concerned state govt. is obtained and then Survey and Investigation is carried out for the preparation of DPR. Thereafter, implementation agreement / MOU is signed by a CPSU with the concerned state government where the project is located. Secondly after entering into a MOU / Agreement with the State Government, CPSUs obtain clearances / approvals under three stage clearances process introduced by GoI in July 2001 for developments of hydroelectric projects."

3.18 When the Committee wanted to know whether NHPC is looking at hydel power plants in foreign countries and to give details about them, the Company gave the following in the form of a written reply:-

"NHPC has already commissioned 2 projects abroad on deposit and turnkey basis i.e. Devighat (14.1 MW) in Nepal and Kurichu (60 MW) in Bhutan. NHPC is open to implementing hydro power plants in the neighboring countries if asked by the Government."

3.19 When asked to elaborate on the initiatives taken by the Ministry of Power for hydro power development, the Secretary (Power), Shri Anil Razdon, during the oral evidence stated the following: -

"The Government of India has tried to encourage hydro power development. Through the Central Electricity Authority, we had formulated a 50,000 MW

hydroelectric plan in the year 2003. We had tried to give a merit order ranking for the possible good projects which could come up on priority. But hydro, water and water power are in the exclusive domain of the State Governments. NHPC on its part, now even NTPC and NEEPCO as well as SJVN, THDC and NHDC – Narmada Hydro Development Corporation, a subsidiary of NHPC in joint-venture with Madhya Pradesh Government – are pursuing it. We are pursuing all kinds of strategies to try and accelerate the pace of firm allotment of projects because what has been happening in some situations is that the State asks our organisations to prepare the DPR and the project is then allotted to another agency. I have been pleading with some of the States that we have absolutely no problem if they want more than one operator in their State.

But they should try and see that projects in a particular river basin or sub-basin are allotted to only one agency so that that particular agency develops the infrastructure there appropriately in full measure, and then reaps the fruits of it also. Thereafter, it is able to develop that basin or sub-basin in a very comprehensive manner.

I would even go to the extent of saying -- which I have tried for the State of J&K in our negotiations -- that even the small hydro potential should be given to that organisation. I am saying this because while they are working there, let them develop the entire potential in that limited area comprehensively so that once we have covered that particular sub-basin, then we move on to the next rather than scattering ourselves all over the place. In such a case, supervision is not as effective and the full gains of that infrastructure investment are not forthcoming. We have yet to attain success in this kind of an approach.

I would say that we do have some reasonable scope for improvement in pre-construction investigations, particularly, in areas where we are having these geological surprises because I think that this is what delays projects at times. I think that if investigations are better; more money is spent on preparation of the DPRs and the full investigation, then the ultimate construction and other activities may be faster."

IV). <u>Clearances for Hydro Power Projects</u>

3.20 The Committee sought to know from NHPC as to how many clearances are needed from various agencies and time taken for the same for setting up a hydro power plant. in a written reply furnished to the Committee, the Company gave the following reply:-

"For setting up of hydroelectric project, following statutory clearances are required:

1. Concurrence from CEA (earlier known as TEC)
2. Environment Clearance from Ministry of Environment and Forest.

3. Forest Clearance from Ministry of Environment and Forest except in case of Projects in J&K State where Forest Clearances obtained from State Govt..
4. Defence clearance in case project is located in proximity to International Border, LOC, restricted area etc.
5. Clearance from MOWR/CWC in case of inter-state projects
6. Clearance from Indus Water Commission in case of the projects located on rivers covered under Indus Water Treaty such as Chenab, Jhelum, Indus etc.

The time taken for obtaining above clearances vary from 3 – 12 months."

3.21 Adding on the role and support provided by the Ministry in getting clearances for the projects, the Company stated the following:-

"Ministry of Power plays a Pivotal role in providing support in liaisioning, negotiations and other co-ordination assistance needed from time to time in obtaining the various statutory clearances."

3.22 When asked by the Committee as to whether the Ministry has any mechanism to resolve the issues faced by the PSUs into other agencies like State Government Agencies, Electricity Boards etc. the Ministry made the following reply in a written submission:-

"No formal mechanism exists to resolve the issues faced by PSUs with such agencies. However, issues related to Power Sector are discussed regularly in meetings which are held by State Power Ministers with Ministry of Power, Senior Officers of State Government with Secretary (Power) and other Senior Officers. The Ministry also provides platforms in the form of conferences/meetings, involving Chief Ministers/Chief Secretaries of States, to discuss various issues. Following Conferences/Meetings were held during the year 2007 to discuss Power related issues:-

- Chief Secretaries' Conference on 23rd & 24th April, 2007.
- Chief Ministers' Conference on 28th May, 2007.
- Group of Ministers' meeting on 24th September, 2007 wherein constitution of following Task Force/ Sub Committee was approved:-
  (i) Task Force on Hydro Project Development
  (ii) Sub-Committee on financing issues.
- Chief Secretaries Conference was held on 19th Feb. 2008.
- Meeting with the Forum of Regulators (FOR) and State Power Secretaries on 05.11.2007.
- State-wise review meetings are also held by Cabinet Secretary."

3.23 When asked what measures are being taken by the Ministry to reduce the delays in obtaining clearances for hydropower plants, the Ministry in a written note inter-alia stated:-

> "For undertaking detailed survey & investigation at site, preparation of DPR and infrastructural works Prior Environment Clearance is required from MoEF along with approval of Terms of Reference for undertaking EIA /EMP studies.
>
> Though no clearance is directly required from the Ministry of Power, this Ministry has been insisting that when a DPR is submitted for concurrence to the CEA, as specified under Section 8 of the Electricity Act, 2003, then CEA should accord its approval within a period of 90 working days from the date of submission of DPR. However the other clearances such as Environment & Forest Clearance are accorded by the MoEF. It is often seen that the Environment and Forest clearances follow a time consuming and cumbersome procedures. This Ministry has been regularly taking up with the Ministry of Environment and Forest to streamline the procedures, so as to expedite the said clearance in a time bound manner."

3.24 When asked to furnish a note on the monitoring mechanism for ensuring completion of projects as per scheduled date, NHPC have in a written note stated as under:

> "NHPC have a specific department for project monitoring at corporate office named "Corporate Project Monitoring Group". Each project under execution, pre-construction stage and under investigations are monitored through different groups in CPMG. Modern Project Management software "Primavera" is used for project planning, scheduling and monitoring. The performance of the projects are continuously monitored through well institutionalized system of Progress review meetings being held every month at Project level, once in two months at regional office level and once in three months at Corporate office level. In these PRMs, project status is apprised and constraints are discussed for resolving with interface departments/ agencies. Various issues affecting the progress of projects, critical activities, remedial measures/ corrective steps to be taken, follow up actions etc. to improve the progress and for timely completion of all the works are also discussed in detail.
>
> Abstract review meetings at Corporate level with the head of the executing company (contractor) are also held and issues of critical nature affecting the progress are discussed and resolved.
>
> Progress reports of critical activities are generated on daily basis for review/comments. Corrective measures are further conveyed to projects for compliance. Weekly progress reports of critical activities are generated for internal monitoring by NHPC as well as report is sent to MOP. Exception reports are prepared on monthly basis.

The NHPC projects are also monitored by CEA and CWC and monthly reports are being sent to them and are discussed in the Performance Review meetings held at the level of MOP. MOU is signed annually with targets of execution projects, investigation projects etc. besides other aspects. MOU milestones are regularly monitored and reported."

3.25 When enquired as to how does NHPC propose to complete all projects as envisaged in the XIth Plan and to furnish details of the same, NHPC in a written note stated as under:-

"To complete the projects, following measures are taken:-

Monitoring of all the construction projects on daily / monthly / quarterly basis is being done by NHPC/concerned Agencies to stick to schedules and remedial measures, if any are taken immediately. Besides this, following also pursued for completion these projects within the schedule time.

- Regular on line progress reporting, Primavera schedules and regular review meetings of the progress at various levels both at the projects and Corporate Office are being held to sort out the problems if any, being encountered in execution.

Construction equipment with latest technology are being deployed for construction resulting in reduction of gestation period from several years to about 4 to 7 years only.

External experts are consulted as and when required to tackle the geological surprises/other technical problems encountered at projects during construction phase resulting in minimum loss of time.

Combined with the above, the experience of about 3 decades in the field, NHPC is confident to achieve the capacity addition targets.

Besides above for further effect to implementation and also to arrest the delays in execution of the projects, the following mechanism is being followed:-

Package wise review by respective Engineers-in-charge on weekly basis.
Progress review meetings at project site every month.
Review of progress at Corporate level every month.
Review of critical activities by Directors/CMD on daily basis.
Quarterly performance reviews at Ministry of Power level."

3.26 The Committee sought the details regarding the average construction period for a power plant for NHPC and whether it can be shortened by better project management techniques. In a written reply furnished to the Committee, the Company stated the following:-

"For hydroelectric projects, there cannot be a uniform time for construction. Each project is unique in itself and generally contains some peculiar features which differentiate it from others. Construction period for each individual project has to be worked out on the basis of the time required for construction of its individual structures taking into account their size, type, complexity as well as other local conditions. In NHPC, most of the projects taken up so far took between 4 to 7 years for construction. However due to various conditions and occurrences at site like natural calamities, problems involved with working in fragile Himalayan geology, attitude of local populace etc. have caused slippages in some of the projects while some other have been completed with no or very little delays. For example, 300 MW Chamera-II and 520 MW Omkareshwar Project were constructed in a record time of less than 5 years. The 400 MW Uri Power Station and 280 MW Dhauliganga Power Station were also completed with little delays.

During execution of the project several types of problems are encountered which cannot be anticipated in advance. Such problems cause delays and call for innovative solutions. However, there is always scope for improvement in the project management techniques."

3.27 Asked to compare the project management skills of NHPC with international norms by the Committee, the Company stated the following:-

"The construction periods for the hydroelectric projects and the techniques deployed for construction by NHPC are very well comparable to the international standards. In fact in several projects internationally reputed firms have executed the works with best quality and optimum gestation time. NHPC personnel at all levels have been imparted, from time to time management training and specialize training for development of skills for best possible project management. As a result, the avoidable losses have been minimized and the age old impression of dam projects lingering on for years and decades has since vanished."

3.28 When asked about the problems encountered by NHPC in execution of the projects, the NHPC in their written reply stated the following:-

"Problems encountered.

The impediments noticed during the execution of hydel projects of NHPC in North-East are poor infrastructure work, unfavorable Law and Order situation, Boarder disputes of states and non signing of MOU.

Poor Geological condition in HRT Face-VII – Progress at HRT Face-VIII is slow due to poor geological condition and high ingress of water.

Law and Order problem :- Matter has been taken up with State Government for declaring the project as prohibited area.

Poor Geological condition:- Progress at Adit to Pressure Shaft Top is slow due to very poor, thinly foliated, and highly weathered rock.

Initial set back because of labour unrest amount workers of M/s HCC:- There was in fighting among the labour causing murder of three workers on 11th June, 2006."

3.29 When the Committee asked how are Relief and Rehabilitation (R&R) packages managed by NHPC for their projects, the Company in a written reply stated the following :-

"Resettlement & Rehabilitation of project affected families is carried out on the basis of socio-economic surveys conducted in the project area during the course of Environmental Impact Assessment Studies. The baseline information about the social inventory of project affected families provides information on the village-wise distribution of PAFs, demographic profile of family structure, health and nutritious status, economic profile, resource base, common property resources of PAFs, land to be acquired from PAFs, total land holding of the PAFs, loss of production from the land to be acquired, and the loss of individual property. On the basis of the above categorization of the affected people into large small marginal and landless categories is conducted and further it is evaluated as how many families are going to be displaced, losing house, shops and whether the family is going to be affected fully or partially. Based on the above statistics, Resettlement & Rehabilitation plans are formulated for project affected families. These plans conform to the legislative provisions enforce like the National Policy on Resettlement & Rehabilitation. The Rehabilitation plan contains information about the compensation for land, houses, other immovable properties and ex-gratia payment etc. In the Resettlement & Rehabilitation plan provisions for community development, entrepreneurship training programme, subsidy for LPG, scholarships, infrastructure development, various kinds of other assistance are worked out along with the cost estimates. The Resettlement & Rehabilitation plan so devised is submitted in Environment Management Plan of the project to Ministry of Environment & Forests for appraisal and approval of EAC. On approval of the ministry, the same is implemented in the project in consultation with respective State Governments. During the course of project implementation, the same is monitored by the monitoring Committee, consisting members of MoEF, State Government and the project."

3.30 Giving suggestions to improve the present system of Relief and Rehabilitation measures, the company added the following:-

"Ministry of Power had introduced three stage development of new hydroelectric power projects in 2001. The time period for key activities for three stages is well defined.

The procedures followed for environmental and forest clearance have been streamlined by MOEF. All the clearance procedures of MOEF are time bound in nature. Provisions provided in NRRP – 2007 are sufficient enough to resolve the Resettlement and Rehabilitation (R&R) problems. Procedural methods provided in NRRP – 2007 are time bound in nature."

3.31 In its written reply to the Committee on Relief & Rehabilitation policy, the Ministry stated the following reply:-

Ministry of Rural Development has notified the National Rehabilitation and Resettlement Policy 2007 on 31st October, 2007. It is to mention in the new Hydro Policy notified by Ministry of Power as approved by the Cabinet on 3.1.2008 following have been included:

- An additional 1% free power over and above 12% will be earmarked for a Local Area Development Fund aimed at providing a regular stream of revenue for income generation, infrastructure creation and welfare schemes in the affected areas.

- Each project affected family (PAF) will get 100 units of electricity every month for a period of 10 years free of charge."

3.32 Asked by the Committee as to whether NHPC has undertaken any projects overseas, the company in their written note submitted to the Committee gave the following reply:-

"So far NHPC has commissioned two projects outside the country on deposit and turnkey basis, i.e., Devighat in Nepal (14.1 MW) and Kurichu"in Bhutan (60 MW)."

3.33 The Committee enquired as to whether NHPC is interested in diversifying into other avenues of power generation like thermal, nuclear etc. NHPC in its written reply submitted to the Committee gave the following:-

"As per the Memorandum of Association of NHPC, company has mandate for development of hydroelectric, wind, tidal power, Geo-thermal, transmission, distribution and sale of power in accordance with the National Economic Policy and objectives laid down by the Government from time to time.

NHPC has done investigation works for preparation of DPR for 5 MW geo-thermal project at Puga in J&K.

NHPC has been engaged as the nodal agency by Ministry of Non - conventional Energy Sources (MNES) for development of Geothermal Power in India.

The ranking studies of the Indian Geothermal Fields have been carried out during 2001-02 with cooperation of international consultant M/s GeothermEx, Inc., USA. Six most promising geothermal sites have been identified for development in order of following ranking:

- Tattapani in Chhattisgarh
- Puga in J&K
- Cambay Graben in Gujrat
- Manikaran in HP
- Surajkund in Jharkhand
- Chhumathang in J&K

The cost benefit studies for development of Tattapani Geothermal fields in Chhattisgarh & Puga Geothermal Field in J&K, have been done.
The proposal regarding overall development of Tattapani geothermal fields have been prepared by NHPC & submitted to MNES. MNES is getting certain survey work done from National Geophysical Research Institute (NGRI) Hyderabad and NHPC shall be associated with further work depending on the results of these survey works.

NHPC on request of MNES has submitted PFR of Puga Geothermal Fields, J&K. Subsequent to this an action plan for exploiting Puga Geo-thermal fields for Power Generation by developing it as national experimental demonstration project of 5 MW capacity was submitted to MNES on 23.05.2003. This proposal was considered in a meeting of the Commission for Additional Sources of Energy (CASE). The proposal was not approved by the Commission.

A team comprising representatives from GSI, Govt of J&K, CEA & NHPC and Prof. D. Chandra Shekhran, IIT, Mumbai & Chairman of M/s Geo Syndicate Power Pvt. Ltd. were deputed to New Zealand by MOP to study the Geothermal projects in operation. The inception report including tour report of visiting members of the team has been submitted to Ministry of Power in Jan 2006, followed by comments / observation of NHPC on structuring of geothermal project at Puga vide letter dated 03.03.2006.

Recently an Expert Group consisting of representatives from CEA, MNRE, NHPC, GSI, NGRI & M/s Geo-syndicate has been constituted to examine & compile the information available with various agencies involved in the areas of geothermal energy for assessment and development of the geothermal potential at the Puga valley, J&K.

The First meeting of the expert group was held in CEA on 17.10.07 and a decision to take up the deep drilling has been taken. The expert group has visited the site at Puga during 11th to 15th of Nov.07. Second meeting of the Expert Group was held at NGRI, Hyderabad on 28.01.2008. The Expert Group shall

submit its recommendations on development of Puga Geothermal fields to MNRE."

The salient features of New Hydro Policy are given at **Annexure – II.**

V). Technology Adequacy

3.34 The Committee wanted to know whether the country and the PSUs are having the latest technologies for the development of hydro power sector. As the hydel power projects are developed in difficult terrains and weather patterns. It is essential that a technology relevant to the particular project is available.

3.35 When the Committee asked NHPC to spell the technological constraints in hydropower sector the company in a written reply to the Committee stated the following: -

"Following technological constraints are being faced:-

1. Geological surprises & uncertainty.
2. Hydrological services & non-availability of hydro metrological long term data.
3. Resourceful Contractor.
4. Availability of state of art equipments and its supports services."

3.36 The Committee asked the Ministry as to whether the technology available is adequate for the hydro power sector in the country. The Ministry in their reply had stated the present status of technological adequacy in the hydro sector. Some of the salient points regarding the technology adequacy given by the Ministry to the Committee are as follows:-

"Hydro Technology

Present Status regarding adequacy of technology in the Hydro Sector

- As regards the adequacy of technology for the HE projects which have been executed/under execution, it may be mentioned that these are being achieved by incorporating the requirement of state of art equipment, on line monitoring devices etc. in the tender specification/bidding documents.

- Since the technology for GIS & 400 KV XLPE cables is not available in the country these equipments are being procured through the foreign firms due to which the requisite modernization & technology up-gradation in the power sector is also achieved.

Future Technological Options

A. Electromech Works

The new areas for Technology Improvement/Technology Upgradation in the Power Sector have been identified and stated in the National Power Plan (1997-2012) prepared by CEA. The scheme for Hydro Electric Sector as derived from the National Power Plan broadly covers acquiring/developing new technology.

B. Civil Works

Improvements in the Instrumentation in Hydro-Power Projects

Instrumentation of hydraulic structures in India is not very encouraging. Hardly 5% of the large dams have state of art instrumentation and data collection system. Even in well-instrumented structures the attention to the data acquisition, archiving and processing is not adequate. It is felt that this area needs more attention to enable engineering community to reap the benefits of good instrumentation programme. Further, mortality rate of instruments is also very high. Instrumentation technology needs updating through international interactions.

Advanced Technologies in Investigation Methodologies of Hydro Power Projects

Advanced technologies in investigation methodologies are yet to become a part of Indian practice, in case of Major/Mega Hydro projects it is desirable that the .scheme for investigation is worked out in detail. Projects, where obvious geological problems, such as crossing of intra-thrust zones e.g. in Himalayan belts, well known faults and lineaments crossings by tunnel alignments etc. are likely to be encountered, a dedicated geological investigation program involving experts of specialized disciplines should be evolved, instead of going by the standard guidelines which have been formulated for the complete range of project sizes.

Since satellite imageries plays a role in interpretation of sub-surface features, the experts need to deliberate on the related issues and a blueprint may be drawn to modernize the investigation techniques. This will not only ensure reliability of investigated features but would also minimize the time cost overruns' on account of unpredicted geological problems and surprises. The planning strategy therefore be devised in such a way that reasonably detailed information is available on shareable platforms such a internet etc. as well as in the form of Atlases or Standard Maps similar to those produced by Survey of India.

Technical Know How for Arch Dams

India needs to build up technical knowledge in Arch Gravity dams which have not so far been designed and constructed in our country.

Technical Know how for RCC Dams

The recent advances in the dam construction using Roller Compacted Concrete had made it feasibly to commission Hydro-Power plants sooner than the normal schedule. However, the State-of-the Art in this sphere has not reached to the extent desired in India. It would be very useful that the overall Technology development program should include suitable Transfer of Technology programme in this sphere as it would help speed up projects in remote areas in short duration.

Polymer trash racks for extreme cold situations and automatic trash raking machines at inlet of water intakes.

Polymer trash racks have been developed abroad for protection against ice adherence and blockade. These trash racks are suitable for projects located in extreme cold climate. The continuous type rotating trash raking screens have also been developed abroad for projects where trash is a daily threat. Several Indian projects also suffer from similar problem. The acquiring of technology for above items would be useful for projects located in high reaches of Himalayan region.

The availability and adequacy of technology can be met by technology upgradation, available in other countries."

D. FINANCIAL PERFORMANCE OF NHPC

3.37 The financial performance of Company during each of the last 5 years, (budgeted and actual figures) is as follows:-

	2002-03		**2003-04**		**2004-05**		**2005-06**		**2006-07**	
	Budget	**Actual**	**Budget**	**Actual**	**Budget**	**Actual**	**Budget**	**Actual**	**Budget**	**Actual**
Turnover	1493	1628	1440	1966	1630	1978	1863	2022	2374	2403
Less Advance against depreciation	190	153	161	138	105	132	119	48	239	216
Less Cost of production	951	920	947	1185	1033	1068	1236	1162	1310	1099
Net profit before tax	352	555	332	643	492	778	508	812	825	1088
Less Tax	2	44	1	22	32	93	35	69	75	163
Net profit after tax	**350**	**511**	**331**	**621**	**460**	**685**	**473**	**743**	**750**	**925**
Net paid up capital	2537	2522	4742	3137	3137	3137	5560	3573	5560	3558
MOU rating given	**Excellent**		**Excellent**		**Excellent**		**Excellent**		**Excellent (expected)**	

3.38 The information regarding dividend declared, power generated and free reserves available with NHPC are given below:-

		2006-07	2005-06	2004-05
(a)	Sales or Turnover (Rs. in Crore)	1969.93	1661.99	1581.73
(b)	Power Generated (MU)	13048.76	12567.15	11286.43
(c)	Net Profit (after tax)	924.80	742.75	684.58
(d)	Free Reserves (cumulative)	5367.05	4709.89	4168.49
(e)	Dividend declared (Rs. in Crore)	278.00	223.00	140.00
(f)	Equity Capital (Rs. in Crore)	11207.04	10576.09	9933.27

3.39 When the Committee enquired as to whether NHPC avail the infrastructure status for its power projects and tax benefits available. The company gave the following in the form of written reply:-

> "NHPC is availing benefits of Section 80-IA of Income Tax Act, 1961which provides for deduction of profit and gains from industrial undertaking or enterprise engaged in infrastructure development
>
> The said section provides for deduction of 100% of profit and gains derived from such business for ten consecutive assessment years out of fifteen years beginning from the year in which the undertaking begins to generate power at the option of the assessee.
>
> 1. Tax Benefits (Custom Duty-Nil & Excise Duty-Nil) were obtained in respect of the following Projects as per Mega Power Policy:
> i) Parbati-II HE Project
> ii) Parbati-III HE Project
> iii) Teesta-V HE Project
> iv) Subansiri Lower HE Project.
>
> 2. Tax Benefits (Concessional Excise Duty) were obtained in respect of the following Projects as per Deemed Export Benefit Policy:
> i) Uri-II HE Project
> ii) Chamera-III HE Project
> iii) Teesta Low Dam-IV HE Project."

3.40 Asked by the Committee to furnish details of MOU rating, NHPC gave the following reply:-

> "NHPC has been signing Memorandum of Understanding with Ministry of Power ever since 1991-92. NHPC has been rated Excellent for the 12th consecutive year (since 1994-95 to 2005-06). NHPC has been rated Excellent by Deptt. of Public Enterprise during the last three years.

The targets in MOU are fixed after detailed deliberation during the MOU negotiation meeting wherein representative of Ministry of Power, Central Electricity Authority and eminent person comprising Task Force members."

3.41 When asked regarding the main contributors for the turnover of NHPC and target for sale and profit, the NHPC in their written reply stated the following information.

"The main contributor for the turnover of NHPC is from sale of Electricity. As per Central Electricity Regulatory Commission (CERC) norms the sale of Electricity constitutes Annual Fixed Charges, Secondary Energy Charges, Incentives, UI Charges and taxes recoverable through tariff etc. Over the last three year the contribution made by above in the sales revenue has been as under:

	2004-05	2005-06	2006-07
Annual Fixed Charges	1390	1366	1523
Secondary Energy Charges	55	78	86
Incentives	62	73	79
UI Charges	47	65	56
Taxes (for current year)	56	53	133
Others	58	79	86
Total	**1668**	**1714**	**1963**

Corporation is getting its sales revenue from its commissioned projects. Uri project (480 MW) in J&K, Chamera – I (540 MW) & Chamera - II (300 MW) in HP & Salal project (690 MW) in J & K has contributed a major portion in the sales revenue of the Corporation. The revenue generated from these Power Stations in the last 3 years has been as under :-

Rs. in crores

	2004-05	2005-06	2006-07
Uri project	583	469	581
Chamera – I	276	314	295
Chamera – II	277	348	428
Salal	242	238	238
Other projects	290	345	421
Total	**1668**	**1714**	**1963**

The target set for next two years in sales and net profits (as per proposed budget) are as follows:

Rs. in crores

	2007-08	2008-09
Sales revenue	2224	2473
Net profit	875	943

3.42 When the Committee questioned whether the capital availability of NHPC is adequate for carrying out its proposed and future plans. NHPC gave the following in their written reply:-

> "Corporation has target to add capacity addition of 5233 MW of power in the XI Five year plan (2007-08 to 2011-12). In the proposed plan of the Corporation a total Plan outlay of Rs. 28,000 crores has been assessed which has been proposed to be financed from Equity Rs. 10812 crores and from Debts 17188 crores which includes Subordinate debts from Government of Rs. 1103 crores. The Equity Rs. 10812 crores has been proposed to be out of Internal Resources of the Corporation Rs. 4870 crores and for balance Equity requirement of Rs. 5942 crores a fresh infusion of capital in the equity is needed. Government of India has already given its approval to allow NHPC to issue an Initial Public Offer (IPO) not exceeding 24% of its paid up capital, in tranches, the first tranche being limited to 10%, from domestic / external market. Further Government has approved the disinvestment of 5% of its shareholding in NHPC, along with the public issue of fresh equity of shares of NHPC. Accordingly, Corporation has filed its Draft Red Herring Prospectus (DRHP) with SEBI in the month of April 07 for the IPO which is expected to hit in the market in the current financial year. For the balance Equity requirement NHPC would mobilize the resources after assessing market conditions and its future requirements."

3.43 When the Committee sought to know regarding any need for fresh infusion of capital in the equity of the company, NHPC submitted the following in their written reply:-

> "As mentioned above there is a need for fresh infusion of capital in the equity of the Corporation keeping in view the massive capacity addition programme of the Corporation. As mentioned above fresh Equity infusion of Rs. 5942 crores is needed by the Corporation in the XI Five year plan. Government of India has already given its approval to allow NHPC to issue an Initial Public Offer (IPO) not exceeding 24% of its paid up capital in tranches. The IPO of NHPC is expected to hit in the market in the current financial year. For the balance Equity requirement NHPC would mobilize the resources after assessing market conditions and its future requirements.
>
> As per the projections for capacity addition during 11th Plan and advance action on projects of capacity addition beyond 11th plan, NHPC has proposed a fund requirement of Rs.28,000 crores to meet its target of capacity addition of 5322 MW during the 11th Plan including 2 projects of 89 MW in best effort category."

3.44 When the Committee wanted to know the functions and responsibilities assigned to the Directors who represent the Government on the Boards of the NHPC, the Ministry in their written reply stated the following:-

> "As per Article 32 of the Articles of Association of NHPC, the business of the Company is managed by the Board of Directors and decisions are taken by the consensus or majority of the Board. Government is represented in the Board of NHPC by two senior level officials, one from the Ministry and other from the Central Electricity Authority. While no specific functions and responsibilities have been assigned by the Ministry to these officials. In accordance with the Memorandum of Articles of Association of the Corporation, they watch the interest of the Government during the proceedings of the Board and simultaneously ensure that the decisions taken in the Board meetings are within the purview of the prescribed guidelines on respective issues. Similar is the case for other CPSUs of the Ministry also."

3.45 Asked to furnish the views of the Ministry regarding the performance of NHPC, the Ministry in their written reply submitted to the Committee gave the following :-

> "National Hydroelectric Power Corporation Ltd. now known as NHPC Ltd., was established in 1975. NHPC is a Schedule 'A' Enterprise of the Government of India with an authorized share Capital of Rs.15000 crore and an investment base of about Rs.25400 crore. NHPC is ranked as a premier Organization in the country in the field of development of Hydro Power. NHPC has also been recently conferred with Mini Ratna Status by the Government of India. NHPC has been recently certified for Integrated Management System in compliance with PAS – 99' 2006 by integrating ISO 9001, ISO 14001 & OHSMS from BSI, New Delhi.
>
> NHPC has registered a net profit (after tax) of Rs.1002.06 crore during 2007-08 against the net profit (after tax) of Rs.924.80 crore during the previous financial year. NHPC has achieved an all time high sales turnover of Rs.2311.47 crore during 2007-08 as against Rs.1962.76 crore during the year 2006-07. It has paid an interim dividend of Rs.100 crore for the year 2007-08 to the Government of India. NHPC at present is operating 13 Power Stations generating a total of 5175 MW of Power which includes two Power Stations in Joint Venture with the Government of Madhya Pradesh. During the financial year 2007-08, Power Stations of NHPC generated 14811.35 MU exceeding the annual MOU target of 13906.95 MU for "Very Good Rating". The machine availability of the operating Power Stations measured as capacity Index is 96.13% exceeding the annual MOU targets of 94.5% for 'Excellent Rating'. Revenue realization from all the 27 beneficiaries of NHPC operating Power Stations during 2007-08 is 100% i.e. Rs.2270 crore.

NHPC has added 1420 MW during 2007-08 by Commissioning three Projects namely 390 MW Dulhasti in J&K State, 510 MW Teesta-V in Sikkim and 520 MW Omkareshwar Project in Madhya Pradesh (under joint venture with Government of Madhya Pradesh).

NHPC, at present, is having eleven projects of varying capacities under construction in the State of J&K, Himachal Pradesh, West Bengal and Arunachal Pradesh which will be having a total installed capacity of 3622 MW. All these projects are scheduled to be completed during the XI Five Year Plan.

NHPC is also providing Consultancy Services in the area of Hydro Power Development for generating additional revenue in the form of Consultancy business.

Under Rajiv Gandhi Gramin Vidyutikaran Yojana (RGGVY). NHPC has taken up Rural Electrification works in 27 Districts of State of West Bengal, Bihar, J&K, Chhattisgarh and Orissa with an estimated cost of about Rs.2580 crore. NHPC has also under taken Construction of Rural Roads and its maintenance in Six Districts of Bihar namely east Champaran, Muzaffarpur, Sheohar, Sitamarhi, Vaishali and west Champaran.

NHPC during its 32 years of existence has won many accolades in the form of awards and recognitions.

The company is proposing, subject to receipts of requisite approvals, market conditions and other considerations, a public issue of its equity shares and to file a Draft Red Herring prospectus with SEB during the month of August' 2008.

The performance of NHPC is regularly reviewed through quarterly meetings as also through periodical reports and returns submitted by NHPC. Overall performance of the Corporation has been found satisfactory."

CHAPTER-4

PERFORMANCE OF NUCLEAR POWER SECTOR

4.1 The energy released as a result of fission in certain materials is the basis for nuclear power generation. A nuclear reactor is an apparatus in which nuclear fission is produced in the form of a controlled self-sustaining chain reaction. There are different kinds of nuclear reactors like research reactors, power reactors, breeder reactors and production reactors etc.

4.2 In India the nuclear power generation is entirely in the hands of NPCIL a Central PSU under the Deptt. of Atomic Energy. At present power from nuclear energy is about 3% of the total power capacity installed in the country.

A. INDIAN NUCLEAR PROGRAMME

4.3 The Atomic Energy Commission (AEC) is the apex body for formulation of policy and direction of the programmes relating to peaceful uses in Atomic Energy, viz. power (electricity generation) and non power applications. AEC implements its policies and programmes through DAE.

4.4 Giving the details of three stage nuclear programme, NPCIL in a written note to the Committee stated: -

> "The indigenous nuclear power programme is based on the optimum utilization of nuclear resources in the country. The currently known domestic nuclear energy resources are 61,000 tons of Uranium and 2,25,000 tons of thorium. Natural Uranium comprises of only 0.7% of Uranium ^{235}, the only fissionable material available in nature, the rest being Uranium ^{238}. However, in principle all the Uranium and Thorium can be converted to fissionable materials Plutonium and Uranium ^{233} respectively and utilized for electricity generation.
>
> The three-stage sequential nuclear power programme is based on a closed fuel cycle; in which spent fuel of one stage is reprocessed to obtain fuel for the second stage. The first stage comprises of Pressurized Heavy Water Reactors (PHWR) fuelled by natural uranium. The first stage has a power potential of about 10 GWs. The U235 is fissioned in these reactors to generate electricity. The spent fuel of the first stage is reprocessed to obtain Plutonium (Pu) for fuelling the second stage.
>
> The second stage comprises of Fast Breeder Reactors (FBR) fuelled by a mixed oxide Pu and U ^{238}. While Plutonium undergoes fission and releases energy for electricity generation, U^{238} is converted to Pu by absorption of neutrons at the same time. In this process, more Pu is generated than is consumed, which is extracted by reprocessing the fuel. It is necessary to introduce thorium in a timely manner, as the doubling time in case of

Thorium-U 233 fuel cycle is much larger than in the case of Uranium 238-Pu and therefore an early introduction of thorium could impact the rate of growth of installed capacity. The total FBR potential is estimated to be about 530 GWe. Introduction of thorium could only be about three to four decades from now by which time a significant FBR capacity would be in operation."

Present Status:

4.5 The first stage has reached commercial maturity and a capacity of 3800 MWe (15 PHWRs) is in operation and 660 MWe (3 PHWRs) is under construction. Work on 8 more PHWRs, each of 700 MWe is planned to be initiated in the XI Plan. On progressive completion of these reactors, the first stage potential of 10,000 MWe GWe will be reached.

4.6 The second stage has been launched, and the first FBR is under construction, which is scheduled to be completed in 2011. It will be followed by 4 FBRs to add a capacity of 2000 MWe by the year 2020.

4.7 The third stage systems are under development. Commercial deployment of thorium reactors needs R&D and a sizeable capacity of second stage reactors.

B. POTENTIAL OF NUCLEAR ENERGY

4.8 The potential for development of nuclear energy in the country in the long term is huge. The details are:

Resource	Amount (tons)	Electricity Potential (GWe-Years)
Uranium-Metal - In PHWR - In Fast Breeders	 61,000	 328 42,231
Thorium-Metal (In Breeders)	2,25,000	155,502

Ref: A Strategy for Growth of Electrical Energy in India – DAE, Government of India 2004

C. ORGANISATIONS CONNECTED WITH NUCLEAR POWER PROGRAMME

4.9 In India, nuclear power generation has been kept for the Government owned Public Sector Undertakings only due to historical reasons. The design, construction and operation of nuclear power plants in the country started as a departmental activity in the early sixties, by the Department of Atomic Energy, Government of India. In the year 1967, Power Projects Engineering Division (PPED), a division of the DAE, was formed and entrusted with this responsibility. PPED was converted to Nuclear Power Board (NPB) in the year 1984, with increased delegation of powers.

4.10 There are two Central Public Sector Undertakings involved in power generation namely, Nuclear Power Corporation of India Ltd. (NPCIL) and Bhartiya Nabhikiya Vidyut Nigam Ltd (BHAVINI). Among this

(i) Nuclear Power Corporation of India Ltd. has been formed with the objective of setting up of power plants based on PHWR technology or related technologies.

(ii) BHAVINI has been incorporated to construct and operate the country's first PFBR (Prototype Fast Breeder Reactor) at Kalpakkam, Tamil Nadu.

D. PHYSICAL PERFORMANCE OF NUCLEAR POWER CORPORATION OF INDIA LTD. (NPCIL)

I). Background

4.11 Nuclear Power Corporation of India Limited (NPCIL) was formed on 17th September 1987. NPCIL was registered as a Public Limited Company under the Companies Act, 1956 with the objective of operating nuclear power plants and implementing the atomic power projects for generation of electricity in pursuance of the schemes and programmes of the Government of India under the Atomic Energy Act 1962.

4.12 NPCIL is a Public Sector Enterprise under the administrative control of the Department of Atomic Energy, Government of India. NPCIL activities include design, construction, commissioning, operation, renovation and modernization (R&M) and all other aspects of nuclear power reactors. NPCIL operates reactors with a capacity of 4120 MWe. Five nuclear power reactors with a capacity of 2660 MWe are under construction for progressive completion by 2010-11. The Company currently generates about 3% of the total electricity generation in the country.

II). Percentage Share

4.13 When asked to give the percentage share of nuclear power to total power generated in the country in the last five years, NPCIL in a written note stated as under:-

> "The quantum of nuclear energy generated during the last five years in Million Units and the share in the total power generated in the country is as follows:

Year	2002-03	2003-04	2004-05	2005-06	2006-07
Generation (MUs)	19358	17861	17010	17324	18801
% share	3.2	2.8	2.6	2.8	2.9

> *Note: Figures include generation from RAPS-116 MUs in 2002-03, 78 MUs in 2003-04 and 303 MUs in 2004-05"*

III). <u>Installed Capacity</u>

4.14 The present installed capacity of the NPCIL is 4020 Mwe comprising of 16 reactors. It also operates RAPS-1 (100 MWe) owned by DAE. The details of the plants operated by the company are as follows:-

Unit-	*Location*	Reactor Type	Capacity (MW)	Commercial Operation
TAPS-1	Tarapur, Maharashtra	BWR	160	28 October 1969
TAPS-2	Tarapur, Maharashtra	BWR	160	28 October 1969
RAPS-1	Rawatbhata,	PHWR	100	16 December 1973
RAPS-2	Rawatbhata,	PHWR	200	01 April 1981
MAPS-1	Kalpakkam,	PHWR	220	27 January 1984
MAPS-2	Kalpakkam,	PHWR	220	21 March 1986
NAPS-1	Narora, Uttar Pradesh	PHWR	220	01 January 1991
NAPS-2	Narora, Uttar Pradesh	PHWR	220	01 July 1992
KAPS-1	akrapar, Gujarat	PHWR	220	06 May 1993
KAPS-2	Kakrapar, Gujarat	PHWR	220	01 September 1995
KAIGA-2	Kaiga, Karnataka	PHWR	220	16 March 2000
RAPS-3	Rawatbhata,	PHWR	220	01 June 2000
KAIGA-1	Kaiga, Karnataka	PHWR	220	16 November 2000
RAPS-4	Rawatbhata,	PHWR	220	23 December 2000
TAPS-4	Tarapur, Maharashtra	PHWR	540	12 September 2005
TAPS-3	Tarapur, Maharashtra	PHWR	540	18 August 2006
Kaiga-3	Kaiga, Karnataka	PHWR	220	06 May 2007

4.15 In addition, a capacity of 2660 MWe, comprising of five nuclear power reactors, is under construction:-

> "The present capacity of 4120 MWe in operation will reach 7280 MWe by 2011 on progressive completion of projects in the country under construction (2660 MWe by NPCIL and 500 MWe by BHAVINI). Construction of eight indigenous Pressurised Heavy Water Reactors (PHWR) each of 700 MWe by NPCIL and an Advanced Heavy Water Reactor (AHWR) of 300 MWe by BARC is planned to be initiated in the XI Plan. Construction of four Fast Breeder Reactors (FBR) of 500 MWe by BHAVINI will be taken up in the XII Plan, so as to reach a capacity of 15,180 MWe by ongoing and indigenous programme by the year 2020. The technology for the indigenous programme has been developed and is available.
>
> The programme of reaching 21,000 MWe by 2020 as given in Integrated Energy Policy envisaged having a capacity of 6000 MWe through imported Light Water Reactors. The achievement in this regard is dependent on availability of international co-operation."

4.16 As regards the plans made by the Department for the next three years, it was stated:-

> "Currently, Kaiga-4, RAPP-5&6 and KK-1&2 are the projects under construction and these will be progressively completed in next two years. NPCIL has also plans to commence work on four 700 Mwe PHWRs in the next three years. This however, is subject to establishment of fuel linkages.In addition, the work is also expected to commence on setting up of LWRs at 3 sites, subject to Operationalisation of international commerce in the nuclear field."

4.17 When asked to give details of perspective planning of NPCIL, the Company in a written reply furnished to the Committee stated the following:-

> "Vision 2020 of DAE envisages reaching a capacity of 20,000 MWe by the year 2020 by a mix of 10,000 MWe from PHWRs, 2500 MWe from FBRs, 300 MWe from AHWR and the remaining from LWRs.
> As an additionality, imported LWRs, upto 40,000 MWe can be taken up, contingent to developments on international cooperation. In addition, reactors of the second stage and third stages are also planned in the future plans. The integrated energy policy envisages a nuclear power capacity of 48,000 to 63,000 nuclear power capacity by 2031-32."

4.18 The Committee wanted to know the progress in the three stage nuclear programme and how this programme will roll out. The Chairman of NPCIL, during the oral evidence stated the following:-

> "In the first stage, we are planning to reach 10,000 MW which will be completed by the end of the Twelfth Five Year Plan. Already, we are operating at around 4000 MW. We have plans to start work on 8 units of 700 MW which will take us to 10,000 MW. So, coming to the first stage, the entire potential will be available by the end of 2020.
>
> In the second stage our plan is to build a series of Fast Breeder Reactors. The fuel for the Fast Breeder Reactor is plutonium. Unless we have resources for producing that much plutonium, we cannot start the Fast Breeder Reactor in a big way. Now that we are in a position we have got spent fuel coming out from our 4460-megawatt capacity, we will be in a position to start constructing one or two Fast Breeder Reactors every year. In the third stage, we will introduce thorium in these Reactors. Thorium gets converted into Uranium 233. The fuel conversion which we are talking about is in the gram scale, while for the reactor to be started we need the fuel in tonnes. We have to take it to a commercial level. Today, we have developed the capabilities for back end of second stage to reprocess some few kgs. of plutonium which is coming out from our Fast Breeder Test Reactors. But we have to take it to a larger scale. The third stage system will be available between 2032 and 2050, not earlier than that. "

4.19 When asked to outline the time frame by which these 2nd and 3rd stage reactors will be in operation, the Chairman, NPCIL stated the following during the oral evidence:-

> "The Integrated Energy Policy Document specifies the time-frame up to 2032. So, up to 2032 it will be only the reactors of the first stage and the second stage which will be available for meeting the requirement of 63,000 MW. Regarding the third stage, which is based on thorium, by the end of 2032, actually 24 years from now – we will have a series of Fast Breeder Reactors. Thorium will be introduced by that time. That will be the time when we will be at the similar stage as we are today in respect of the Fast Breeder Reactors."

4.20 When this question was asked to DAE on how much progress has been made in the Indian Nuclear Power Programme, the DAE in their written reply gave the following information:-

> "The first stage of PHWRs has reached a state of commercial maturity with 15 reactors in operation and 3 reactors under construction. The performance in operation, safety, construction, renovation and modernization and other specialized 'in core' jobs has been excellent. The first stage has 285 reactor-years of excellent safety record. The second stage has been commercially launched with the start of construction of the 500 Mwe Prototype Fast Breeder Reactor (PFBR) in 2004. Comprehensive capabilities in all aspects of nuclear power from siting, design, construction, operation of nuclear power plants and front & back ends of the fuel cycle have been developed. The third stage systems are under development and may take a few decades for attaining commercial maturity."

IV). <u>Monitoring Mechanism</u>

4.21 When asked by the Committee to give a note on the monitoring mechanism for ensuring completion of projects as per scheduled date, NPCIL has given the following written reply:-

> "An Integrated Action Plan is prepared based on the project completion date broken down to various levels and Rolling Plans on six monthly basis are prepared. The progress of every activity of the project is monitored on a daily basis by the respective group heads and the integrated action Plan is constantly monitored by the Corporate Planning Group. The gist of the analysis is submitted to the management regularly. Advanced Software tools are used to build in all the complex linkages of thousands of activities of the project and to monitor them.
>
> In addition to regular monitoring, the progress of the project is monitored on a weekly basis by the Project Director and monthly basis and at least once in a

quarter by the Chairman and Managing Director. The performance on MOU targets is monitored on a quarterly basis. The performance of projects is monitored by the Secretary, Department of Atomic Energy, on a quarterly basis. Key milestones of the projects are also monitored by the Ministry of Statistics and Programme Implementation."

V). Capacity Utilisation

4.22 The details of Capacity Factor of each of the units are as follows:

	2002-03	2003-04	2004-05	2005-06	2006-07
TAPS-1	90	90	91	94	88
TAPS-2	92	88	94	96	98
TAPS-3	-	-	-	-	59
TAPS-4	-	-	-	70	42
RAPS-2	91	79	75	80	69
RAPP-3	84	80	76	79	62
RAPS-4	97	74	86	78	66
MAPS-1	72	97	-	79	72
MAPS-2	-	77	77	81	64
NAPS-1	89	87	64	71	-
NAPS-2	96	71	79	69	53
KAPS-1	98	78	65	55	67
KAPS-2	92	87	66	68	60
KAIGA-1	85	78	79	66	69
KAIGA-2	87	83	73	82	63
NPCIL	90	81	76	74	63

"The nuclear power installations in the country, including the frontend and back-end fuel cycle facilities, are designed for operation of plants at normative capacity factors of 68.5%. The operation of nuclear power reactors at progressively increasing capacity factors in past, completion of new projects in about five years time and delays in uranium mining projects in the country have resulted in a demand-supply mismatch of fuel. The operation of reactors at high capacity factors, upto 90%, has been demonstrated by NPCIL. The Availability Factors of NPCIL plants are high (88% in 2004-05, 89% in 2005-06 and 85% in 2006-07). Currently the PHWRs are being operated at reduced power due to the fuel demand supply mismatch**.** The Government is making efforts to augment fuel supply by opening new mines. The situation is expected to improve in due course."

4.23 When enquired about the steps taken proposed to be taken by NPCIL to improve their PLF of the plants, the Committee were given a written reply as follows:-

"Currently NPCIL plants are being operated at high Availability Factors. The PLF is remaining low on account of shortfall in supply of fuel. The improvement in PLF is expected with the improvement in fuel supply."

VI). <u>Fuel Availability</u>

4.24 The Committee had visited the nuclear power reactors at Tarapur and Kakrapar in January, 2008. During their study visit, the Committee were informed by the plant officials that due to fuel shortage, the reactors were operating at much below their capacity. The Committee were concerned with the shortage of fuel in the nuclear plants which was causing shortfall in generation of power.

4.25 When the Committee wanted to know the position regarding fuel shortage, the Chairman, NPCIL during the oral evidence before the Committee made the following submission:-

> "It is a fact that today out of 15 reactors which we are operating and 3 reactors which are under construction, we are suffering due to fuel shortage. All the three plants are all ready and waiting for fuel to be commissioned for the last many months. Projects are ready, but fuel is not there. All the 15 reactors are operating at a capacity of 50 per cent or less."

4.26 The Committee also asked NPCIL as to why this situation of fuel shortage was not foreseen to which the Chairman, NPCIL replied the following:

> "Our difficulty today is, we are not in a position to do mining. UCIL has been successful in Singhbhum belt of Jharkhand. At present, our entire uranium is coming only from Jharkhand. Three mines are under operation. There is a processing mill which was also set up together with the expansion programme. That processing mill was to be commissioned in the beginning of 2006. If that had been commissioned, then the uranium which is available today would have doubled. We are not able to operate our reactors to full capacity because of the difficulties which are faced in the successful operation of the mills. But way back in 2000 itself, 8 years ago, the Department of Atomic Energy has initiated in all sincerity to start mining in Andhra Pradesh which has got very huge uranium reserves and also in Meghalaya. This project is being monitored at the Prime Minister's level. The environmental clearance was obtained in 2001-02 itself, but because certain NGOs decided to go to the High Court – they filed a writ petition that this should not be permitted – it has been referred to the Ministry of Environment and Forests and it is reconsidering that, we could not start mining there."

4.27 Explaining the steps being taken to explore and mine the Uranium resources, the Chairman of NPCIL during his oral evidence before the Committee stated the following details:-

> "I will just explain to you the mining development which takes around four to five years in the kind of assets which we have got and it is commissioned. We thought actually two years time, as per our experience, is good enough time for completing all these public hearing and other interaction processes

and we were confident that in 2002 the mining work will start and the actually production from these additional mines will be available from 2006-07 onwards. If that had happened, the things would have been different, but today's stage is that it is actually not possible, as I mentioned because of those reasons we are not able to start any work in Meghalaya. But we have got some success in Andhra Pradesh.

In addition to that, one more mining project is there, that is, Tummalapalle in addition to Turamdih, which will double the production. The Tummalapalle project has been cleared, the State Government has permitted it, the land acquisition has been completed, the mining work has started and the milling process has started. This mine is actually to start production in 2010-11, which will give us the total uranium availability of three times of present availability. This is the status.

The second stream has started and by October end or early November 2008 positively we are going to get the uranium. That will ensure that the three plants which are waiting, we can commission them and the other plants which are starving of uranium, and we will take their capacity factor to 70 per cent. This is the present position."

4.28 The Committee enquired as to whether the Uranium mining should be free from any hurdles in exploring them to which the CMD, NPCIL in his reply stated the following:-

"Sir, we would definitely welcome support from the hon. Members in whatever way they can. As I mentioned, we are making efforts for the last eight years for starting uranium mining. I mentioned to you about our effort for starting the Turamdih Mill. That will actually double the uranium availability to run the plants."

4.29 The Committee enquired as to whether NPCIL has been looking at other countries which are rich in Uranium resources and any cooperation in mining or in buying of such mines in those countries are being contemplated. In responding to this, the Chairman, NPCIL during the oral evidence gave the following reply:-

"There are many countries like South Africa, Central Africa, Niger, Kazhakistan which have got uranium assets in their country and they are looking for some joint investment proposals. The moment this opportunity is available, in that direction also we will very aggressively go. In parallel with this particular programme, we will definitely ensure that we tie up such assets. The purpose is that we must have multilateral sources which will supply the fuel to us, not depending only on one country or one source. I would like to make that very clear."

4.30 When the Committee asked whether the Department of Atomic Energy has been carrying out surveys for deposits of Uranium ore in the country, the Department in their written reply furnished to the Committee gave the following information:-

"Exploration and research for uranium in India is being carried out by Atomic Minerals Directorate for Exploration and Research (AMD), under Department of Atomic Energy, Government of India. Since its inception in July 29, 1949 and commencement of operations in October 3, 1950, AMD is the only organization in the country engaged in exploration for geological materials including uranium required for India's nuclear power programme.

Apart from the headquarters, centralized laboratories and specialized groups at Hyderabad, AMD has seven regional centers at New Delhi, Jaipur, Shillong, Jamshedpur, Nagpur, Bangalore and Hyderabad. Two sectional offices are located at Thiruvananthapuram and Vishakhapatnam for beach sand and offshore investigations.

The physical targets achieved since inception of AMD, are given in the table below:

Principal Activity	**Target**
Reconnaissance Survey	5,17,004 Sq Km
Detailed Survey	10,837 Sq Km
Geochemical Survey	2,24308 Sq Km
Ground Geophysical Survey	2963 Sq Km + 27 L Km
Air-borne Geophysical Survey	5,57,000 Sq Km + 16,153 Line Km
Drilling (Departmental)	12,17,555 m
Drilling (Contract)	3,69,255 m

World over the uranium deposit types that contribute to the major chunk of the production are the unconformity, vein and sandstone types. In India all these types of deposits have been located and in the case of few other types, exploration is at an advanced stage. AMD has so far identified uranium resources of 1,07,268 tonnes of U308 in deposits located in different parts of the country as shown in the table below.

State	**Deposits**	**Rosources (tonnes of U308)**
Jharkhand	Jaduguda, Bhatin, Narwapahar, Turamdih, Mouldih, Bagjata	47,809
Andhra Pradesh	Lambapur, Peddagattu, Koppunuru, Tummalapalle - Rachkuntapalle, Chitrial	27,870

Meghalaya	Domiasiat, Wahkyn, Gomaghat – Phlangdilion, Tyrnai, Lostoin	17,233
Karnataka	Gogi, Walkunji	4,233
Rajasthan	Rohil, Umra	4,113
Chhattisgarh	Bodal, Jajawal, Bhandaritola, Dumhat – Dhabi	3,986
Uttar Pradesh	Naktu	785
Himachal Pradesh	Rajpura, Tileli, Kasha-Kaladi	784
Maharashta	Mogarra	355
Uttarakhand	Pokhri – Tunji	100
Total		**1,07,268**

AMD also has identified several potential areas in the country that have several favourablity criteria for hosting high grade uranium deposits. To meet the challenges of the predicted nuclear power growth in India AMD has scaled up its operations manifold during XI plan period (2007-2012). The major physical targets for uranium investigation are:

Principal Activity	**Target**
Reconnaissance Survey	30,000 Sq Km
Detailed Survey	1,000 Sq Km
Geochemical Survey	8,000 Sq Km
Ground Geophysical Survey	As per Requirement
Air-borne Geophysical Survey	4,00,000 Line Km
Drilling (Departmental)	3,00,000 m
Drilling (Contract)	4,80,000 m

AMD has also ushered in an era of more accurate and dependable exploration strategies with the support of advanced technologies. Collaboration and co-operation with premier professional organizations and academic institutions of excellence will be a major paradigm in all future endeavors of AMD."

4.31 When asked to furnish agencies relating to Exploration, Mining & Processing of Ores carried out by Department of Atomic Energy, the Department in a written reply furnished the following information:-

"Exploration and research for uranium in India is being carried out by Atomic Minerals Directorate for Exploration and Research (AMD), under Department of Atomic Energy, Government of India whereas Uranium Corporation of India Limited (UCIL), a PSU under Department of Atomic Energy is the agency involved in uranium mining in the country."

VII). <u>Nuclear Agreement with other Countries</u>

4.32 Recently, the Nuclear Supplier Group (NSG) had given clearance for its member countries to enter into cooperation in the field of civil nuclear cooperation with India. The Committee were interested to know the benefits of this agreement to the country in the area of power generation.

4.33 When asked by the Committee on the possible impact of the Civil Nuclear Cooperation Agreement on the Indian Nuclear Power Programme, the DAE in a written submission gave the following reply:-

> "The fruition of international nuclear cooperation can end the country's decades' long isolation and open avenues for nuclear commerce in the international market. It can open up the possibilities of large capacity addition through imports in the near term.
>
> It could also open possibilities of and export of small reactors, nuclear goods and services. There is also potential of India becoming a manufacturing hub for equipment and components for the global nuclear industry."

4.34 The Committee sought to know the views of the expert, Dr. Kirit Parikh, a Member of the Planning Commission regarding the share of nuclear power in the emerging power scenario of the country and the impact of the agreement that may be entered in the other countries for the import of reactors for generation of nuclear power. The expert made the following reply:-

> "Today, we have around 4,000 MW of nuclear power, and we are also constructing some more power plants. The whole strategy of the 123 Agreement is that India needs to have a nuclear power plant as a backup solution from a longer term perspective, and it can be a major solution also. We are short of Uranium, and we can set up only about 10,000 MW worth of power plants with the existing Uranium. Our strategy has been to set up 10,000 MW worth of power plant, but the first generation power plants like the ones we have in Rajasthan, Chennai, etc. produce electricity and the Uranium that they put in comes out as a depleted Uranium or spent fuel in which there is also some amount of Uranium converted into Plutonium. Once we have enough of Plutonium -- in something called the Fast Breeder Reactor (FBR). So, the FBR runs on an inventory of Plutonium plus the depleted Uranium that one has. Then it uses it, and further converts the depleted Uranium and produces electricity. It produces more Plutonium than one puts in. That is why, it is called a 'breeder', it breeds plutonium. After eight years or ten years, you have enough plutonium bred so that you can start another fast breeder reactor; and after 16 years, two more and so on. That is the whole idea of the strategy that we will recycle our uranium from the first generation power plants which can only support 10,000 mw into fast breeder reactors. With the available uranium, we can run for 35 years 10,000 mw worth of power plant. Thirty-five years is the lifetime. That is the amount of uranium we have. We

do not have more uranium available. But if we recycle the entire amount of uranium in this faster breeder reactors, we can set up 500,000 mw worth of fast breeder reactor. Our strategy is not only to do that, but also some time later, surround the core of a fast breeder reactor with a blanket of thorium. Some of the neutrons which would have gone to converting more plutonium, producing more plutonium will now go to converting thorium into uranium 233 which is a fissile material. Thorium by itself cannot be used in a reactor but when converted into uranium 233, you can run a uranium 233 based reactor. We have enough thorium to produce another 4.5 million mw of power plant. This is the thing. In the long run, we will run out of coal for sure. When we run out of coal, we will need some thing else, and 50 years down the line, nuclear can be our only source available, if solar does not come in a big way. If nothing else, as insurance, it is required.

Now, if we are able to import, say, 30,000 mw worth of power plants in the next 10-15 years with the uranium, then the amount of nuclear power plants we can set up this way, in the year 2050, can be almost 450,000 mw or even more, 480,000 mw, whereas if we do not import anything, we would not be able to set up more than 200,000 mw. That is the difference that we will have a hugely large potential of nuclear power plant if we are able to import uranium for the first generation power plants today, that is, in the next 10 years or so."

4.35 The Committee enquired the Chairman of NPCIL during the oral evidence as to whether the fuel obtained from one country can be used in the reactor built with the cooperation of another country. The Chairman, NPCIL gave the following reply:-

"Technically, it is possible to use any fuel from any country in any other plant. We have already signed the contract for supply of fuel for Kudankulam reactors for next five years and that fuel is available. There will not be any difficulty. As far as Kudankulam is concerned, incidentally, as per the inter-Governmental agreement with Russia, there is a life time guarantee of the fuel supply as a sovereign guarantee from the Russian Government."

4.36 Adding further to the above, the CMD, NPCIL stated that :-

"I would like to submit again that we are a commercial organisation. As a Corporation, unless there are some other directives, we are very clear that we will sign the contracts only when we are very confident about the fuel supply commitment for the lifetime. Secondly, we must have a freedom to use from multi-lateral sources and not bound by one."

4.37 When asked whether NPCIL will be able to ensure the continuous availability of fuel for the reactors even if a country goes back on its commitment or fails to honour its commitment to supply fuel to the reactors, the Chairman, NPCIL submitted during the oral evidence: -

> "We are very clear as a commercial organisation, we do not want to see any interruption in our power plant. We will insist that whichever is the reactor supplier has to give us guarantee of fuel supply to buy some mines. We can have a joint venture for uranium mining also. But we are very clear that with this guarantee and with this certainty, the agreements will be signed."

4.38 The Committee sought to know from the CMD of NPCIL as to what will be the additional power generation that can be achieved from the existing reactors by the agreement with other countries for supply of fuel. During the oral evidence, the Chairman, NPCIL stated that we will be in a position to come to 90 per cent plant load factor

VIII). <u>Technology Adequacy</u>

4.39 To a question by the Committee on Technology available for nuclear power sector, the DAE, Secretary stated the following:-

> "NPCIL is the custodian of thermal reactor technology. Similarly, Bhavini would be the custodian of fast reactor technology. At the moment Bhavini is not generating any electricity. The first project is under construction."

4.40 When asked by the Committee to state the kind of technology that may be available when the reactors are imported from foreign buyers, the Secretary DAE, during his deposition before the Committee made the following comments:-

> "In terms of technology, I would submit that because we have our own capability in technology, it is not we are dependent on technology from anybody, but because we have that capability, we are very intelligent buyers. I can submit to this august House that Koodankulam I and II, compared to similar reactors supplied in China for example or compared to similar reactors which were constructed in Russia, they are more advanced in terms of their safety characteristics. That has been done because of the insistence from the Indian side, both Nuclear Power Corporation and also, I would say, Atomic Energy regulators. They also insisted on certain safety requirements.
>
> The same thing will continue with other vendors whether it is US or France or Russia. We are not going to buy anything unless it meets Indian requirements and we are very insistent on ensuring that they meet Indian requirements. I would say that all these technologies are advanced and all these technologies will be better than not just the minimum threshold but a fairly high threshold. This is the way I would submit."

4.41 With regard to superiority of technology of different countries, the CMD, NPCIL during evidence elaborated:

> "As compared to the US, France and Russia have got a vibrant industry because they have been constructing their own plants and they have been

supplying. Really speaking, the US is only having the software – the design part of it. There are no heavy industries in that country and they are outsourcing all the materials either from Korea or Japan. So, really speaking, they can only give the design and other things which are other than the main components – the control instrumentation or what we call the low volume but high value items. These are the things which they actually source.

Today France actually has got 1,600 MW capacity reactor. If we set up a reactor, in five years we can generate 1600 MW. That is being marketed by the France. The Russian reactors and the American reactors are of 1,000 MW and above.

As far as the technical level is concerned, we will be evaluating it with the same parameter and there will not be any compromise, and there will be bare minimum differences. If somebody is offering superior to that, we have no difficulty but the unit energy cost will be the parameter."

4.42 When asked to comment on the share of nuclear energy in the energy mix of the country and also to justify the investments to be made in nuclear power viz-a-vis other sources like thermal hydro etc., the Secretary DAE during the oral evidence made the following comments:-

"First, I believe at this moment, the fraction of nuclear power in the total nuclear generation is very small. So, if we get access to energy in any form from wherever, indigenously or from outside, I think we should get that access.

Now, having said that I still foresee a serious energy crisis of global dimension in the long-term. At that point of time, for example, if the Indian hydrocarbon requirement or Indian coal requirement becomes between 20 and 30 per cent of the global consumption, then the question would be whether we will be able to get that energy resource at all, and if so, at that time, at what cost. I think we should prepare our country for that eventuality. In that context, it is very clear that in terms of the capital requirements, if you get, if you set up the fossil fuel energy source, the capital requirement would be less. There are no two opinions on that. With nuclear even today we can produce electricity at the competitive tariff. We can compete the unit energy cost. But in the long run, it is a question of whether India will have adequate energy resources to meet its requirements. I am of the very firm opinion that nuclear would play an extremely important role at that point of time, provided we have two things. We have adequate Uranium at our command again from wherever, indigenous or of foreign, and we go through this full technology development. If we get this Uranium and we do not carry out the technology development, then all this cannot be realised. If we do both, I think it provides a very important answer to the long term energy independence of the country."

4.43 Elaborating further on the need to harness different energy sources, he stated the following:-

> "We need to tap all energy sources. In fact, I am a champion of solar energy. In fact, we have programmes on solar. With regard to coal and oil, the situation is different and they say that we must buy that quickly even today. But just between the solar and nuclear – I am not talking about R&D – in terms of deployment, one would get higher value for rupee in the case of nuclear."

E. FINANCIAL PERFORMANCE OF NPCIL

4.44 NPCIL is fully owned by the Government of India. Of the authorized share capital of Rs. 15000 crore, Rs. 10145 crore has been paid up as on 31.03.2007.

4.45 When asked by the Committee to give the financial performance during each of the last 5 years, NPCIL has in their written reply to the Committee have stated as follows**:-**

> "NPCIL has been making profits over the last many years and has been paying dividend to the Government. The financial instruments (bonds) of the company are rated 'AAA' signifying highest safety. The details of the targeted and actual financial figures during the last five years (in Rs. Crore) are as follows:

(Rs. In Crore)

Particulars	2002-03		2003-04		2004-05		2005-06		2006-07	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Turnover (Income)	3875	4840	4846	5501	3522	3967	4068	4186	4137	4220
Cost of Production (Expenditure)	1845	2390	2078	1649	1674	1563	1902	1793	2053	1915
Net Profit after tax	1106	1509	1700	2604	965	1705	1285	1713	1091	1571

Targets as per RE "

4.46 When asked to furnish a note on extent of functional autonomy to the Company and its adequacy, the company in a written reply stated the following:-

> "NPCIL is a PSE under the Department of Atomic Energy and has adequate delegation of Power. A proposal for enhanced delegation of powers to the Board of Directors of NPCIL, for incurring capital expenditure and setting up of joint ventures, is under consideration of the Government."

4.47 The figures of budget allocation made and utilization by NPCIL furnished by the Department of Atomic Energy during the last three years are as follows:-

"BE and utilization in respect of 2005-06, 2006-07 and 2007-08 in respect of NPCIL are given below:

Year	BE (Rs. Crore)	Utilisation (Rs. Crore)
2005-06	4700	3692
2006-07	3400	3215
2007-08	2698	1775

The total expenditure on new launches planned by NPCIL in the XI Plan is estimated to be about Rs. 1,02,337 crore (at 2006-07 prices) of which Rs. 22,660 crore (at 2006-07 prices) is planned in the XI Plan. The equity portion of the projects of NPCIL is proposed to be funded by internal reserves and surpluses of NPCIL . The debt is proposed from domestic sources and external credit in respect of imported reactors. The other projects of DAE Power sector are funded by Domestic Budgetary Support, except PFBR by BHAVINI, where about 20% of domestic borrowings are envisaged."

4.48 Asked whether the Department has availed any loans from foreign sources or agencies for any of the programs, the DAE in a written note made the following reply to the Committee:-

"KK project 2 x 1000 Mwe is being executed in technical co-operation with Russian Federation. The project is funded through equity and credit extended by Russian Federation. The credit utilisation in the last three years, has been Rs. 1195 crore in 2005-06, Rs. 1177 crore in 2006-07 and Rs.373 crore in 2007-08."

4.49 Asked by the Committee as to whether the Department is satisfied with the availability of funds for carrying out the proposed capacity addition by NPCIL and does the Department need any additional funds, the DAE made the following submission to the Committee:-

"No difficulties have been experienced in connection with availability of funds by the Government since the expenditure has been met without any domestic budgetary support."

4.50 The Committee were concerned as to whether non-availability of funds for mining of Uranium by Uranium Corporation of India in India is hampering the production of Uranium within the country and thereby affecting the construction programme of new reactors of NPCIL. When asked about this during the oral evidence, the Secretary, DAE, stated the following in his reply:-

"They have an independent budget. The budget itself is not an issue. The issue is that we are not able to get all the necessary permissions for starting the uranium mining project, particularly in Meghalaya because Meghalaya is a big mine. If I get the sanction for starting the construction of that mine, that

mine will be ready in three to four years, I can also switch on the construction of the nuclear power project. But at this moment, we have to bring it down because the uranium availability was a question at that point of time."

F. PRIVATE SECTOR IN NUCLEAR POWER

4.51 According to the Deptt of Atomic Energy:-

"Atomic Energy Act, 1962 currently allows for setting up nuclear power stations only by the Government companies. The participation of public/private sector in nuclear power would need amendment of Atomic Energy Act and setting up of rules regarding eligibility to enter into nuclear power generation."

4.52 The Committee desired to know the view of NPCIL regarding the entry of other players in the field of power generation. CMD, NPCIL stated the following: -

"As per the Atomic Energy Act, as I mentioned to you, only a Central Government owned PSU can set up a plant. But there is a provision available that today NPCIL can have a joint venture with any of the industrial entities, whether it is a PSU or a private company. The only requirement is that NPCIL will have to be a majority shareholder meaning the entire operation will be under the control of NPCIL. Even today that provision exists.

Coming to the future role of the private sector, it will need an amendment to the Atomic Energy Act. But there are certain areas which will also require some policy decisions. First one is the institutional commitment for lifetime taking care of a nuclear power plant. That is because a loss-running nuclear power plant cannot be abandoned. There has to be some kind of commitment.

Today, as per the Atomic Energy Act or even also country's requirement, we are supposed to be the custodian of nuclear material and any movement of nuclear material has to be accounted for. If a private sector company is planning to set up a nuclear power plant, the mechanism as to how the total nuclear material accounting will take place, not only for the fresh fuel but what happens to the spent fuel has to be put in place. Our policy is that we do not want to keep the spent fuel. We would like to reprocess it and use it."

CHAPTER - 5

PERFORMANCE OF RENEWABLE ENERGY SECTOR

A. OVERVIEW

5.1 The major sources of energy for power generation are namely, coal, oil, Uranium etc are depleting and may be exhausted in a finite time period. Hence, it is imperative that efforts have to be made to explore the possibilities to meet the ever-increasing energy needs of the country from several renewable sources such as:-

(i) Solar Energy
(ii) Wind Energy
(iii) Energy from Bio-mass.
(iv) Tidal Energy
(v) Geo-thermal Energy
(vi) Ocean thermal energy conversion.

5.2 The advantages of renewable energy are that they do not pollute the atmosphere and can be termed as clean energy. They are also available in abundance and major benefit will be suitability of putting up of this power plants at very many locations thereby catering to the needs to the population at a specific place Increasingly, due to various factors like climate change concerns and environmental related issues, there has been a greater interest shown towards developing power from new and renewable sources of energy. This has been a trend in the global scene and substantial R&D and investments have been channelised and also planned in the sector.

5.3 According to the Integrated Energy Policy Report:-

> "From a longer term perspective and keeping in mind the need to maximally develop domestic supply options as well as the need to diversify energy sources, renewables remain important to India's energy sector. It would not be out of place to mention that solar power could be an important player in India attaining energy independence in the long run. With a concerted push and a 40-fold increase in their contribution to primary energy, renewables may account for only 5 to 6 % of India's energy mix by 2031-32. While this figure appears small, the distributed nature of renewables can provide many socio-economic benefits."

I). Role of the Ministry of New & Renewable Energy

5.4 Ministry of New and Renewable energy (MNRE) is the nodal Ministry of the Government of India at the National level for all matters relating to new and renewable energy. The Ministry has been facilitating the implementation of broad spectrum programmes including harnessing renewable power, renewable energy to rural areas for lighting, cooking and motive power, use of renewable energy in urban, industrial and commercial applications and development of alternate fuels

and applications. In addition, it supports research, design and development of new and renewable energy technologies, products and services. The Ministry of New & Renewable Energy has eight Programme Development/ Deployment Groups as under:-

Programme Development /Deployment Groups:

1. Biogas
2. Remote Village Electrification
3. Urban, Industrial and Commercial Applications (Solar energy, U&I waste to energy; non-bagasse cogeneration)
4. Wind and Biomass Energy
5. Solar Energy
6. Small Hydro Power
7. New Technologies (Hydrogen Energy & Fuel Cells; Tidal & Geothermal Energy Alternate Fuels)
8. Information, Publicity and Extension

The Ministry has two institutions, namely Centre for Wind Energy Technology (C-WET) and Indian Renewable Energy Development Agency Ltd. (IREDA) under its administrative control.

B. POTENTIAL OF RENEWABLE ENERGY

5.5 The Committee enquired about the estimated potential for power generation from renewable energy sources. The Ministry in their written note stated: -

"The estimated potential for power generation from renewable energy sources such as wind, small hydro and biomass has been estimated at 84,776 MW in the country, as per details given below:-

Sl. No.	Resource	Indicative Estimated Potential (MWe)
1.	Wind Power	45,195[1]
2.	Small Hydro Power (upto 25Mw)	15,000[2]
3.	Bio-power (Agro-residues)	16,881[3]
4.	Cogeneration-bagasse	5,000[4]
5.	Waste to Energy: Municipal solid waste to energy Industrial waste to energy	 1,700[5] 1,000
	Total	84,776

MWe =Megawatt electrical

(1): Potential based on areas having wind power density (wpd) greater than 200 W/m^2 assuming land availability in potential areas @ 1 per cent and requirement of wind farms @ 12 ha/MW, not all of which may be technically feasible for grid-interactive wind power. In line with international practice for setting up grid-interactive wind power systems, potential would drop substantially if sites having wpd greater than 300 W / m^2 were to be considered. However, the lower end of the potential might be suitable for off-grid applications. Further, preliminary surveys do not at this juncture suggest a sizeable grid-interactive off-shore wind power potential.

(2): Technically feasible hydro potential of all sites upto 25 MW station capacity, not all of which may be economically viable. Technically feasible potential of identified sites is placed at around 10,500MW.

(3): Although the potential is based on surplus agro-residues, in practice biomass power generation units prefer to use fuel-wood for techno-economic reasons. A potential of 45,000 MW_e from around 20mha of wastelands assumed to be yielding 10MT/ha/annum of woody biomass having 4000 k-cal/kg with system efficiency of 30% and 75% PLF has not been taken into account. In order to realize this potential a major inter-Ministerial initiative involving, among others, Environment & Forests, Agriculture, Rural Development, and Panchayati Raj would be required. Further, a Biomass Atlas is under preparation which is expected to more accurately assess state-wise renewable energy potential from agro-residues.

(4): With new sugar mills and modernization of existing ones, technically feasible potential is assessed at 5000 MWe, not all of which may be economically viable. Furthermore, several sugar companies/ cooperatives are unable to develop bankable projects on account of their financial and liquidity positions.

(5): With expansion of urban population post census 2001, current technically feasible municipal waste-to-energy potential is assessed at 1700 MWe, not all of which may be economically viable. However, subsidy disbursement under the municipal waste to energy programme has been kept in abeyance on the orders of the Supreme Court until final disposal of a PIL seeking composting as the preferred route for MSW disposal."

I). <u>Installed Capacity and 11th Plan Targets</u>

5.6 When asked by the Committee to give details of energy being generated by various sources of New & Renewable Energy, the Ministry in their written reply gave the following information:-

"The total installed capacity of power generation from various renewable energy sources and estimated annual energy generation, as on 31.3.2008 is as follows:

Sl. No.	Grid –interactive renewable power	Installed Capacity (MW)	Annual estimated energy generation (million units)
1.	Wind power	8757.40	11413*
2.	Small Hydro Power	2180.84	3951
3.	Biomass Power including Cogeneration (Agro-wastes/residues)	1406.00	10972
	Total	12344.24	26336

5.7 When enquired by the Committee as to what is the quantum and percentage share of renewable energy to total power generated in the country in the last five years, the Committee was given the following written reply :-

"Year-wise details of RE installed capacity vis-à-vis conventional power installed capacity and share of the RE to the latter during last five years are given in the following table:

(Capacity in MW)

	2002-03	2003-04	2004-05	2005-06	2006-07
Renewable Energy installed capacity in the country:	3952	4799	6164	6191	10,175*
Total Installed Capacity	107973	112058	118000	124287	1,35,781
Renewable Energy as a percentage of total capacity	3.5%	4.1%	4.9%	5.0%	7.49%

*(As on 30.9.2007) Source: CEA, New Delhi"

5.8 When asked to furnish the capacity addition targets for renewable energy in the 11th Plan by the Ministry of New & Renewable Energy, the following written reply was furnished by the ministry to the Committee:-

Plan Period	MNRE
2007-2012	15,000 MW Wind 10,500 Small Hydel Projects 1400 Bio-power 2100 Others 1000

5.9 Elaborating the benefits of renewable energy during the oral evidence, the expert Shri S.P.Gon Choudary made the following remarks:-

"They are for CDM benefit, nuclear is not for CDM benefit. It will further bring down the cost. I think, the energy scenario of future of India is very complex. There is not only one solution but we require many players. Unfortunately, renewable is somewhat neglected area.

I think, now the time has come with the climate and with the Indian growth that renewable should be given more importance and really it will play a major role in 2025-30. So, our readiness should be there. We should start doing work in the renewable field. There should be perspective plan.

I would like to submit that you support this renewable clean energy. I am not against any other form of energy, but I do feel that India will be on renewable energy in 2040 and at least 50 per cent contribution should be there from renewable."

5.10 When the Committee posed the expert, Dr. Leena Srivastava as to how to provide better focus on renewable energy sources, she stated in a written note as follows:-

> "The awareness creation in case of renewable energy is an important and multi-level activity. Not only making public, including school-children, aware about many facets and benefits of renewable energy technologies; it is vitally important to make policy and decision makers realize the advantages of exploiting renewable energy. For instance, (a) renewable energy based solutions can be taken up, not only for rural electrification, but for integrated rural development and (b) solar lanterns can effectively and efficiently substitute kerosene for lighting in village households in addition to providing better quality light."

C. SOLAR POWER

5.11 As regards the solar energy, the solar thermal and solar photovoltaic routes to electricity generation remain attractive options. However, the cost of solar power is highly prohibited thereby limiting the present investments. But, a major breakthrough in solar photovoltaic may bring a significant improvement and solar power may become very attractive options and a good avenue for investments.

5.12 The Committee asked the views of the expert, Dr. Kirit S. Parikh, on the potential of solar energy. In a reply, the expert made the following observations:-

> "We have abundant solar energy as with 10 million hectares of land in the country as a whole, with today's available photovoltaic cell, we can generate enough energy to meet all our projected requirements for 2031 and more. So, it is really a question of bringing solar technology upfront and pushing it. That is one of the reasons why in the Climate Change Council, in India's Action Plan, a Solar Mission has strongly been recommended. It has also been recommended in the Integrated Energy Policy Committee Report."

5.13 Regarding cost of solar power, Shri Parikh stated:-

> "If I come back, we were told that Rs. 20 is the per KWH cost of solar power. Last year, we did initiate a programme with MNRE which says that they would subsidise and give a feed-in tariff up to Rs. 15 for solar power for installing 1 MW or more size solar power plant which will feed in a grid. So, you set up a 1 MW solar power plant and feed the energy in a grid and for whatever the grid pays you, the difference between Rs. 15 and that amount will be paid by the Centre and this was supposed to be restricted to first 50 MW. As on today, they have got something like 2,000 *plus* MW of offers by the private sector people willing to set up these kinds of power plants.
>
> I think, there is a lot of enthusiasm and Rs. 20 has come down already to Rs. 15 in a sense. I think, with little more effort, it can be done. There is a lot of

progress taking place in the world so that solar power may become competitive, maybe in five to seven years down the line particularly when the scale expands."

5.14 In a written note submitted to the Committee on the potential of solar energy in the country, the expert, Shri S.P. Gon Choudhary, M.D., WBGEDCL, Kolkata, made the following observations:-

"In our country, the solar energy potential is 6,00,000 MW and only in some parts of the country, in Rajasthan and Gujarat, in a few areas, in a few hundred square kilometre areas, we can generate very large size Solar PV Power Plants. Already in the whole world now solar energy installation has exceeded 5,000 MW and the growth of solar power is 55 per cent which is the highest growth in the world in any sector. It is all connected to the grid. They are installing and pushing it into the grid and every year it is increasing by 55 per cent.

In our country, so far there is no large size Solar PV Power Plant. Only 1 MW and 2 MW solar power plants are coming up and they are coming up again in West Bengal. In Asonsol we have started the execution work."

5.15 Comparing the cost of solar energy with nuclear energy, the expert stated:-

"Solar is Rs.11 per KW hour. If you have about 5,000 MW in 2030, at that time, solar cost will be Rs.6 to Rs.7 per KW hour, whereas the nuclear or coal or anything will be beyond Rs.10 per KW hour. We always think that the cost of nuclear may be Rs.7 or something like that, but when we calculate, we do not calculate the decommissioning of the nuclear power. After 40 years, nuclear power plants are to be decommissioned and at that time you need huge money for safe environment. If you add that cost then nuclear cost will be much more than solar. If we consider all these issues, we only find one solution that we must have many players in the field and then only we can solve the problem."

5.16 Asked to comment on the plan of harnessing solar power, the Secretary, MNRE stated the following:-

"But everybody is saying that we should go big. Prime Minister wants us to go big. The Action Plan on Climate Change has suggested that we should go big. The Council is working on the Solar Mission. We would be giving our inputs to them and they would also like to go big. Of course, this will involve incentives and will involve, certainly for the first five six years, substantial amount of money. So, that is the call which people have to take."

5.17 When quipped as to whether the solar mission should be dealt separately by another agency other than MNRE, the secretary replied the following:-

"We do not agree. Out stand is that the Ministry is capable of handling the solar mission. That is because the Solar Mission involves a large number of things.

The Climate Change Council is preparing the document of the National Solar Mission. But I think our Ministry will be doing it. How the R&D will be handled could be decided. There may be a separate Council for R&D. It has not yet been finalized."

5.18 According to the Annual Report (2007-2008) of the Ministry of New and Renewable Energy:-

"The SPV Programme has accelerated development of photovoltaic technology in the country and helped in countrywide demonstration of various photovoltaic applications. During the last three decades the country has developed a strong research base as well as indigenous production capabilities for manufacture of solar cells, modules and a wide range of SPV systems. The Indian SPV programme is one of the leading programmes in the world for decentralized applications of photovoltaic technology.

The Research and Development (R&D) efforts in the solar photovoltaic technology have been aimed at development of materials used in fabrication of solar cells and modules, different types of solar cell device structures, module designs, components, sub-systems and systems, with a view to reduce the cost and improve the overall efficiency at different stages. The Ministry has been sponsoring Research and Development projects on different aspects of the PV technology in academic and research institutions, national laboratories, IITs and industry, for development of new materials, processes, systems, production and testing equipment for solar cells and modules and electronics used in the PV systems."

5.19 While commenting on the subject of solar photovoltaic cells, the expert Shri S.P.Gon Chaudhary made the following observations:-

"Organic Solar cells will be visible shortly. You will see that nano technology based solar cells will have high efficiency. The cost is coming down, but our readiness should be there. In a country like India, we are not ready to install large solar plant and evacuate the same. We have to start it. Up to now, in the whole of India, there is not a single company which makes solar cell material. All materials are imported in the country. We do not make any material.……Polysilicon Ingot or Monosilicon Ingot etc. We import these from China, Korea, Taiwan, Germany, etc. We must take that type of initiatives. If materials are used in bulk the cost will be down. Large size Solar Power plant will be visible in India."

D. PHYSICAL PERFORMANCE OF INDIAN RENEWABLE ENERGY DEVELOPMENT AGENCY LTD. (IREDA)

I). Background

5.20 IREDA, which was established as a Public Financial Institution in March 1987 under the Companies Act, 1956 to extend term-loans to new and renewable energy projects and systems, is registered as Non-Banking Financial Company with the Reserve Bank of India. Subsequently, its business operations have been widened to extend term-loans to energy efficiency and energy conservation projects as well. IREDA is a 100 per cent Government owned company whose authorized share capital is Rs.1000 crore and paid up capital is Rs.520 crore as on 31.7.2008. IREDA is a profit making company since inception.

5.21 The main function of IREDA is to give term loans to renewable energy and energy conservation projects. It also extend loan to the equipment manufacturers in the renewable energy sector. IREDA also supports the Ministry in implementing some of its schemes.

II). Projects Sanctioned

5.22 The Committee asked IREDA to give details on projects sanctioned and dispersed during the 10th plan. In a written note furnished to the Committee, IREDA have given the following reply:

> "IREDA is a financial institution extending term loans for setting up Renewable Energy and Energy Efficiency projects in India. It does not implement any projects by itself. In last 5 years, IREDA has sanctioned projects amounting to Rs.2747 crores out of which a disbursement of Rs.1687 crores have been made for the projects which are implemented/ under implementation so far."

5.23 The overall status of sanction and disbursement for the sectoral projects during the 10th Plan are as under:

Actual Loan Sanctioned and Disbursement (Rs./Cr)

	2002-03		2003-04		2004-05		2005-06		2006-07		Total	
Sector	Sanc.	Disb.	Sanc.	Disb.	Sanc.	Disb.	Sanc	Disb	Sanc	Disb	Sanc.	Disb
Wind	160	45	121	93	204	102	261	135	266	258	1013	634
Small Hydro	282	66	122	79	177	90	17	65	160	58	758	358
Biomass Cogeneration	77	90	58	86	77	26	0	18	116	19	329	241
Biomass Power	51	68	58	53	32	46	89	37	0	38	231	242
Energy Efficiency &	17	5	45	5	97	0	123	41	21	29	303	80

Conservation												
SPV	18	35	3	7	0	6	0	11	0	0	21	47
Solar Thermal	13	11	11	8	12	17	7	5	13	5	56	46
Waste To Energy	2	24	0	9	0	2	0	0	9	1	11	37
Biomass Gasification	0	0	0	0	0	0	0	0	1	0	1	0
Misc.	13	0	4	2	0	12	7	0	0	0	24	2
Total	633	345	423	342	599	289	505	302	588	410	2747	1687

5.24 As per the information furnished to the Committee, the details of loan sanction and disbursement during 11th plan are as follows:-

(Rs./Cr)

	2007-08		2008-09		2009-10		2010-11		2011-12		Total	
Sector	Sanc.	Disb	Sanc	Disb	Sanc.	Disb	Sanc.	Disb	Sanc.	Disb	Sanc	Disb
Wind	357	275	371	275	774	542	1350	945	1377	964	4229	3001
Small Hydro	157	120	200	165	317	222	414	290	630	440	1718	1237
Biomass Power / Cogeneration	96	70	176	123	264	185	283	198	303	212	1122	788
Energy Efficiency & Conservation	71	60	100	50	157	110	174	122	192	134	694	476
Waste To Energy	33	25	53	37	59	41	64	45	72	50	281	198
Total	714	550	900	650	1571	1100	2285	1600	2574	1800	8044	5700

5.25 When asked on the monitoring mechanism for ensuring completion of projects as per scheduled date, IREDA gave the following written reply:-

> "Project monitoring and evaluation are being carried out through the mechanism of appointing Nominee Directors/ Concurrent Auditors / Engineers, direct inspections and physical verifications."

5.26 On enquiring as to whether the projects being financed by IREDA are being executed in the projected time and cost schedule. IREDA in their reply stated the following details:-

> "IREDA is a financial institution extending term loans mainly to the private sector for setting up Renewable Energy and Energy Efficiency Conservation projects in India and does not implement any project by itself. In most cases

the projects in the private sector are implemented within schedule and thereby does not have time and resultant cost over run."

5.27 Asked whether panchayats/Governmental Agencies/ NGOs/Self-Help Groups are eligible for sanction of loan for renewable energy projects, the Agency gave the following reply in their written note:-

"IREDA does not finance government departments.

To be eligible for obtaining loan from IREDA the applicant must have borrowing powers and powers to take up renewable energy and energy efficiency projects as per their Charter. Any government organization that meets this requirement is eligible for availing loan from IREDA."

III). <u>Incentives for Renewable Energy</u>

5.28 When asked by the Committee to give a detailed note on the policy on incentives available for setting up of projects for different sources of renewable energy source, the Ministry submitted the following in their written reply:-

"The Government is promoting development of the renewable energy sector through a mix of fiscal and financial incentives that include capital / interest subsidy, accelerated depreciation, nil/concessional excise and customs duties. Further benefit under Section 80-1A of Income Tax Act 1961 is available to undertakings setup for the generation or generation and distribution of Renewable power in India. This apart, preferential tariff for grid interactive renewable power is being given in most potential states."

5.29 In a written reply to this Committee, IREDA have stated that exemption of 100% customs and excise duty for all equipments required for renewable energy power generation manufacturing projects and equipments may be considered. When the Committee wanted to have the views of the Ministry the Ministry gave the following in a written reply: -

"A large number of renewable energy equipments are already in the list of concessional customs duty and excise duty. The Ministry regularly assesses the requirements of the sector and makes suitable recommendations to Ministry of Finance while formulating the budget proposals based on the prevailing policies and requests received from the developers / manufacturers. While the Ministry is in favour of concessional duties, it may not be necessary to completely exempt all equipments with a view to increase indigenization and to avoid misuse."

5.30 When asked about the network of the Company, IREDA in their written reply submitted the following: -

> "As on date, IREDA has two Camp Offices situated at Chennai, Tamil Nadu and Hyderabad, Andhra Pradesh. The details of Camp Offices are given below:
>
> Camp Office, Hyderabad : i. Operation is being looked after by one official
> ii. Responsible to pursue with the borrowers' in the States of Andhra Pradesh and Karnataka.
>
> Camp Office,Chennai : i. Operation is being looked after by two officials
> ii. Responsible to pursue with the borrowers' in the States of Tamilnadu, Kerala and UT of Pondicherry ."

5.31 Regarding the diversification plan of the Agency, the Company submitted the following information to the Committee: -

> "IREDA had engaged the services of a reputed Consultant for developing a suitable strategy and action plan for IREDA for adopting to the changing business environment. IREDA is exploring various options to expand business and has already taken steps for:
> - Consortium Financing with other financial institutions for renewable energy project
> - Financing of medium size hydro projects above 25 MW capacity in consortium financing
>
> Financing of new Business Areas in Energy Efficiency Sector."

IV). Problem in Evacuating Power

5.32 When the Committee enquired as to whether there is any problem in selling power by renewable energy producers, the Agency stated the following in a written reply:-

> "The power produced by renewable energy sources by the private companies is utilized for captive, third party sale/ sale to utilities/ SEB. There is no problem being faced whenever there is attractive tariff."

5.33 On the issue of evacuation of power, the expert Shri Chaudhary during oral evidence stated:-

> "Not only one source, but all the sources can only solve India's energy crisis. India is going to face a very severe energy crisis within the next 25 to 30 years. Unless we take up major infrastructure development in the solar energy sector, we cannot solve our energy crisis. If we generate solar energy

in the States of Rajasthan or in Gujarat at 50,000 MW level, where is the evacuation network, where is the thinking? If we can generate solar energy during day time, in the night time we can utilise the wind that we are getting in States like Maharashtra and Tamil Nadu and produce wind energy there and in the eastern party of our country we have got a lot of agricultural waste in Bihar, Orissa and West Bengal and we can generate power from that. So, if we can connect these three things, we can generate 2,00,000 MW of power and if there is a dedicated renewable energy grid, which Germany and Spain are making, it will be very useful for our country. So, for a country like India, definitely a corporation like NTPC should be there for renewable energy."

5.34 Asked to respond to the problems faced by the power producers in evacuating the power produced from renewable energy sources, the secretary, MNRE during the oral evidence stated the following:-

"In the small hydro, the evacuation problems are there. We do not have any institutional mechanism. It is essentially a function of the State. Whichever State will do better will naturally harness more of those resources. What wer are attempting to do now on a regular basis is to have interaction with the States and developers so that these issues which come up of land acquisition or grid connectivity are sorted out. At the moment perhaps this is the best that we can do."

V). <u>Separate PSU for Renewable Energy</u>

5.35 The Committee felt that the role of IREDA is of a financial institution and not of power generation. The Committee were of the opinion that a separate PSU for harnessing various renewable resources would help in harnessing the sources better.

5.36 When the Ministry was asked as to whether there is a need for a separate CPSU for harnessing renewable energy in the country, the Ministry of New & Renewable Energy in their written reply stated the following:-

"Setting up of separate dedicated CPSU for implementation of renewable energy projects in the country may not be necessary due to the following reasons:

Implementation of renewable energy projects is being presently led by the private sector.

Unlike thermal, hydro or nuclear power projects that are large in size, renewable energy projects are small in size and also modular in nature, requiring investments significantly lower than conventional power projects.

As RE projects are generally small in size and are spread in thousands of locations across the country, it may also not be logistically possible for implementation, monitoring and control by a single dedicated CPSU. The very nature of RE power is suited for decentralized generation and therefore

also naturally suited for decentralized implementation. Need for dedicated CPSU is therefore not felt in developing this sector.

In any case, if any CPSU would like to take up RE power generation as an independent viable business proposition, they are free to do so. In fact, several central public sector undertakings have set up and are in the process of setting up separate units and or subsidiary companies to take up implementation of RE projects as part of their own business model.

Some states level public sector undertakings have also been set up for implementation of RE projects. In fact, the Ministry has recommended that states take up projects through their state PSU's."

5.37 When the expert Shri S.P.Gon Choudary was asked to give his views regarding the setting up of a PSU for renewable energy, he stated the following:-

"…We are doing all these things at the State level. But I think the time has come to form, as the hon. Chairman has mentioned, like Nuclear Power Corporation, like National Thermal Power Corporation, to form a Renewable Energy Corporation, who will not be funding, but who will implement renewable energy projects. They will be given targets. We are doing this type of thing at the State level. I think it will be a very good idea if we can do it at the national level."

5.38 On the same issue the expert Shri Kirit S. Parikh made the following comments: -

"Should we have a public sector unit in the renewable? It is another question. I think we need to push renewable. My feeling is that having public sector units in the power sector has done us some good. They have provided capacities when others were not coming. But it has also created some problems. For much of the delays in the power sector's targets realisation, if you ask the people, they will often blame it on BHEL not meeting their delivery schedules on time. That is one of the reasons. I think, perhaps, we can have a Renewable Public Sector Corporation but it would not be just a monopoly of a public sector renewable corporation. We should have a system of policies and encouragement and incentives which gives a level playing field. Let the public sector and the private sector compete. The public sector units would keep the private sector in check and the private sector would keep the public sector in check. I think that would be, perhaps, a better solution to do that."

E. FINANCIAL PERFORMANCE OF IREDA

5.39 The Committee asked IREDA to give details of the financial performance of the Agency during each of the last 5 years. IREDA in their written reply furnished to the Committee gave the following:-

"Required details of the financial performance of IREDA during each of the last 5 years are given below:

Key Parameters	2004-05		2005-06		2006-07	
	Target (BE)	Achievement	Target (BE)	Achievement	Target (BE)	Achievement
Loan Sanction (Rs/Cr)	**	**	540.00	509.57	626.00	588.50
Disbursement (Rs/Cr)	350.00	289.98	380.00	301.60	400.00	410.87
Domestic Resource Mobilisation (Rs/Cr)	350.00	359.50	200.00	155.00	**	**
Gross Income (Rs/Cr)	230.00	263.13	**	**	**	**
Net Profit /Net Worth (%)	0.99	5.11	1.51	4.77	1.90	4.87
Non-Performing Assets (%)	13.00	13.42	10.00	20.32	18.00	19.86
MoU Rating	GOOD		GOOD		GOOD	

** These items are not MOU parameters for the respective year."

5.40 The Committee note that Non Performing Assets in IREDA is around 20% which is very high. When asked as to what systemic improvements have been taken by IREDA to reduce NPA's, the Agency in their written reply submitted the following:-

"The following steps have been taken by IREDA to reduce NPAs:

- Strengthening of appraisal system through:
  - Analysis of balance sheets and main line of business of the borrower and reflection of the same in the appraisal notes;
  - Review of the existing parameters of sensitivity analysis;
  - Inclusion of implementation plan and IREDA's observations in the appraisal notes.
- Introduction of Credit Risk Rating for project proposal
- Introduction of trust and retention account for power projects of higher value.
- Appointment of nominee director to take care of interest of IREDA in board meetings of the borrower company.
- Appointment of concurrent auditors and concurrent engineers wherever considered necessary
- Restructuring of NPA loans
- Revision of Reschedulement and OTS policy
- Revision of Prudential Norms."

5.41 When asked by the Committee as to whether IREDA get any funds from International funding agencies, the Agency gave the following reply:-

"IREDA has been availing International Assistance. Since 1994 from various agencies like Govt. of Netherlands, DANIDA, World Bank, ADB, KfW. The details of International Assistance are given below:

(in Million)

International Assistance to IREDA				
No.	Sources of Fund (Already availed)	Currency	Amount of Fund	Sectors covered
1.	DANIDA	US $	15	Wind Energy
2.	Govt. of Netherlands	Dutch Guilder	18	Wind Energy
3.	World Bank/GEF/SEC (1st Line of Credit includes 5 M US $ under TAP)	US $	195	Wind, Small Hydro & Solar PV
4.	Asian Development Bank	US $	100	Wind, Biomass, Cogeneration & Solar Thermal
5.	KfW Germany	Euro	61.35	Wind Energy, Biomass, Cogen. & SPV
6.	World Bank 2nd Line of Credit (including GEF Grant (For TA 5 M US $)	US $	135	Small Hydro & Energy Efficiency

5.42 When the Committee sought the details of the break-up of the funding by IREDA to various sectors, the Agency gave the following reply in the form of a written note to the Committee:-

"IREDA's funding in terms of loan sanction and disbursement to various sectors as on 31st December 2007 is given below:

(Rs. in Crores)

S N	Sector	Cumulative Loan Sanctions as on 31st Dec. 2007	Cumulative Disbursement as on 31st Dec. 2007
1.	*Wind Power*	3171.13	1867.61
2.	*Small Hydro Power*	1930.74	855.07
3.	*Biomass Cogeneration*	1343.07	800.91
4.	*Biomass Power*	706.64	517.69
5.	*Solar Photo Voltaics*	585.95	288.26
6.	*Biomass Gasification*	12.43	5.12
7.	*Solar Thermal*	137.11	91.79
8.	*Biomass Briquetting*	19.47	9.99
9.	*Biomethanation from Industrial Effluents*	72.47	57.60
10.	*Energy Efficiency & Conservation*	513.16	157.55
11.	*Waste to Energy*	58.33	42.95
12.	*Miscellaneous*	33.16	3.24
13.	*TOTAL*	8583.66	4697.78

5.43 The Committee enquired as to how does IREDA raise resources and does it have any capital requirement to carryout its activities, to which the agency gave the following reply:-

> "M/s Indian Renewable Energy Development Agency Limited (IREDA) is a Renewable Energy Sector specific Public Financial Institution in existence for the last 20 years. IREDA raises its resources in the form of borrowings from bilateral and multilateral agencies, commercial banks and equity contribution from Government of India. The authorized share capital of IREDA as on date is Rs.1,000 crore against which the paid up capital is Rs.490 crore. Government of India is contributing equity in the range of Rs.25 crore to Rs.50 crore on annual basis.
>
> In the 11th Plan Period, IREDA envisages capacity addition of 1750 MW with a loan commitment of Rs 8145 crore. In order to meet disbursement commitment and maintain healthy Debt Equity Ratio, IREDA requires steady infusion of equity. For the 11th Five Year Plan, it was estimated to get Rs.250 crore equity from Government of India and also to raise equity from other sources to the extent of Rs.300 crore. Against the equity estimate of Rs.50 crore for the year 2008-09, Government of India has provided Rs.30 crore leaving a balance equity of Rs.220 crore for the 11th Plan to be provided in the balance period of 11th Plan. As regards, raising equity from sources other than Government of India, action is being initiated to prepare Business Plan and Equity Valuation for broad basing of equity. Response from market and potential investors would be known on completion of the study."

I). <u>Funds Availability</u>

5.44 The Committee asked the Ministry to furnish the details of the allocation made in the Budget for New & Renewable Energy Department during the last three years and utilization of funds made by the Ministry. The Ministry in their written reply gave the following information: -

> "The year-wise details of the amount allocated to the ministry at BE and RE stages and the actual expenditure incurred by it during 2005-06 to 2007-08 are given below:-

(Rs. in crore)

Financial Year	Amount allocated		Actual Expenditure
	Budget Estimate (BE)	Revised Estimate (RE)	
2005-06	599.75	350.00	298.37
2006-07	597.00	380.00	397.27
2007-08	626.00	483.00	478.72

> The Ministry had proposed 11th plan outlay of Rs.10,460 crore as per the following break-up:

		Rs. in crore
•	Grid-Interactive & Distributed Renewable Power	3,925
•	Renewable Energy For Rural Applications	2,250
•	Renewable Energy For Urban, Industrial & Commercial Applications	685
•	Research, Design & Development	1,500
•	Supporting Programmes & Spill-over liabilities	2,100
	Total:	10,460

The Planning Commission have approved a total outlay of Rs. 10,246 crore with a GBS component of only Rs.4000 crore and IEBR component of Rs. 6,246 crore. The Ministry had represented to Planning Commission to enhance the GBS component, as that approved would be inadequate for achieving the 11th Plan goals/targets. It has been advised that the issue could be revisited at the time of Annual Plan Discussions."

5.45 When asked for suggestions to improve the funding and operations of IREDA, IREDA stated the following in a written note submitted to the Committee: -

"(a) IREDA may be approved to issue bonds under section 54EC(b) of the Indian income Tax Act, 1961 to finance renewable energy projects.
(b) Reduction of Government of India fee on the existing LOC's like ADB, KFW & IBRD.
(c) Continued and adequate equity support.
(d) To provide GOI guarantee to raise resources from bilateral/multilateral agencies and from Indian market to finance renewable energy projects."

5.46 Asked for the views of the Ministry of New and Renewable Energy on the above issues and whether any action has been taken in this regard, the Ministry stated the following in its written reply:-

"(a) IREDA was given the permission to raise resources by issuing tax free bonds during 1990-91 to 2003-04 to a tune of Rs. 25 to Rs.100 crore every year. However, from the year 2004-05 onwards, Ministry of Finance has discontinued the practice of allowing issue of tax free bonds and hence the permission for further raising tax free bonds was not granted to IREDA by the Ministry of Finance.

(b) The issue of reducing Government guarantee fee for raising loans from international financing institutions has been taken up by the Ministry with Ministry of Finance. The matter was also discussed in the meeting of the Committee of Secretaries and it was decided that the Department of Economic Affairs would favourably look into the matter within FRBM limits and the issue of waiver of guarantee fee. The Ministry has consistently been in favour of reduction of such a guarantee fee so that the borrowing from the external agencies becomes attractive as compared to the Indian market.

(c) The Ministry has been providing equity support to IREDA since its inception and so far an equity participation of Rs. 520 crore has been made by the Government. A provision of Rs. 250 crore towards infusion of equity in IREDA has been made for the 11th Plan.

(d) The Ministry supports the proposal of IREDA to provide GOI guarantee to raise resources from bilateral / multilateral agencies and from Indian market to finance renewable energy projects. The matter is under consideration in the Ministry of Finance."

5.47 Asked by the Committee whether the autonomy enjoyed by the Agency is adequate, the Agency in their reply made the following submissions:-

"IREDA is a 100% Government of India owned NBFC headed by Chairman & Managing Director. CMD being a whole-time Director on the Board has substantial powers with regard to the affairs of the company relating to business transactions as well as independent decision for smooth operation of the company. In certain matters relating to borrowing from international agencies, the approval from RBI, MNRE and Ministry of Finance are received."

II). <u>Joint Ventures</u>

5.48 The Committee asked IREDA to give details of National/International Joint Ventures entered into by the Agency. In response to this query, IREDA in their written reply gave the following:-

"IREDA has entered into a joint venture initiative with M/s Consolidated Energy Consultants Pvt. Ltd. and M/s M P Urja Vikas Nigam Ltd. (A joint venture company in the state of Madhya Pradesh) to form M/s M.P. Windfarms Ltd. with the following shareholding pattern :

Consolidated Energy Consultants Pvt. Ltd.	:	51%
IREDA	:	25%
M. P. Urja Vikas Nigam Ltd.	:	24%

The company has installed several wind power projects and has also set up its own wind farm. The Company undertakes operation and maintenance services of wind farm projects."

5.49 When asked to furnish the main competitors of IREDA, the Company in a written reply stated the following:-

"IREDA is the only dedicated financial institution for financing Renewable Energy and Energy Efficiency projects in the country. Feed in tariff for renewable energy has made renewable energy projects commercially viable

and therefore funding has become attractive for other financial institutions such as HUDCO/PFC/REC and commercial banks."

5.50 The Committee sought to know whether there is any need for a separate National Renewable Energy Policy in the country to which the Agency submitted the following in a written note to the Committee:-

"There is a need for a separate National Renewable Energy Policy as there is no uniformity in the decision taken by various State Electricity Regulatory Commissions (SERC) with regard to various issues pertaining to renewable energy tariff fixation and other allied areas."

5.51 When the Committee asked to spell out recent policy initiatives taken, the Ministry in a written reply gave the following comments: -

"The Ministry of New and Renewable Energy has recently announced new schemes to incentives power generation from grid connected solar photovoltaic plants and generation linked incentive for wind power projects. The Ministry has also launched a programme for popularizing renewable energy systems in urban areas and for commercial & industrial applications.

During the 11th Plan period it is proposed to add power generation capacity of 15,000 MW from renewable sources and deploy 11.6 million sq. meter of solar thermal collector area for water heating, cooking, drying applications and 2 million cubic meter aggregate capacity of family type biogas plants. Provision of renewable energy systems for electricity /lighting and other uses in about 10,000 remote villages is envisaged. In addition, 2000 Akshay Urja Shops and 100 Solar cities are proposed."

5.52 Asked by the Committee whether the country has the latest technologies for the development of various new & renewable forms of energy, the Ministry in their written reply gave the following:-

"The power generation from wind, small hydro and biomass is now at commercial stage. The Indian manufacturers have latest technologies through their in-house efforts or through international collaborations. The technology used in the country is at par with international developments. Number of Indian manufacturers in wind and small hydro have technical collaborations with international companies to share technical developments in the respective fields. This also leads to export of indigenous equipment. The Ministry has memorandum of understanding with some countries towards technical cooperation in the field of renewable energy."

5.53 When asked by the Committee as to how does the Ministry coordinate with the State Governments to pursue policies and programmes to harness New & Renewable Energy, the Ministry in their written reply made the following observations:-

> "Every State has separate Department / Agency to deal with the subject of new and renewable energy. These departments / agencies are the nodal agencies for Ministry of New and Renewable Energy to implement various renewable energy programmes. In case of power generation projects, the Ministry also coordinates with the respective Power Departments / Electricity Boards.
>
> The Ministry regularly interacts with the State Governments, State Nodal Agencies and State Electricity Regulatory Commissions through various meetings to review and pursue them about the need of expanding use of renewable energy in their respective States. The Ministry also organizes various training programmes in the States to make them aware about latest developments in the renewable energy sector. Based on the resources available in the States, focus areas are identified and programmes implemented accordingly. For some programmes, specific targets are also assigned to the State agencies for implementation. The Ministry also provides financial support to the State agencies for their strengthening and implementation of renewable energy programmes"

CHAPTER-6

RESEARCH & DEVEOLOPMENT PROGRAMMES BY POWER PSUs

A. OVERVIEW

6.1 Research and Development (R&D) is an important activity for the growth and development of any sector. The investments made in the sector will always be beneficial for the future. However, the capabilities built up will be useful for adoption of latest technologies in any field. Also, the R&D infrastructure set up will always be keenly watched by other countries to estimate the capability of the country.

6.2 According to the Integrated Energy Policy Document:-

> "Research & Development in the energy sector is critical to augment our energy resources to meet our long-term energy needs and to promote energy efficiency". Such R&D would go a long way in raising our energy security and delivering energy independence over the long term. R&D requires sustained and continued support over a long period of time.
>
> Energy related R&D has not been allotted resources that it needs. India needs to substantially augment in the resources made available for energy related R&D and to allocate these strategically. Basic research leading to a fundamental break through may open up possibilities of application. R&D is needed to develop conceptual break through and prove their feasibility".

6.3 The Committee were concerned with the above recommendation. The Committee during the examination of the PSUs wanted to know their allocation of funds and various activities being pursued under R&D by these organisations.

B. R&D ACTIVITIES BY PSUS

I). NTPC Ltd

6.4 When asked by the Committee to furnish a note on R&D projects taken up to improve efficiency in augmentation of power generation by NTPC Limited, the company furnished the following written note:-

> "The main focus of R&D activities has been to provide a comprehensive range of scientific services to stations to enable them to operate & maintain the plants at high performance levels including high availability & reliability. Lately R&D center has also been active in various applied research projects with deliverables directly aimed at tangible benefits to NTPC stations' enhanced performance. Lately, R&D has also started emphasizing IPR aspects. Therefore, while a thrust has been put on getting patents for the work done in R&D, a system for comprehensive patent & literature scan,

before taking-up a job, has also been put in place so that infringing of patents held by others is also avoided. R&D is in the process of filing four (04 Nos.) of patents.

A need was also felt to upgrade R&D to world-class scientific services & research institution. Accordingly, for business processes re-engineering and capacity building, a consultant has been placed for advising long-term road map, re-organization, affiliations with world-class R&D institutions etc. The Consultant, IISc Bangalore, shall submit the final report very shortly."

6.5 As per the information furnished to the Committee the provisional outlays of 2007-08 (RE) and 2008-09 (BE) for NTPC are as follows:-

(Figures in Rs. Crores)

6.6

Item	2007-08 (RE)	2008-09(BE)
R&D	8.66	11.62
Energy Technologies	24.96	94.75
Total - NTPC	33.62	106.37

When asked to give details on the facilities available in NTPC Ltd. for carrying out R&D projects, NTPC in a written reply stated as under:-

"NTPC had set up R&D centre at a cost of about Rs.28 crore with a mandate to provide scientific services to various power projects to help increasing availability and reliability. NTPC envisages to further upgrade / strengthen the R&D centre facilities during the 11th Plan.

Presently in order to further boost our R&D efforts and focus our present R&D activities from future energy scenario, NTPC has planned to develop state of the art technologies through a strong emphasis on fundamental R&D by setting up world class Energy Technology research center precisely to cater to such a cutting edge work. In this regard, 75 Acres of land at Greater Noida has been acquired at the cost of approximately Rs. 27 Cr. Pre-fabricated temporary campus has already started functioning at Greater Noida. The construction of phase-1 of main campus consisting of around 5500 Sq-m of built-up area at an estimated cost of Rs. 22 Cr. has also started. Meanwhile the activities of Energy Technology research center have already started and NTPC has entered into research collaborations with leading research institutes for research projects in various areas of efficiency and environment w.r.t. power generation.

NTPC board has committed an investment of 0.5% of its net profit every year on R&D activities over and above the capital expenditure for Energy Technology research center."

6.7 Asked to furnish details of R&D activities in its R&D centers, the NTPC furnished the following information in a written note submitted to the Committee:-

"NTPC has 2 Centres viz.

(i) R&D Centre and
(ii) Energy Technology.

(i) R&D Centre

R&D Centre mainly focuses on providing Scientific Services, Advanced testing facilities, Failure analysis, etc to the operating Stations for ensuring high reliability and availability. In the process of resolving many complex generic operations, equipment problem related to O&M, materials, import substitution, non-destructive testing, etc. some relevant research work is also done essentially with the objective of enhancing operational/maintenance flexibility and ensuring reliability.

(ii) ENERGY TECHNOLOGIES

In order to further boost our R&D efforts and focus our present R&D activities from future energy scenario, NTPC is developing state of the art technologies through a strong emphasis on fundamental R&D by setting up world class energy Technology Research Center precisely to cater to such a cutting edge work. 75 Acres of land has been acquired for this purpose at Greater NOIDA. Pre-fabricated temporary campus has already started functioning at Greater Noida. The construction of phase-1 of main campus consisting of around 5500 Sq-m of built-up area has also started. The ET campus at Greater Noida will have number of research labs and pilot plants.

Activities being pursued by Energy Technologies Centre

1. While the infrastructure at Greater Noida campus is under development, NTPC has networked with number of research and academic institutes for around 14 research projects in the areas of efficiency, reliability and environment w.r.t. power generation. These projects will be completed in a time span of 18 to 48 months. The list of these projects is given below,

Sl	**Name of the project**	**Collaborating Institute**
1.	Development of SO3 reactor and associated components for SO3-Flue Gas Conditioning	National Chemical Lab (NCL), Pune
2.	Development of Artificial Intelligence based Modeling & Optimization system for SG-TG Cycle.	NCL, Pune
3.	Computational Fluid Dynamics (CFD) Modeling of Coal Fired Boiler	NCL, Pune
4.	CO2 separation using membrane contractors based on ionic liquid.	NCL, Pune

5.	Anoxic Microbial sequestration of carbon dioxide in flue gasses to methane	Agharkar research Institute (ARI), Pune
6.	Development of Adsorbent based process for the recovery of the CO2 from power plant flue gasses*	IIT Mumbai
7.	Development of Adsorbents for the recovery of CO2 from flue gas*	Central Salt and marine Chemical research institute (CSMCRI), Bhavnagar
8.	Development of Adsorption Technology for the removal of CO2 from the flue gas of thermal power plant*	National Environmental Engineering Research Institute (NEERI), Nagpur
9.	Development of Adsorption technology for the removal of CO2 from the flue gas of thermal power plant*	Indian Institute of Petroleum (IIP), Dehradun
10.	Ammonia based flue gas conditioning system	IIT Kharagpur
11.	Improvement of Turbine Cycle Heat Rate through Multi-Composition Ammonia Liquor Absorption Engine (MALAE)	University Institute of Chemical Technology (UICT) Mumbai
12.	Modeling and Design of Cooling Towers & Their Components for Optimum Approach Temperature.	UICT Mumbai
13	Develop and Deliver Automated Boiler Tube Inspection System for Coal Based Thermal Power Plants	Bhabha Atomic Research Center (BARC), Mumbai
14	Transfer of Ammonia Based Flue Gas Conditioning (AFGC) technology to NTPC and further research for the improvement of efficacy of AFGC.	Heavy Water Board (HWB), Mumbai

** This is a joint R&D project with 4 institutes*

2. A number of other research and development projects in the areas of efficiency and reliability improvement viz. recovery of heat from flue gases, reduction of pressure drop in ducts etc. are being taken up in-house and through networking. Cooling tower test facility and pilot scale test loop for MALAE cycle is also proposed to be set up. A solar thermal demonstration plant is also proposed.

3. NTPC is also working on setting up of technology demonstration R&D based Integrated Gasification Combined Cycle (IGCC) plant in collaboration with other organizations/institutions.

6.8 When asked by the Committee to give details on the budgeted and the actual expenditure on R&D in each of the last three years of NTPC, the company replied the following:-

"The details of budgeted and actual expenditure on R&D during last three years is as below:-

(Rs. Million)

Sl.No.	Details	2004-05	2005-06	2006-07
1(a)	Capital	146.7	104.5	74.4
1(b)	Revenue	21.9	24.8	19.0
1	Total R&D Budget	168.6	129.3	93.4
2(a)	Capital	3	5	7
2(b)	Revenue	42	58	54
2	Total R&D Expenditure	45	63	61
	R&D Exp. as %age of total annual expenditure	.023	.028	.023

The outlays for R&D For Annual Plan 2008-09 is detailed below: -

(Figures in Rs. Lakhs)

Item	2007-08 (BE)	2007-08 (RE)	2008-09 (BE)
R&D	1139	867	1172
Energy Technologies(ET)	14445	2496	9475
Total - NTPC	15584	3363	10647

The expenditure is expected to pick up as ET starts functioning in full swing.

6.9 The R&D expenditure of NTPC Ltd. as percentage of net profit is less than 0.2% for 4 out of 5 years. When asked by the Committee as to why the expenditure on R&D is so low, the company replied the following:-

> "R&D Centre mainly focuses on providing Scientific Services, Advanced testing facilities, Failure analysis, etc. to the operating Stations for ensuring high reliability and availability. In the process of resolving many complex generic operations, equipment problem related to O&M, materials import substitution, non-destructive testing, etc., some relevant research work is also done essentially with the objective of enhancing operational/maintenance flexibility and ensuring reliability and the recommendations are implemented at stations.
>
> The expenditure on R&D studies are minimal at lab scale level but expenditure on field trials or expenditure on implementing the recommendation of R&D for improving plant performance are much more & reflected in station expenditure."

6.10 When the Committee asked whether any R&D program of NTPC Ltd. is connected with research for solar power generation, the company replied the following to the Committee in a written note:-

> "At present no dedicated research on solar power generation is being carried out in R&D Centre of NTPC. We are in the processes of finalizing the R&D work in solar power along with Anna University."

6.11 When asked by the Committee as to what is NTPC's plan for Solar Power generation, the company replied the following:-

> "Preliminary study for addition of Solar field at NTPC-Anta was finalized in association with KfW, Germany. Subsequently, feasibility studies for the proposed 10 MW solar field is being finalized through a consultant."

6.12 When details were sought regarding the tie-up with national or global institution for its R&D activities, NTPC Ltd. in a written reply gave the following information:-

"(i) NTPC R&D is working jointly with following Institutes/Organizations at Present:

S.No.	Institute/organization	Area of networking
1	BARC, Mumbai	MOU for developing techniques for online blade damage, shaft crack detection & online creep assessment, small punch technique, etc
2	IISC, Bangalore	Restructuring & strengthening of R&D Centre

(ii) Apart from 14 research projects being pursued by Energy Technologies as given in reply to 21(b) above NTPC has also signed an umbrella MoU with Anna University Chennai for collaborative R&D in the area of mutual interest. Specific research projects under this MoU are being identified.

(iii) Indian Institute of Science, Bangalore has been appointed as Consultants for restructuring and upgradation of R&D Centre. They will be carrying out the entire study in 3 phases.

- Phase 1 - Define Vision, Mission, Future Goals & strategies for R&D, Audit of existing setup, Assessment of external & Internal demands & needs of R&D, & gap analysis – Completed

- Phase 2 - Benchmarking, positioning & restructuring of R&D Centre, identification of new labs/competencies & facilities, development of key competencies and identification of projects for R&D Centre – Completed

- Phase 3 - Preparation of Road map, creation of Centres of Excellence, setting up of IPR Group, R&D Organization Structure, sourcing of manpower and Networking with National & International Laboratories/Institutes, etc – Draft report has been received which is under discussion and finalization.

Actions have been initiated to implement the recommendations of the consultant."

II). <u>NHPC Ltd.</u>

6.13 When asked by the Committee to give details on R&D projects taken up by NHPC, the company informed that No R&D projects are presently conducted for improvement of efficiency in augmentation of power generation.

6.14 Furnishing the details regarding the percentage of financial resources allocated for R&D by NHPC for the last 5 years, NHPC in a written reply stated the following: -

"The expenditure incurred on R&D activities during last 5 years is indicated below: -

2002-03	Rs. 198.70 lakhs
2003-04	Rs. 23.52 lakhs
2004-05	Rs. 7.35 lakhs
2005-06	Rs. 43.80 lakhs
2006-07	Rs. 21.73 lakhs"

6.15 The expenditure incurred on R&D by NHPC is very insignificant as compared to the profit of the company. When questioned further as to why is the expenditure on R&D very low, NHPC replied the following:-

"In NHPC R&D Activities are being identified based on the need to the Corporation in concept to commissioning and O&M of Hydro Power Projects and accordingly these activities are being pursued and so there is no link between the R&D Expenditure and profit of the company. Moreover, some activities are basically services offered to Projects/Power Stations which does not require budget. The activity "Development of Silt Erosion Resistant Material for Turbines of Hydro Generators" has been taken up as National R&D Project under National Perspective Plan for R&D in Indian Power Sector in which MOP, NHPC, SJVNL& NML are the funding organizations and few more activities such as Flow through downstream of dam & barrage for sustaining aquatic life & other requirements, Greenhouse gas emission from reservoirs and Sedimentation Management in Basins, Rivers & reservoirs are also being planned for taking as National R&D Projects for which funding support from Ministry of Power is expected. Further, R&D programs are of continuous in nature, requiring fewer budgets in the initial stages/preliminary stages and more in the detailed study level."

6.16 When asked to give details regarding tie-up with global or national level institutions for its R&D activities by the Committee, NHPC in a written reply stated that the (i) National R&D Project -Development of Silt Erosion Resistant Material for Turbines of Hydro Generators and (ii) Co-operation/co-ordination between IRTCES, China & NHPC are the projects which have cooperation with other institutions.

6.17 When the Committee sought to know the views of Ministry regarding the R&D activities for the power sector, the Ministry in its written reply stated the following:-

"(a) Though there is indeed a need for stepping up R&D activities by the Power Sector PSUs, factors like inadequate funds etc. often inhibit such efforts.

(b) Central Power Research Institute under Ministry of Power has already been discharging it's role as a nodal centre for R&D in the power sector for the past four decades. Investments have been made by the Ministry of Power in CPRI for creating and carrying out R&D in the areas of generation, transmission and distribution. The R&D effort has benefited the power utilities.

In the context of the massive power development programme during the 11th & 12th Five Year Plans, capacity building and infrastructure for R&D in CPRI needs to be strengthened. Towards this objective, the plan allocation for CPRI during the 11th Plan has been stepped up."

III). <u>NPCIL</u>

6.18 When asked by the Committee to furnish details of R&D programme being followed by NPCIL, the company stated the following in their written note:-

"The R&D is carried out through in house efforts and collaboration with BARC, other DAE/Government R&D institutions and academic institutes participating in nuclear power programme. NPCIL carries out in-house R&D for improving the safety and performance of existing plants, reduction of gestation period and development and testing of systems for the 700 MWe PHWRs, the reactors to be set up in future to augment the nuclear power capacity. The main achievements of R&D efforts during the last three years are successful development of 'LASER' based tools for Reactor coolant channel inspection, remote underwater spent fuel inspection technology, thermographic imaging system for detection of hot spots in high radiation reactor core, automatic orbital pipe cutting machine for Enmasse Coolant Channel Replacement (EMCCR) and development of several computer based systems. An R&D centre at Tarapur has been set up. "

6.19 When asked for the percentage of outlay on R&D projects of the total turnover and benefits accrued to the Company, the company stated as follows:-

"The details of expenditure on R&D in the year 2006-07 are:

Capital	Rs. 475.93 lakh
Recurring	Rs. 728.44 lakh
Total	Rs. 1204.37 lakh

The expenditure on R&D as a percentage of total turnover was 0.33%. The expenditure on R&D is to be considered in light of the basic work being done by R&D institutions of DAE. NPCIL activities are limited to applied R&D to meet the needs of power stations. R&D efforts of NPCIL have resulted in

development of special tools for in-core jobs. These tools contributed significantly in carrying out the Enmasse Coolant Channel Replacement and upgradation jobs at four reactors, resulting in their extended life, improved performance and enhanced safety. Most of the R&D projects currently taken up by NPCIL are for development of future reactors and systems and will yield benefits in future."

6.20 When asked to furnish details on R&D projects taken up to improve efficiency in augmentation of power generation., NPCIL stated as under

"NPCIL carries out in-house R&D for improving the safety and performance of existing plants and development and testing of systems for the 700 MWe PHWRs, the reactors to be set up in future to augment the nuclear power capacity.

The main plans for R&D include:

- Setting up of Hydrogen Recombiner Test Facility for testing passive recombiner device being developed jointly with BARC.
- Setting up of Thermal-hydraulic Test Facility for verification of hermal-hydraulic codes.
- Development of 700 MWe PHWR fuelling Machines.
- Setting up of Remote tooling Laboratory.
- Setting up of Gamma Irradiation Facility.
- Development of fly ash concrete for use in nuclear power plants.
- Setting up of experimental PCCS loop for ventilation code verification.
- Simulated Experiments for Calandria Tube – Pressure Tube contact and dry out studies.
- Electrical Supervisory Control &Data Acquisition system for RAPP-5&6."

IV). <u>IREDA</u>

6.21 The Committee enquired IREDA as to whether the Agency fund any R&D activity to which the Agency stated that it does not fund any R&D activity.

6.22 When the Committee asked the Ministry of New & Renewable Energy to give details of R&D programs in the field of new and renewable energy, to this, the Ministry gave the following in the form of a written reply:-

"Ministry of New and Renewable Energy has a focused programme on the research and development of various renewable energy technologies. It has been funding R&D projects taken up by industry, R&D institutions, academic institutions, etc. in all areas of new and renewable energy technologies. A large part of renewable energy development in the country can be attributed to the indigenous R&D efforts made during last 25 years. The Ministry has a

scheme to fund R&D projects and also solicited proposals in specific areas. In addition, the Ministry provides Central Financial Assistance upto 50% of the total cost for projects involving industries where academic institutions and industry participates on a specific development aspect. The Ministry has also initiated providing core support to strengthen R&D institutions in specific areas of their expertise for technology development and deployment. The Ministry has also identified focus areas to be pursued for R&D during the 11th Plan."

6.23 Giving her views, Dr. Leena Srivastava, Executive Director, The Energy Resources Institute (TERI) stated the following regarding investment in R&D in the renewable energy sector and the steps required for the same while deposing before the Committee:-

"An environment that is conducive to R&D *per se* and private sector participation in particular, has to be created. Appropriate fiscal incentives to the private sector for R&D, encouragement to public – private partnership in R&D, and a transparent process would go a long way in enhancing overall confidence levels in this field.

An R & D Vision and Technology Development Mission could be set up having due representation of the government, eminent research and academic institutions; NGOs; and industry. This body would identify thrust areas for R&D, based on the country's needs; review the status of indigenous as well as global developments; and chalk out time-bound plan of action.

Some of the existing research institutions that are well equipped to meet the R&D needs of this sector may be recognized as Centres of Excellence for R&D work. These institutions may be provided long-term funds to enhance their R&D capability.

The expenditure on renewable energy related R&D should be increased from the present threshold; in both, public as well as private sectors."

6.24 When the Committee wanted to know as to what could be the role of PSUs in R&D in this area, Dr. Leena Srivastava made the following observations before the Committee during the oral evidence:-

"It is necessary to encourage greater linkages between industry and research organizations in order to achieve the full benefit of the renewable energy potential available in the country. Towards this, the companies in the energy sector such as oil and power could join hands with other research institutions for carrying out collaborative R&D in the mission mode, including funding such research programmes.

Working in a mission mode is important because most of the developmental work in the field of renewable energy is inter-disciplinary in nature. Under the circumstances, a better way of developing a technology or a product may be to take up the entire job in mission mode rather than operating on project basis."

CHAPTER-7

HUMAN RESOURCES

A. NTPC Ltd.

7.1 One of the most important issue facing many sectors in INDIA is shortage of skilled manpower. Human resource is a key resource for the planning and sustenance of any sector. The Committee were very keen that this issue should be examined with the PSUs.

7.2 When asked by the Committee as to how to deal with the issue of human resources retention the Committee was given the following reply in the form of a written note: -

> "Number of remedial measures have been taken to ensure employee motivation & they do not leave NTPC which include strengthening of the Pension Scheme, providing avenues for challenging assignments to employees through special projects, career growth, providing special rewards and incentives etc.
>
> NTPC has given its suggestions to the 2nd Pay-Revision Committee for PSEs for adoption of compensation system more in line with market realities.
>
> Besides, payment under the existing Generation & Construction Incentive Schemes, for the year 2006-2007, based on Company performance, NTPC has announced payment of Annual Additional Incentive to its employees under the DPE guidelines provided for performance related payments with ceiling of 5% of distributable profits.
>
> The above payments are within the afore-mentioned ceiling prescribed by DPE."

7.3 When asked whether NTPC plans to set up dedicated Institute to ensure continuity in supply of talent, the Company replied the following:-

> "At present, NTPC does not have a dedicated institute to ensure continuity in talent supply.
>
> However, NTPC has a dedicated Training institute at the apex level which is the Power Management Institute (PMI) located at NOIDA which conducts both technical & managerial training for the employees of the organisation. It also coordinates the activities of the plant Employee Development Centres (EDC) to ensure that relevant and quality training is provided throughout the organisation. PMI has over the years, developed a very robust system of

imparting training to fresh inductees in the organisation in the executive level wherein one year of rigorous training is provided which turns qualified engineers into power professionals.

With the growth in activities of NTPC and diversification into various other businesses, the induction of talent has gone up considerably over the years. To maintain its standard of quality in training, PMI along with the EDCs have been upgrading their infrastructural set up. In this context another dedicated training institute with state of art training facilities has been planned at Sector 62 NOIDA for which land has already been acquired by NTPC. This institute would be part of PMI and would take up dedicated training in the diversified business of NTPC.

It has been stated by NTPC that the attrition rate is about 3%. It has also been stated that it has started facing problems in getting adequate number of qualified people and a good number of executives are leaving the organization at senior and middle management positions."

7.4 When asked by the Committee as to whether NTPC faces any problems in attracting good talent and also in retaining existing talent, the NTPC Ltd. in their reply furnished the following:

"The intake of talent in the company, in the executive cadre, is met by resorting to three modes of recruitment:

i) Campus recruitment at IITs and NITs
ii) All India test for Executive trainees
iii) Lateral recruitment.

Although NTPC is able to meet the requirements of its executive manpower presently from these sources, it has started facing problems in getting adequate number of qualified people particularly keeping in view the growth plans of the company. This shortfall in the category of graduate engineers would be on account of the following reasons:

1. The IT and ITES sector is growing at a fast pace and is attracting large number of engineers across the country.
2. Fresh graduates in engineering disciplines are also preferring to join the IT and ITES sector, since it is offering good pay package, a hope of being posted abroad for some time and creating a college like atmosphere at the work place which attracts.
3. As on date, the pay package being offered by these companies and a PSU like NTPC at entry level is almost the same. However, as the salaries rise very rapidly in these organizations vis-à-vis salary revision in PSUs happening once in ten years, the preference for new entrants is towards private sector.

The requirement of non-executive technical manpower is low due to advanced technology that is being utilized for our plants. However, we do not envisage any difficulty in recruiting talent at the non-executive level.

The attrition rate in NTPC for executives has been rising in the last couple of years and presently it is at 3.01%. Attrition is happening at junior levels where a number of fresh graduates resign on selection in Civil Service, Engg. Services etc. A good number of executives are also leaving the organization at the senior & middle management, especially executives at E6/E7 levels. These are executives who have 15 – 20 years of experience and are being offered employment by the private companies who have entered the power generation business. The reasons for high attrition are as follows:

- Much higher salary package offered by private sector
- Place of posting (NTPC plants are normally at remote locations)
- Relatively slower career growth in NTPC.

NTPC has developed a strategy for containing the attrition through various measures like further improving work environment, enhancing belongingness, providing developmental opportunities, providing job satisfaction and enrichment etc.

The support needed from the Govt. is to ensure that the salary revision and benefit structure which is due with effect from 1.1.2007 is commensurate with the expectations of the employees and is attractive enough to ensure that fresh graduates join the organization, and it retains the existing professionals in the organization. Government should further empower PSUs (particularly the Navratnas) to decide the remuneration of its employees within the framework of broad guidelines that Govt. may prescribe."

7.5 Regarding the effective utilisation of human resources after they super annuate from the services of PSUs, NTPC Ltd. added the following:

"Considering a robust talent development system at NTPC, the succession process ensures smooth take over and no disruption takes place. After superannuation from NTPC , skilled employees are utilized in areas where deployment of regular manpower is difficult. These areas include consultancy sites, Partnership in Excellence, APDRP etc. A policy guideline has been framed for awarding job contracts to retired CPSU employees for executing job at consultancy sites. On similar lines approval has been taken for job contracts in areas like PIE & APDRP.

Retired employees are often invited for participating in our training and development programs to impart the expertise as and when such programs take place "

B. NHPC Ltd.

7.6 When the Committee asked how serious is the problem regarding human resources, the Company gave the following reply:-

> "In the past 02 years, NHPC has been encountering higher attrition than ever before, especially in some important disciplines:
>
> Executives:
> In the year 2006 alone, there were 73 resignations in the Executive cadre out of which 34 were from Power Engineering and 22 were from Civil Engineering. Further analysis of the same reveals that out of the 34 resignations in the Power Engineering discipline, 33 were from the E2/ E2A/ E3 grades. Of the 22 resignations in Civil Engineering, 21 were from the E2/E2A/E3 grades.
>
> In the case of 2007, there were 105 resignations in the Executive cadre, 48 were from the Civil Engineering discipline and 27 were from the Power Engineering discipline. Out of the 48 resignations in Civil Engineering, 32 were from the E2/E2A/E3 grades and 15 were from the E6/E7 grades. In the Power Engineering discipline, out of the 27 resignations, 23 were from the E2/E2A/ E3 grades.
>
> Supervisors:
> In the year 2006 alone, there were 80 resignations in the Supervisor cadre out of which 29 were from Power Engineering and 31 were from Civil Engineering.
>
> In the case of 2007, there were 50 resignations in the Supervisors cadre, 23 were from the Civil Engineering discipline and 11 were from the Power Engineering discipline.
>
> This reveals that NHPC is finding it difficult to retain talents in the younger cadre and of late in the senior level i.e. E6/E7 grades. It is needless to say that the resignations are of the better rated employees as they are being poached by the private players and also more established PSU who has entered the hydropower sector like NTPC."

7.7 When the Committee sought to know whether NHPC faces any problem in attracting good talent and also in retaining of existing talent the company gave a detailed note on the subject outlining the steps taken by NHPC to address the problem:-

> "Today NHPC is thriving in a competitive environment with challenging business proposals. The major factor that will determine the growth & success of an organization shall be the knowledge work force.

NHPC does face problems in attracting talent on account of following reasons:

- In comparison to Private Sector the compensation package offered to a similar status employee in PSU is much lower.
- Within the Power Sector NHPC has a lower pay scales in the induction grades compared to its sister concerns hampering attracting best of the talents.

The core activity of NHPC relates to construction of Power Projects and generation of Power. The Projects being located in the remotest corners of the Himalayan belt, working conditions are extremely tough and harsh thereby making situations a bigger challenge to attract talents considering the compensation package.

- Limitation of compensation package being capped as per Govt. guidelines better offers to experience / talent is not possible.

NHPC also faces problems in retaining talent on account of following reasons:

- The lower pay scales in comparison to other similarly placed PSUs / Private are a bottleneck in retaining talent in the company.
- The stipulations of the Government also restricts the modification of compensation structure thereby the compensation structure of Private Sector still remains lucrative.
- NHPC is handcuffed in extending lucrative allowances and perquisites for employees at such tough locations due to Govt. stipulation of limiting the same within 50% of Basic pay.
- Limitation of allocation of amount for Performance Linked Incentives within the maximum limit of 5% of distributable profit as per Govt. guidelines.

In spite of all the above, NHPC has taking some initiative in the direction of addressing the issue as under:-

(i) A Retention Strategy has been formulated.
(ii) Taking effort to enhance the brand image of NHPC in the area of its core competency that is being recognised in both national and international forums.
(iii) The organization's financial health is also under improvement thereby making it a worthy company to work for.
(iv) Encouraging healthy work life balance at all locations.
(v) Promoting uniform organization culture.
(vi) Maintaining lucrative post retirement benefits that are absent in Private Sector.
(vii) Impetus on development and training employees in an exhaustive manner.
(viii) Merger of Dearness Allowance is also an additional benefit.
(ix) Rewards and Recognition Schemes for employees."

7.8 While furnishing suggestions for improving the performance of human resources to the Committee, NHPC have stated the following:-

> "The following points are suggested for improving the performance/functioning of the corporation:
>
> - As power is the single most important component for the growth of the economy and GOI has given its due emphasis in this sector by chalking out massive capacity addition plan where every power PSUs are going to play a vital role therefore the human assets will be considered as the centre stage for meeting this target. But due to boom in the job market the attrition rate of power PSUs has become suddenly increased manifold and the industry is facing shortage of manpower. Inducting and retaining talents has become the greatest challenge for HR now-a-days. Therefore it is extremely necessary to re-look at the quantum and structure of the compensation package of PSUs keeping in view the dominant market conditions. Compensation package need to be devised in such manner so that horizontal movement of talents from PSUs to competitor private companies gets arrested.
>
> - Human Resource function of the Corporation need to be more empowered or strengthened so that it can become innovative in its way to make it a strategic partner. Industry-Institute partnership needs to evolve for harnessing the customized talent as needed by the industry."

7.9 When asked for the views of NHPC on starting captive training institutions to source human resource for its requirement, the Company in a written reply furnished to the Committee stated the following:-

> "NHPC has established 04 Training Institutes (Hydro Power Training Institutes) at following Power Stations
>
> - HPTI, Chamera-I Power Station, Distt. Chamba (HP).
> - HPTI, Salal Power Station, Distt. Udhampur (J&K).
> - HPTI, Uri Power Station, Distt. Baramulla (J&K).
> - HPTI, Tanakpur Power Station, Distt. Champawat (Uttaranchal).
>
> These Institutes are catering to the training needs of the employees posted at the Power Stations in which the Institutes exists along with the employees posted at the other Power Stations / Projects of NHPC. These Institutes are recognized by CEA and equipped with latest training aids and logistics. Apart from technical training and soft skills training to the employees in all grades and disciplines, these institutes are also conducting statutory training in terms of The Indian Electricity Act 2005 and The Indian Electricity Rules 1956.

The workmen in unskilled cadre are also getting benefited through the statutory training as per the provisions of The Indian Electricity Act 2005 and The Indian Electricity Rules 1956.

Keeping in view the functioning and utility of these training Institutes, start of such captive training institutes would help to source human resource as per the requirements."

C. NPCIL

7.10 The Committee wanted to know whether any study has been conducted to find out the adequacy of manpower requirements in NPCIL and furnish the outcome of such study and the follow-up action, the Company stated the following in its written reply:-

"Manpower requirements of Construction Projects and Operating Stations have been studied by High Power Internal Expert Committees from time to time. The Committees had developed standardized manpower models for the different types of Projects/Plants during the construction phase as well as operation and maintenance phase. These models envisage optimum manpower in the different categories/ disciplines. In accordance with these standardized models, the manpower of the Projects/Stations are being assessed from time to time and postings / redeployments are carried out."

7.11 Give details on the system of imparting training to staff, NPCIL stated the following: -

" NPCIL has training schools/ centres of its own for training manpower at five stations (TAPS 1&2, TAPS 3&4, KGS, MAPS & RAPS) in addition to the BARC training school. These training centres are fully equipped with latest pedagogical training/teaching aids. Training is also provided to key operations personnel on full scope training simulators to prepare them for responding to any postulated plant conditions. The training schemes of NPCIL are at par with international standards."

CHAPTER-8

COST OF POWER

A. THERMAL SECTOR

8.1 The Committee were concerned with the cost of power to various consumers, like industry, commerce and large households. The Committee desired to know measures taken by NTPC for reducing the cost of power. In a written reply to the Committee, NTPC stated the following:-

> "(i) Determination of power tariffs to be charged by the distribution licensees is the statutory function of the State Electricity Regulatory Commissions (SERCs). In doing so SERCs are guided by the provisions contained in the Electricity Act 2003 which, inter alia, include the factors that would encourage competition, efficiency, economical use of resources, safeguarding of consumers interests and at the same time ensure recovery of cost of electricity in a reasonable manner, reduction of cross subsidies, the National Electricity Policy and the Tariff Policy. The SERC is required to determine tariff in a transparent way after hearing various stakeholders.
>
> The cost of power to a consumer includes the overall bulk power purchase cost as well as transmission cost and the operational and financial performance of the Distribution Companies (DISCOMSs) i.e. Aggregate Technical and Commercial (AT&C) losses, operational expenses, capital investment for system upgradation / augmentation, consumer profile, subsidy and cross subsidy etc. Accordingly, the tariffs vary between different DISCOM areas and also between different categories of the consumers, even within the same DISCOM area.
>
> As the tariff of electricity to the domestic and agriculture consumers are cross subsidized, the tariff for industrial, commercial are higher in India as compared to developed countries."

8.2 NTPC furnished the following information in its written reply to the Committee regarding the cost of production of power per MW:-

> "The per MW cost (current) of NTPC power stations and new projects are as follows: -
>
> a. Project completed during last 5 years – Rs.3.45 Cr./MW to Rs.4.47 Cr./MW.
> b. Ongoing / New thermal (coal based including JV) projects – Rs.3.73 Cr./MW to Rs.5.83 Cr./MW
> c. New gas based project – Rs.2.51 Cr./MW to Rs.3.35 Cr./MW
> d. Ongoing Hydro Projects – Rs.4.83 Cr./MW to Rs.5.66 Cr./MW."

8.3 The Committee were interested in the cost of production of per unit of electricity and the rate at which it is supplied to consumers. NTPC gave the following in a written reply:-

"**Cost of Production of Electricity**-
The electricity that is supplied to various end consumers is procured by the respective SEB / DISCOM from different central, state and private generating stations. The average cost of electricity sold to SEB / DISCOM (excluding taxes and duties) from NTPC generating stations was Rs. 1.64 per unit and Rs. 1.75 per unit during the years 2005-06 and 2006-07 respectively.

Rate of electricity to end consumer-
The retail tariff or rate at which electricity is supplied by the respective SEBs / DISCOM to the various categories of end consumers including the common man in the village is fixed by the respective State Electricity Regulatory Commissions (SERC) and varies across the country.

Modalities of Retail Tariff
According to the Electricity Act 2003, the tariff for retail sale of electricity shall be determined by the Appropriate State Electricity Regulatory Commission. The State Commission shall regulate electricity purchase and procurement process of the distribution Licensees including the price at which electricity shall be procured from the generating companies or licensees or from other sources for distribution and supply within the state. The State Commissions shall specify terms and conditions for determination of tariff and in doing so shall be guided by factors which would encourage competition, efficiency, economical use of resources, good performance and optimum investments, safeguard consumers' interest and at the same time ensure recovery of cost of electricity in a reasonable manner.

The tariff determination by the State Commission is done through a transparent and consultative process of hearing where the views of various stakeholders including the end consumers is considered and prudence check is carried out by the Commission while determining the retail tariff.

Factors affecting Retail Tariff

The tariff to end consumers fixed by the SERC generally depends on the following factors: -

1. Power purchase cost
2. Transmission and distribution charges
3. AT&C losses
4. Cross subsidy provided to various consumer categories by the SERC.
5. Subsidy provided by Government to select consumer categories.

As the factors on which retail tariff depends are different in different states, the retail tariff varies across the country."

8.4 Asked about the measures suggested for reducing cost of power to ultimate consumer, the company stated:-

"The key steps needed to be taken so that cost of power is reduced to the ultimate consumer are as under:

1. Reduction in T&D losses.
2. Reduction in commercial losses
3. Reasonable fuel Price - The tariff of generation comprises of capacity and energy / fuel charges and latter accounts for nearly 60 to 65% of the tariff. The price of fuel has been increasing substantially in the recent past. A fuel regulator to go through the reasonableness of price of coal, gas and other fuel is required for reduction in the power purchase cost of SEB / Discoms."

8.5 When asked to give details of the net increase in the price of coal supplied to NTPC power plants in the last three years and its effect on generation costs and the Company's suggestions in regard to the regulatory mechanism to be evolved for controlling/deciding on coal prices, NTPC in a written reply to the Committee stated as under:-

"Coal Price and Average Variable Charges

		2006-07	2005-06	2004-05
i)	Average Price of Coal Consumed (Rs./MT)	1218	1170	1044
ii)	Average Variable Charges (coal stations - Rs./Kwh)	1.01	0.96	0.87

While the average price of coal consumed for 2005-06 increased by 12% over 2004-05, the increase in average variable charges for the same period was 10%. Similarly, while the average price of coal consumed for 2006-07 increased by 4% over 2005-06, the corresponding increase in average variable charges was 5%.

It is felt that a regulatory mechanism is needed in the coal sector for various purposes. Not only coal pricing requires controlling by a regulator as the coal companies have been resorting to an arbitrary price hike in a non transparent manner, some other issues also like allocation of coal blocks, clearances of coal projects, coal quality control etc can be overviewed by coal regulator."

8.6 When asked as to whether the company are satisfied with the rail tariffs levied on coal/fuel transportation to its plants and give details of the areas of concern and

remedial measures that are required in this connection, NTPC in a written reply to the Committee gave the following reply:-

"At present the coal freight is being charged in the 140 category of Tariff rates. The details of change of tariff category and details of freight since April 1990 for initial slab of 1 to 100KM are given below:

Date	Category	Freight (Rs./Ton)	Remarks
01.04.1990	125	50.20	
16.08.1991	125D	56.80	
01.04.1992	130D	61.00	
01.04.1995	130	79.30	
15.10.1997	135	94.10	
24.06.1998	135A	96.00	
01.04.2000	130A	101.80	
01.04.2002	130	108.40	
01.04.2005 to till date	140	116.80	133% increase with reference freight rate on 1.4.90

The freight tariff is categorized under18 categories ranging from LR_5 to 220 varying freight rate from 50% (for LR_5) to 220% of freight rate for 100 category. The Railway Freight in class 140 is 40% more than the class 100. To bring down the power generating cost, and provide relief to the consumers, NTPC has been suggesting modifications in Railway freight for coal to the 100 category."

B. HYDRO POWER

8.7 The Committee wanted NHPC to give a note on the cost of power produced by plants operated by NHPC, in particular and hydroelectric in general and also compare the cost of the power produced by other sources. In a written reply furnished to the Committee, the Company stated the following:-

"The cost of energy in respect of NHPC is as under:-

S No.	Name of Power Station	FY 2006-07		
		Energy Available Ex-bus (MU)	Annual Expenses (Rs. Crores)	Cost of Energy (Rs./KWH)
1	Bairasuil	691.00	48.17	0.70
2	Salal	3456.76	93.52	0.27
3	Tanakpur	451.57	43.70	0.97
4	Chamera I	2360.45	139.40	0.59
5	Uri	2796.13	175.99	0.63
6	Chamera II	1426.58	212.23	1.49
7	Dhauliganga	1095.08	130.03	1.19
8	Loktak	465.24	48.73	1.05
9	Rangit	196.07	45.10	2.30
10	Total NHPC	12938.88	936.87	0.72

The average costs of thermal and nuclear tariff are Rs. 1.75 and Rs. 2.14 respectively."

8.8 The Committee wanted to know what measures are being contemplated by the Ministry of Power to reduce the unit cost of power. The Ministry in a written reply to a Committee have stated the following:-

"Provisions for promotion of competition have been made in the Electricity Act, 2003 with the objective to reduce the unit cost of power and also to improve the functional efficiency.

Following measures have been taken to control the unit cost of power:-

(i) Ultra Mega Power Projects

UMPP are very large sized projects, each of approximately 4000 MW and will be using super critical environment friendly technology. These projects are being developed on a Build, Own and Operate (BOO) basis. In terms of the Tariff Policy, procurement of electricity by distribution companies is being done on the basis of tariff based competitive bidding. The tariff obtained in three UMPPs awarded so far at Sasan (M.P.), Mundra (Gujarat) and Krishnapatnam (Andhra Pradesh) have been highly beneficial to the procurers.

(ii) Adoption of Super Critical Technology.

Higher size super critical units are planned for integrated coal based thermal power projects with captive mining in the states. This technology will not only result in improvement of thermal efficiency but also reduce emission of greenhouse gases significantly. Such integrated plants shall have benefits of fuel availability at lower cost and low project cost due to economy of scale.

(iii) AT&C Losses

APDRP Scheme has been launched in the year 2002-03 for improvement in the Sub-Transmission and distribution system in the country. The objectives of APDRP Schemes are improving financial viability of the Utilities, Reduction of Aggregate Technical Losses (AT&C) losses to around 15%, Improving customer satisfaction, Increasing reliability of power supply, Improving quality of supply and with Management Information System (MIS).

A total of 571 projects estimated to cost Rs.17033.58 crore were sanctioned in different States. An amount of Rs.7472.54 crore has been released so far (as on 31.03.2008). The utilization including the counterpart funding is Rs.11900.57 crore which is 70% of the project outlay.

Nine States have shown reduction of cash loss amounting to Rs.5759.46 crore and became eligible for APDRP incentive of Rs.2879.73 crore. Government has released Rs.2879.73 crore.

The status of the T&D losses and the (AT&C losses) which in addition to T&D losses includes losses on account the collection inefficiency, in the country with the implementation of APDRP programmer has been as under: -

Year	% T&D Losses	% AT&C Losses
2001-02	33.98	38.18
2002-03	32.54	36.63
2003-04	32.53	34.78
2004-05	31.25	34.33
2005-06	30.42	34.54
2006-07	28.65 (Provisional)	32.07

It is proposed to continue APDRP which was started in the Tenth Plan during the XI Plan as well with in a restructured form with revised terms and conditions for improvement in sub-transmission and distribution system, enabling accurate base line data and energy accounting embedded in the system.

(iv) Tariff as per Hydro Policy.

It would be obligatory for the developer to go through an International Competitive Bidding (ICB) process for award of contract for supply of equipment and construction of the project either through a turnkey contract or through a few well-defined packages.

The tariff of the project would be decided by the appropriate Regulatory Commission. To this extent, the Tariff Policy notified in January, 2006 is modified and the developer would be required to enter into long term PPAs with distribution companies. While determining tariff the appropriate Regulatory Commission shall not allow as a part of the project cost the expenditure incurred or committed to be incurred by the project developer for getting the site allotted to him. The dispensation accorded under the Hydro Policy of 1998, regarding 12% free power to be provided to the host State Government, will, however, be supplemented by an additional 1%. Any free power beyond 13% would be met by the developers from their own resources and would not be a pass through in tariff.

(v) Energy Audit

Energy audit undertaken on thermal and electrical systems in a wide range of coal, hydro, nuclear and gas based power stations have tried to focus on the

heat rate and determination of the efficiencies of equipments and suggestions for improving the efficiency. The energy audits have also addressed the conservation of auxiliary power consumption and secondary oil consumption. CPRI had conducted instrumented and diagnostic energy audits in nearly 75 thermal power plants.

(vi) Tariff Based Competitive Bidding

Section 61 & 62 of the Electricity Act, 2003 provide for tariff regulation and determination of tariff of generation, transmission, wheeling and retail sale of electricity by the Appropriate Commission. Section 63 of the Act states that "Notwithstanding anything contained in Section 62, the Appropriate Commission shall adopt the tariff if such tariff has been determined through transparent process of bidding in accordance with the guidelines issued by the Central Government."

Guidelines are being issued under the provisions of section 63 of the Act for procurement of electricity by distribution licensee (Procurer) for; (a) long-term procurement of electricity for a period of 7 years and above; (b) medium term procurement of period of up to 7 years but exceeding 1 year.

The guidelines shall apply for procurement of base-load, peak-load and seasonal power requirement through competitive bidding, through the following mechanism' (i) where the location, technology, or fuel is not specified by the procurer (ii) for hydropower projects, load centre projects or other location, specific projects with specific fuel allocation such as captive mines available, which the procurer intends to set up under tariff based bidding process.

(vii) Open Access

The Electricity Act, 2003 provides for open access in transmission right from the beginning and for open access in distribution in phase. The Ministry of Power brought an amendment in the Act (which came into force in January, 2004) mandating open access in distribution for the loads of more than one MW latest by January, 09.

(viii) Power Market/Power Exchange

Setting up of Power Exchanges will ensure an efficient pricing market. These exchanges will facilitate the buyers and sellers by bringing power industry participants together to buy and sell electricity in an auction based system. Power exchanges are a part of development strategy of the Government to carry on market reforms and build nationwide support of infrastructure for providing market access. This strategy will also encourage power companies to come up with more surplus emergent power capacities and also drive new

investments to meet India's growing power requirement. The operation of power of exchanges will be more evident with full scale implementation of open access policy. CERC has approved two applications for Power Exchanges. One of them Indian Energy Exchange has become functional."

C. NUCLEAR POWER

8.9 The Committee were interested to know the average cost per unit of nuclear power and how does it compare with cost per unit of thermally / hydroelectric power In a written response, NPCIL made the following remarks:-

"The average tariff of nuclear power is presently about Rs. 2.30 per unit. As nuclear power stations are operated as base load stations, the comparable technology is coal based thermal power. Nuclear power tariffs are comparable with that of non pithead thermal power stations. The Table below gives the notified tariffs of NPCIL and NTPC's non pithead stations:

NPCIL Notified Tariffs		NTPC Non Pithead Coal Tariffs	
Station Tariff (Paise/unit)		Station Tariff (Paise/unit)	
KAPS 1 & 2	204.34	FGUTPP St-II	198
TAPS 1 & 2	93.56	NCTP Dadri	336
TAPS 3 & 4	265.48	Farrakka STPS	160
NAPS 1 & 2	191.49	Badarpur TPS	307
RAPS – 2,3&4	279.79	Kahalgaon STPS	176
MAPS – 1 & 2	181.18	Simhadri	179
KGS – 1 & 2	279.50		

8.10 Adding further regarding the steps contemplated to reduce the per unit cost of nuclear power, NPCIL made the following observation:-

"NPCIL has taken several measures to reduce the tariffs of nuclear power. These include reduction in the return of equity to 14%, pre-payment of high interest loans, adopting depreciation consistent with the life of reactors, reducing input costs, withdrawl of levies for Renovation & Modernisation and Research & Development etc. The cost of debt has also been reduced by completion of projects well within schedule. Thus ensuring that no time and cost overruns take place.The tariffs for nuclear power are notified by the Government in accordance with the Atomic Energy Act. At present a High Power Committee is reviewing the tariff structure of nuclear power."

8.11 Elaborating further on whether long gestation period (5 to 6 years) in setting up nuclear plants is pushing up the cost of production of per unit of power / electricity charges, NPCIL gave the following reply:-

"Nuclear Power plants world over have a gestation period of about 5 years. The Interest During Construction (IDC) component of the project cost is thus

inherently higher in case of nuclear power plants over other generating technologies other than hydel plants. The capital cost of nuclear power plants is thus higher. However, the cost of electricity generated by nuclear power plants is competitive with other technologies on account of a much lower fuel cost."

8.12 The Committee wanted to know whether the cost of decommissioning is taken into account for working out the cost of power being produced in an nuclear power plant. During his deposition before the Committee, the Chairman, NPCIL stated the following reply:-

"Sir, it is included. Not only that, Sir, right from the first day, 15 years back onward, our tariff has an element of decommissioning cost. We have accumulated enough decommissioning fund. It is a corpus of fund which is available to undertake such decommissioning activities whenever they are required."

8.13 The Committee wanted to know the cost of power generated by the nuclear power stations and the components included in the cost of power. Responding to this query, the Secretary, DAE, Shri Anil Kakodkar during the oral evidence stated the following: -

"Charges include capital cost and other operating charges. For example, for Madras Atomic Power Station, for Narora Atomic Power Station, for Kakrapar Atomic Power Station, the tariff is less than or about Rs. 2 per kilowatt. For some of the later units, it is higher but the average tariff for all power stations put together is around 2.28.

8.14 Adding further, he stated: -

"It varies from plant to plant. In the case of thermal plants, the fixed cost part of the tariff is in fact lower than the fixed cost part of the tariff in the case of nuclear power plants."

8.15 Asked to compare nuclear power with hydropower, Dr. Anil Kakodkar, added:-

"I will not make a comparison with hydro power because hydro power is highly location dependent in terms of capital cost. In some places, hydropower will be cheap and in some places, it will be expensive. But we can make a good comparison with respect to the coal based plants."

8.16 When asked whether compared to thermal power, nuclear power is cheaper and cleaner, he made the following observations:-

"It is cleaner. But I would say that if we make a comparison between coal based thermal plants very close to the pithead, you will find that it may be

cheaper than nuclear. But if you make a comparison with a coal based station which is away from the coal mine, then there is transportation cost of coal involved in it."

8.17 The Committee sought to know whether the cost and tariff of the recently concluded UMPPs could be compared to cost of power generated through nuclear energy. Answering this, Dr. Anil Kakodkar, Secretary DAE, stated the following during the oral evidence: -

"First of all, I think the costs reflected in the ultra mega projects are levellised costs. It looks at the costs over the entire lifetime. The levellised cost usually would be a little lower than the calculated tariff that you would have for the first year. It is depending on case to case. One can show that in some places nuclear power is cheaper than coal and in some places, nuclear power it costlier than coal. But I would like to make a statement that nuclear power is comparable in the same ball park as the thermal power."

8.18 Supplementing further: -

"Similarly with regard to capital cost, I will only give the actual number of plants which we have completed or very nearly completed. Tarapur Units 3 and 4, which are 540 MW units each, we have completed them at around Rs. 5,800 crore which translates to something like 1,200 US dollars per kilowatt. About Kaiga 3 and 4 Units, Unit 3 is complete and Unit 4 is nearly complete. We have completed the project at Rs. 2,600 crore, which translates to 1,300 US dollars per kilowatt. I would like to inform the august Committee that these numbers are very competent compared to global cost for nuclear power stations. The capital cost of nuclear power station would be somewhat higher compared to thermal power station. But the fuelling cost in nuclear power station would be low. What really happens with time, with the coal-fired unit which was constructed around Tarapur vintage with thermal power units capital cost would be lower than Tarapur when it was constructed. However, with time because of the fuelling cost is a major factor in thermal plants and fuelling cost keeps on increasing with time, with escalation, cost of thermal power goes up much faster than the cost of nuclear power because the fuelling cost is a smaller component in the nuclear power. If there is a fuel crisis, then the price may shoot up. That is a separate thing. But, by and large, the escalatory effect on the tariff in a nuclear power plant is lower than compared to thermal power plant."

8.19 Asked by the Committee to give details regarding the quality and cost of Uranium available in India, the Secretary DAE during his appearance before the Committee for oral evidence made the following observations: -

"Our cost is very high because the quality of ore that we have in India is extremely poor. To give an example, we have mining ores, which are .05 per

cent or .04 per cent, and compared to that with the mining ore in Canada, which is as high as 10 or 11 per cent. In Australia, it may be varying between .1 per cent and one or two per cent. So, we are processing extremely lean ores, and that is primarily the reason why the cost is high."

D. RENEWABLE ENERGY

8.20 When the Committee sought to know as to what steps are being taken by the Ministry to reduce the cost of power generated by New & Renewable Energy sources, the Ministry in a written reply furnished the following:-

"The cost of electricity generation depends upon initial capital cost of the project, operation and maintenance (O&M) expense and plant load/capacity factor. While O&M expenses in wind and small hydropower are low, their initial capital cost is somewhat higher in relation to capacity factors obtained thereof. In the case of wind, our country is endowed with only moderate wind regimes leading at most of the potential locations, which leads to relatively lower capacity factors. Small Hydro Power, on the other hand, is somewhat more competitive. In the case of biomass power the biggest hurdle remains the unorganized market for biomass, which raises risk factors. While technological advancement are continuously bringing down cost of power generation from these projects, locating these projects at the places where higher capacity utilization factors can be achieved would further reduce cost of power generation.

The following steps are being taken during the 11th Plan in order to reduce cost of power generation from various renewable energy sources:

(i) Research, design and development of wind electric generators suitable for low wind regimes;

(ii) Raising indigenous content in the wind electric generators;

(iii) Deployment of equipment conforming to international standards or national standards for greater equipment reliability in order to raise capacity factors;

(iv) Accurate resource assessment for effective deployment in order to raise capacity factors;

(v) Forecasting resource availability especially wind, for more effective grid planning in order to raise capacity factors;

(vi) Improvement in efficiencies of biomass gasifiers and SPV modules."

CHAPTER-9

TRANSMISSION AND DISTRIBUTION

A. OVERVIEW

9.1 Transmission of electricity is defined as bulk transfer of power over a long distance at a high voltage, generally of 132 KV and above. In India bulk transmission has increased from 3708 ckm in 1950 to more than 265,000 ckm today. The entire country has been divided into five regions for transmission system, namely, Northern Region, North Eastern Region, Eastern Region, Southern Region and Western Region. The interconnected transmission system within each region is also called the regional grid.

B. TRANSMISSION PERSPECTIVE PLAN

9.2 When the Committee enquired regarding the kind of transmission network and systems are in place in the country in the power sector, the Ministry in their post evidence written reply furnished the following:-

"The existing transmission system in the country consists of the following:

A. Inter State/ Inter-regional transmission system mainly owned and operated by Central Transmission Utility (CTU) viz Power Grid Corporation of India Limited (PGCIL). This mostly consists of 400 kV, HVDC systems and also at 220 kV in some of the states of NER and J&K . A 765 kV Sipat-Seoni line has also been commissioned recently. Inter state transmission serves the following purposes -

- Evacuation of power from the generation projects of Central generating companies, multi beneficiary IPP generation project in which the beneficiaries are located outside the state/region.

- Onwards transmission of power for delivery of share in Central sector and Multi-beneficiary IPP generation projects up to the delivery point of the state grid.

- Transfer of operational surpluses from surplus state to deficit state or from surplus region to deficit region

In order to facilitate optimal utilization of resources, one National Grid has been established comprising 400/765 kV AC as well as +500 kV HVDC bipole & back-to-back links integrating all the five regional grids. Northern, Western, Eastern & North-eastern regions are operated as a single grid of more than 100,000 MW in synchronous mode. Southern Region, of about 40,000 MW capacity, is interconnected with this large grid (ER-WR-NR-NER) mainly through asynchronous links viz., HVDC back-to-back and HVDC

bipole lines. Inter-regional transfer capacity of about 17000 MW is already established which is being enhanced progressively to more than 37000 MW by 2012.

B. Intra state transmission system within the state mainly owned and operated by the state transmission utilities of each state. This is mostly at 132 kV and 220 kV and also at 400 kV in some of the states. Maharashtra has HVDC system also under the state sector. The intra state transmission serves the following purposes :

- Evacuation of power from the generation within the State including that from State sector generation as well as IPPs.

- Onwards transmission within the States of their share in Central sector and Multi-beneficiary IPP generation and also of power received through inter-state trading. This covers transmission from regional grid network delivery points up to the various substations of the state grid network.

- Intra-state transmission within the state grid for delivery of power to the load centers within the state.

C. Sub-transmission and distribution (ST&D) system is also under the State Sector. The sub-transmission and distribution system covers 66kV and below. In some urban areas, the sub-transmission system may also cover 132 kV and even 220 kV. ST&D provides the most important last mile link in the supply chain of electricity fulfilling the following purposes:

- Supply of electricity of HT consumers from the supply point of the transmission system.

- Receiving of power from supply points of transmission system and creation of large number of feed points for feeding power into last mile distribution network.

- Distribution of power by providing wire connectivity up to end consumers.

- Retailing of electricity supply."

I). <u>Role of Powergrid Corporation of India</u>

9.3 POWERGRID Corporation of India Ltd has been carrying out its responsibilities efficiently in the Construction, Operation & Maintenance of inter-State transmission systems and operation of Regional Power Grids. It has been notified as the Central Transmission Utility (CTU) of the country.

9.4 POWERGRID, a Navratna Public Sector Enterprise, is one of the largest transmission utilities in the world. POWERGRID wheels about 45% of the total power generated in the country on its transmission network. POWERGRID has consistently maintained the transmission system availability at 99.65% which is at par with the International Utilities.

9.5 Ever since its inception in 1992, POWERGRID has established a transmission network of about 66,800 circuit kms and 111 sub-stations having more than 73,000 MVA transformation capacity. At the beginning of its commercial business, the initial network was only 22,220 circuit kms and 42 substations with transformation capacity of 12,200 MVA.

9.6 When enquired by the Committee regarding the plans of the Ministry for strengthening the Power Grid Corporation of India in its activities, the Ministry in their post evidence written reply gave the following information:-

> The Power Grid Corporation of India Limited has been conferred upon 'Navratna' status since 1st May, 2008. This has given the corporation functional and operational autonomy. The Board of the PGCIL has been expanded with appointment of seven independent Directors.

9.7 When the Committee wanted to know whether the country possesses latest technologies and manufacturing capabilities for items required in the transmission and distribution sector, the Ministry in post evidence written note stated the following:-

> "POWERGRID has already integrated various state-of-the art technologies in the development of its transmission system with a focus towards optimization of Right-of-way and land requirement as well as safe, secure and reliable operation of very large Grid. Some of these are 800kV AC System, Flexible AC transmission system like series compensation, TCSC, SVC etc., high temperature endurance conductor such as INVAR, multi circuit/multi conductor line, high rise/compact/pole type towers, gas Insulated substations (GIS) for optimization of S/s space in urban areas and substation automation.
>
> The country possesses technologies for manufacture of all cables required in the distribution sector and for transmission voltages up to 220 kV. For the higher transmission voltages (e.g. 400 kV) cables are not being manufactured in the country.
>
> In the substations, equipment such as power and distribution transformers, circuit breakers, lightning arrestors, wave traps, isolators, voltage transformers, current transformers, power line carrier communication equipment, reactors, capacitors, batteries, control and relay panels, etc. are used. The country is self sufficient for manufacturing of items upto 400 kV AC transmission system. Recently PGCIL has commissioned a 765 kV transmission system for which some equipment has been imported.

The highest direct current voltage in the country is ± 500 kV. Along with establishment of HVDC systems in India the technology transfer to indigenous manufacturer i.e. BHEL is also taking place.

To meet the long term power transfer requirement, PGCIL is developing ±800 kV, 6000 MW HVDC system as well as 1200kV AC system. Test station is being established at Bina in association with manufacturers for indigenous development of 1200 kV equipment in India.

As per the assessment made in the 11th Plan Working Group on Power, the total investment in Transmission & Distribution during the 11th Plan has been estimated to be of the order of Rs. 4.27lakh crores, which would include cost of Transmission & Distribution equipments along with expenditure for civil works, erection , commissioning, supervision, overhead charges etc.

There are adequate domestic manufacturing outfits to meet the demand for power transmission and distribution equipments in the country. In addition, various manufacturers are increasing their capacities to meet this demand."

9.8 When asked by the Committee to furnish details on the transmission losses in the country and to give comparative figures at international level, the Ministry in their post evidence written reply furnished the following information:-

"The transmission losses in the country for transmission of power on voltage levels of 400kV and above, that is 400kV, 765kV and HVDC system, are generally of the order of 3%. Comparable data showing voltage level wise losses in other countries is not available.

At lower voltage levels, utilities used to monitor Transmission and Distribution (T&D) losses. In that system there was a tendency of utilities booking subsidized/un-metered supply under distribution losses. T&D losses were being computed taking into account electricity bills issued to consumers as accrued income and not on actual collection basis. T&D losses for the year 2006-07 was 28.26% of the total energy available for sale. Concept of Aggregate Technical and Commercial (AT&C) loss was introduced in 2001-02. AT&C loss captures not only technical losses, but also captures theft, pilferages and commercial losses due to poor metering and billing and non-realization of dues. The draft report on Performance of State Power Utilities for the year 2006-07 prepared by the Power Finance Corporation indicates that the AT&C Loss of the State Power Utilities at the national level for 2006-07 was 33.07% of the total energy available for sale.

T&D losses as percentage of output in some of the countries (which are available for the year 2004) are given below:

S. No.	***Name of the Country***	**T&D losses (%)**
1.	Australia	6
2.	China	6
3.	Canada	7
4.	France	6
5	Indonesia	13
6	Japan	5
7	Korea Republic	16
8	Mexico	16
9	Pakistan	25
10	Sri Lanka	17
11.	United Kingdom	8
12.	United states of America	6

(Source: World Bank Publication, World Development Indicators, upto 2007)

9.9 When the Committee asked about steps taken by the Ministry to reduce the transmission losses, the Ministry in their post evidence written reply furnished the following:

> "During 11th and 12th plan periods, more generation additions are being planned for inter-regional power transfers. This would require transmission network to cover higher distances and correspondingly would entail higher transmission losses. To mitigate the impact of long-distance transmission on transmission losses, more use of higher voltage levels that is at 765kV has been planned for 11th and 12th plan period. Use of 1200kV is also being envisaged for 12th/13th plan period. Similarly, use of 800kV voltage level in HVDC system for transmission of power has also been planned. These higher voltage systems would be part of bulk power transmission network for bulk transmission of power across State/Regional boundaries and alongwith various Regional and State transmission schemes that are under implementation and planned for implementation by Central and State Utilities would limit the transmission losses at EHV/UHV levels of 400kV and above.
>
> The Central Government has built a national consensus to focus on a time bound programme for reduction of AT&C losses. In the Chief Ministers' Conference held under the chairmanship of the Prime Minister on 28th May 2007, a unanimous resolution was adopted which *inter-alia* included the commitment of the States, with appropriate assistance from the Centre, to establish the necessary baseline data and information technology applications for energy accounting and auditing, and for ensuring a resolute elimination of electricity theft.
>
> At the distribution level, Government had launched the Accelerated Power Development and Reforms Programme (APDRP) in the year 2002-03 with the objective of encouraging reforms, reducing AT&C loss, improving quality of supply of power and improving consumer satisfaction. The target was to reduce AT&C losses to 15% in five years to begin with in urban and high

density consumption areas. AT&C loss has come down in towns where APDRP has been implemented. Further, some of the utilities, which adopted various interventions as envisaged under the programme have shown significant reduction in AT&C loss. At town level, AT&C losses have been brought below 20 percent in 215 APDRP towns in the country of which 163 towns have brought AT&C losses below 15 percent.

The Government have approved the continuation of APDRP during the XI Five Year Plan with revised terms and conditions as a Central Sector Scheme. The focus of the programme is on actual, demonstrable performance in terms of loss reduction. The Utilities are to achieve the following target of AT&C loss reduction at utility level:

- 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

Establishment of reliable and automated systems for sustained collection of accurate base line data, and the adoption of Information Technology in the areas of energy accounting are the necessary pre-conditions before sanctioning any projects for strengthening & up-gradation of sub-transmission and distribution networks. Urban areas – towns and cities with population of more than 30,000 (10,000 incase of special category states) are to be covered under the restructured programme. In addition, in certain high-load density rural areas with significant loads, works of separation of agricultural feeders from domestic and industrial ones, and of High Voltage Distribution System (11 KV) are also to be taken up. Projects under the scheme are to be taken up in Two Parts. Part-A is to include the projects for establishment of baseline data and IT applications for energy accounting / auditing & IT based consumer service centers. Part-B includes regular distribution strengthening projects.

Scheme also contains provision of incentive for utility staff in towns where AT&C loss levels are brought below the base line levels."

9.10 When the Committee wanted to know the kind of investments are being planned for the 11th Plan and further by the Government in transmission sector, the Ministry in their post evidence written reply stated the following:-

"The investment requirement in transmission sector during 11th Plan has been estimated corresponding to generation capacity addition target programme of 78000 MW in this period. The requirement for transmission system, at 220kV and above that is 220kV, 400kV, 765kV and HVDC, has been estimated to be of the order of Rs 140,000 crore. This includes the transmission development programme (at 220kV and above) of State Grids, Regional Grids and National Grid. Out of Rs 140,000 crore of total investment, Rs 75,000 crore is estimated in Central Sector for development of Regional Grids and National Grid, and Rs 65,000 crore is estimated in State Sector for development of State Grids."

II). Power Distribution Network

9.11 According to the Ministry of Power: -

"Electricity is a concurrent subject and the responsibility of sub-transmission and distribution segment rests with the States. As per the Electricity Act, 2003 (section 12), the electricity distribution is a licensed activity. Reorganisation of the vertically integrated State Electricity Boards in to separate generation, transmission and distribution entities is also provided for in the Act. So far the Government owned distribution companies dominate the distribution of electricity in various States. Private Licensees e.g. CESC, Torrent Power etc, in the country exists from the very beginning, in few large cities in different States. Privatisation of electricity distribution has been undertaken in Orissa in 1999 and in Delhi in July, 2002. 14 States have unbundled their SEBs so far.

As per Electricity (Amendment) Act, 2007 notified on May 29, 2007 "The concerned State Government and Central Government shall jointly endeavor to provide access to electricity to all areas including villages and hamlets through rural electricity infrastructure and electrification of households".

Electricity generated is generally transmitted to different parts of country through 400KV, 220KV or 132 KV transmission lines. Then it is stepped down to 66 KV, 33 KV or 11 KV through Power Transformers for distribution. From 11KV it is further stepped down to 415 Volts / 220 Volts through Distribution Transformers for consumers."

C. ACCELERATED POWER DEVELOPMENT REFORMS PROGRAMME (APDRP)

9.12 The Ministry of Power in their post-evidence replies have stated as under:-

"The Accelerated Power Development Reforms Programme (APDRP) was launched in 2002-03 as additional central assistance to the states for strengthening and up gradation of sub-transmission and distribution systems of high-density load centers like towns and industrial areas. The main objectives of the programme were to:-

- reduce AT&C loss
- reduction of commercial loss
- improve quality and reliability of supply of power
- increase consumer satisfaction

The Programme had two components:

- Investment component- Central Government provided assistance to the tune of 25% and 90% of the project cost in the form of grant to Non-

special category and Special Category states respectively. Balance amount to be arranged from Financial Institutions / own resources.

- No of projects sanctioned : 571
- Total project Cost : Rs. 17,033.58 Crore
- APDRP (GOI) Component : Rs. 8,720.07 Crore
- Total fund released by GOI : Rs. 7413.29 Crore#
- Counter Part Fund drawn from FIs : Rs. 5014.32 Crore

Total fund utilized : Rs. 12,098.45 Crore

In addition, Rs. 262.22 crore has been transferred from APDP.

- **Incentive component-** This component is to incentivize the SEBs / utilities to reduce their financial losses. Funds are released to the SEBs for actual cash loss reduction, for every Rs.2 of cash loss reduction Rs.1 is given as grant. The cash losses are calculated net of subsidy and receivables. The year 2000-01 has been adopted as the base year. Nine states have shown reduction of cash loss amounting to Rs.5759.46 Crore and became eligible for APDRP incentive of Rs. 2879.73 Crore which has been released to the states.

(Figures in Rs. Crore)

S.No.	State	Cash Loss Reduction	Eligibility	Incentive Released
1	Andhra Pradesh	530.22	265.11	265.11
2	Gujarat	2078.62	1039.31	1039.31
3	Haryana	210.98	105.49	105.49
4	Kerala	295.86	147.93	147.93
5	Maharashtra	275.78	137.89	137.89
6	Punjab	503.88	251.94	251.94
7	Madhya Pradesh	595.22	297.61	297.61
8	Rajasthan	275.42	137.71	137.71
9	West Bengal	993.48	496.74	496.74
	Total	**5759.46**	**2879.73**	**2879.73**

3. **Achievements:**

- % feeder metering completed in 23 states. Overall 98% feeder metering and 88% consumer metering achieved at national level.

- The overall commercial loss (without subsidy) of the utilities reduced from Rs. 29,331 Crore during 2001-02 to Rs. 27,446 Crore during 2006-07.

- Although at national level the AT&C loss of state power utilities has not shown much improvement over the past three years. The loss has come down in towns where APDRP has been implemented. Further, some of the utilities which adopted various interventions as envisaged under the programme have shown significant reduction in AT&C loss.

- AT&C losses have been bought down below 20% in 215 APDRP towns in the country of which 163 towns have been brought below 15%."

I). <u>Restructured APDRP in XI Plan</u>

9.13 Giving details about the restructured APDRP Plan, the Ministry of Power have stated as under: -

"The Government have approved the continuation of Accelerated Power Development and Reforms Programme (APDRP) during the XI Five Year Plan with revised terms and conditions as a Central Sector Scheme. The expected programme size of re-structured APDRP during XI Plan is Rs. 51,577 crore. The focus of the programme shall be on actual, demonstrable performance in terms of loss reduction. Establishment of reliable and automated systems for sustained collection of accurate base line data, and the adoption of Information Technology in the areas of energy accounting will be necessary pre-conditions before sanctioning any projects for strengthening & up-gradation of sub-transmission and distribution networks.

2. It is proposed to cover urban areas – towns and cities with population of more than 30,000 (10,000 incase of special category states). In addition, in certain high-load density rural areas with significant loads, works of separation of agricultural feeders from domestic and industrial ones, and of High Voltage Distribution System (11 KV) will also be taken up. Projects under the scheme are proposed to be taken up in **Two Parts**. Part-A is proposed to include the projects for establishment of baseline data and IT applications for energy accounting / auditing & IT based consumer service centers. Part-B shall include regular distribution strengthening projects. The activities to be covered under each part are as follows:

- **Part – A:** Preparation of Base-line data for the project area covering Consumer Indexing, GIS Mapping, Metering of Distribution Transformers and Feeders, and Automatic Data Logging for all Distribution Transformers and Feeders and SCADA / DMS system for big cities only. It would include Asset Mapping of the entire distribution network at and below the 11Kv transformers and include the Distribution Transformers and Feeders, Low Tension lines, poles and other distribution network equipment. It will also include adoption of IT applications for meter reading, billing & collection, energy accounting & auditing, redressal of

consumer grievances, establishment of IT enabled consumer service centers etc. The base line data shall be verified by an independent agency appointed by the Ministry of Power.

- **Part – B:** Renovation, modernization and strengthening of 11 kV level Substations, Transformers/Transformer Centers, Re-conductoring of lines at 11kv level and below, Load Bifurcation, Load Balancing, HVDS, installation of capacitor banks and mobile service centers etc. In exceptional cases, where sub-transmission system is weak, strengthening at 33 kV or 66 kV levels may also be considered.

3. Expected investment in Part-A (Baseline System) shall be Rs. 10,000 crore and that in Part-B shall be Rs. 40,000 crore. Initially, funds for the projects under both the parts will be provided through loan (100% for Part-A and 25% for part-B, balance to be raised by state utilities through Financial Institutions, except special category and North-Eastern states, for which under Part-B, 90% loan will be provided) which will be converted into grant on fulfillment of conversion conditionalities, namely:

(i) The entire amount of loan for part-A projects is to be converted into grant once the establishment of the required baseline data system is achieved and verified by an independent agency appointed by Ministry of Power.

(ii) Upto 50% of loan for part-B projects can be converted into grant (proportionate to achievement of targets) on achieving 15% AT&C loss levels on project areas for a sustained period of 5 years. In addition, utility level loss reduction (AT&C losses) @ 3% per annum for utilities with baseline loss levels exceeding 30% and @ 1.5% for utilities with baseline loss levels less than 30% have to be achieved.

- Restructured APDRP will also cover:
- **Part - C: Rs. 1177 crores** - An enabling component for the implementation of APDRP and for facilitating the process of reforms in the power sector. This part, to be implemented by Ministry of Power, will include:

    - **Preparation of a template for System Requirement Specifications** for sub-division automation and for customer relations management module, as well as for automated baseline data collection systems.

    - **Validation of the Base-line Data** to be done by independent agencies identified through bidding process by the Ministry or its

nominee. Independent agencies will also verify the AT&C losses and monitor quality of works to be executed under Part-B.

- **Project Advisors and Project Management Consultants** – Advisor cum Consultants will be appointed to assist the Ministry in monitoring of APDRP and to validate the project proposals submitted by the Distribution companies. Project Management Consultants will assist distribution companies in formulating the DPRs, in standardization of bidding/contract documents, managing the bid process, monitoring of progress, quality assurance etc. They will also facilitate the Management Information system and assist the Distribution Reforms Committees formed at the State level.

- **Project Evaluation** by Third Party introduced in the Tenth Plan will continue and will be the basis of computation of the extent of conversion of loan into grant for the specific project. A panel of Project evaluators will be finalized through a bidding process.

- **Capacity Building and development of franchisees** in Distribution Sector will be a major focus area to provide training to employees of the Distribution companies and existing & prospective franchisees in management, technical, commercial and consumer related areas, exposure to latest developments in electricity distribution, loss reduction, theft and pilferage control within India and abroad, dissemination of knowledge through Best Practice Workshops and Conferences, standardization of specifications of equipment required in electricity distribution network, standardization of contractual documents for outsourcing project management, turnkey jobs, franchising etc.

- **Consumer Attitude Survey** will be carried out to assess the impact of the measures taken in the distribution sector towards improving of services, improving the reliability and quality of power supply.

Part D: Rs. 400 crores - Scheme also proposes incentive for utility staff in towns where AT&C loss levels are brought below the base line levels. Each distribution company would be required to implement an incentive programme for utility employees of the specific project area. Details of the incentive scheme and the milestones/achievements that trigger incentive payments shall be agreed to in the project proposals presented by each utility."

CHAPTER-10

RELATED ISSUES IN THE POWER SECTOR

A. RURAL ELECTRIFICATION PROGRAMME

10.1 The Ministry of Power is implementing an ambitious rural electrification programme and under this programme, electricity connections are being provided in villages and households in those villages.

> "Present concept and Definition of Village Electrification:- The concept and definition of village electrification has undergone many changes. According to the latest definition of 2004 a village would be declared electrified if
>
> (I) Total number of households electrified is at least 10% of the total number of households in the village.
> (II) Electricity is provided to public places like Schools, Panchayet Offices, Health Centers, Dispensaries, Community Centers etc. and
> (III) Basic infrastructure such as distribution transformer and distribution lines is provided in the inhabited locality as well as dalit bastis / hamlets where it exists."

10.2 During the examination of the expert, Shri S.P. Gon Choudhary, MD, WBGEDCL, stated by him that there are many flaws in the rural electrification programme. In a written note submitted to the Committee, he has outlined the lacuna in the following manner:-

> "The term 10% has also no scientific base since in course of time due to growth in population the 10% households coverage will reduce to less than 10% unless intensive and continued intensification schemes are launched.
>
> There are 5,86,463 nos. village in the 28 States of which more than 90% have been provide with electricity. Out of 1093 villages of the 7 Union Territories 1090 (100%) have been electrified since electrification of balance 3 villages in the Union Territories is not feasible. Under such impressive figure of Rural Electrification let us look at the household electrification. The status of Rural Households electrification is as under:-
>
> However, it is interesting to no0te that about 200 lacs families in the above mentioned States do not have electricity. The figure represents about 40% of the population of the above. States. The question is why such thing happened. The reason is that the left out families do not have affordability to pay for electricity on regulars basis as such they simply deny to take the advantage of electricity even if they have access to electricity or in some

cases there is no distribution line. The capital investment made by the Govt. is not utilized properly for the benefits of the people."

10.3 Elaborating on the methods to overcome these lacunae, he made the following suggestions:-

"Presently "Access to electricity by all" is a programme where the Govt. becomes a service provider by creating infrastructure however major portions of the rural people refuse to take such service. This is became the service is unreliable and not secured. So there must be some new concept. "Rural Electrification through distributed generation could be a good concept which h has not been tried with right spirit in the country. Distributed generation may include –

1) Solar Photovoltaic
   (a) Individual Home System.
   (b) Small Solar Power Plant with mini grid.
2) Biomass Power Plant of capacity 50 kW with mini distribution line.
3) Micro Hydel Power Plant with mini distribution line.
4) Hybrid Power Plant combining Solar – Wind or Wind – Biomass or Biomass – Micro Hydel with mini distribution line.

The Government may come out with a clear Rural Energy Policy keeping both Power Ministry and Ministry of Non-Conventional Energy Sources involved so that we can achieve 100% Rural households electrification programme within shortest possible time in real terms. "

10.4 The Committee wanted to know the views of the another expert Dr. Kirit S.Parikh in relation to village electrification programme being undertaken by the Government. To this, the expert, Dr. Kirit S. Parikh, made the following reply:

"The second question that was raised by a number of hon. Members was: How come, even though we have so many electrified villages, the number of households connected are only 40 per cent? What is that we should do about it? I think, part of the problem is the definition problem, which says that if 10 per cent of the households are electrified, we consider a village electrified. In the Rajiv Gandhi Gramin Vidyutikaran Yojana, we are saying that you are not just to electrify but you have to provide connections to all the BPL households. Unfortunately, the progress is very slow. Instead of 2.3 crore households, I think, we have done only a few lakhs of them. So, there is a large path. But the idea of the project was clearly there that we need to give free or at least, highly subsidised connections to the households below the poverty line. But there would still remain, may be, households in the margin, who feel today that it is not worthwhile to get the connection; or may be, they are in a slightly peripheral areas and the connection charges, which are imposed are too high; and we need to re-look at it and see that even those, who can afford to pay for it have the incentive to get the electricity."

10.5 Elaborating further on renewable energy based solutions to the rural electrification and development, the expert, Dr. Kirit S. Parikh made the following comments:-

> "One can hope to have a similar revolution in the energy sector if we can develop an independent photovoltaic-based energy system. There must be possibilities of converting photovoltaic energy into hydrogen cheaply and directly. In this case, one has a fuel cell in the house and one can get electricity. The photovoltaic solar energy converts that into hydrogen -- when you do not need it -- and then use that hydrogen to run the electricity as and when one wants it."

10.6 He further stated: -

> "We can think of systems where individual villages can have their own simple solar-based electricity, but that would depend on a central charging system where everyone is given a solar lantern and they can exchange their battery every morning that is charged by the central station for all the villages. One could just replace the batteries every day on some monthly rental basis. Therefore, one can think of some such measures. Currently, these are not at all economical and are very expensive, but in my opinion, they are not very far into the future"

10.7 The Committee were interested as to whether Renewable Energy sources can be effectively utilized to address the energy needs of the villages and remote parts of the country. When the Committee asked whether the Ministry has any plan in place for this, the Ministry in a written reply stated the following:-

> "A number of renewable energy based devices and systems have been developed to address the energy needs of villages and remote parts of the country. These include various models of family size biogas plants, improved wood stoves, solar cookers, solar photovoltaic (SPV) lanterns, SPV home lighting systems, SPV water pumping systems, solar driers, biomass gasifiers etc. For electrification of villages and remote areas, micro hydel projects, SPV power plants, biomass gasifiers are also deployed. The Ministry has programmes for remote village electrification and village energy security. The Ministry has been supporting promotion of these devices and systems by providing central financial assistance. As a result of these programmes, about 40 lakh family size biogas plants, 4.02 lakh solar home lighting systems, 6.7 lakh solar lanterns, 7148 SPV pumps and 6.34 lakh solar cookers have been installed in the country. 3985 villages and 1142 hamlets have been covered under the remote village electrification programme.

B. ENERGY EFFICIENCY AND CONSERVATION

10.8 In a note furnished to the Committee regarding the energy intensity, the Nimistry of Power have stated the following:-

> "The complete position of India with respect to energy intensity as assessed by Planning Commission is given below:

Region/Country	GDP Per Capita-PPP (US $ 2000)	TPES Per Capita (kgoe)	TPES/GDP (kgoe/ $-2000 PPP)	Electricity Consumption Per Capita (kWh)	kWh/ $-2000 PPP
China	4838	1090	0.23	1379	0.29
Australia	28295	5630	0.20	10640	0.38
Brazil	7359	1094	0.15	1934	0.26
Denmark	29082	3852	0.13	6599	0.23
Germany	25271	4210	0.17	6898	0.27
India*	2732	439	0.16	553	0.20
Indonesia	3175	753	0.24	440	0.14
Netherlands	27124	4983	0.18	6748	0.25
Saudi Arabia	12494	5805	0.46	6481	0.52
Sweden	27869	5751	0.21	15397	0.55
United Kingdom	26944	3906	0.14	6231	0.23
United States	35487	7835	0.22	13066	0.37
Japan	26636	4052	0.15	7816	0.29
World	7868	1688	0.21	2429	0.31

[4]

Integrated Energy Policy ,Planning Commission ,2006

> The Government of India is committed to meet the growing energy at affordable rates required to meet the objectives of economic development. To deliver a sustained economic growth rate of 8% to 9% through 2031-32 and to meet life time energy needs of all citizens, India needs to increase its primary energy supply by 3 to 4 times and electricity generation capacity about 6 times. As a result energy service demand growth rates will keep on increasing because of accelerated industrialization, urbanization, and an emerging consumer society."

I). Bureau of Energy Efficiency

10.9 The Government of India has enacted the Energy Conservation Act 2001, which provides a legal frame work for energy efficiency initiatives in the country. For implementing various provisions in the EC Act, Bureau of Energy Efficiency (BEE) was operationalised from 1st March 2002. The Bureau is spearheading the task of improving the energy efficiency in various sectors of the economy through regulatory and promotional mechanism. Bureau of Energy Efficiency coordinates with

designated consumers, designated agencies and other organizations recognize, identify and utilize the existing resources and infrastructure, in performing the functions assigned to it under the EC Act.

II). <u>Projects and Programmes</u>

10.10 Asked about the projects and programmes under implementation under the Bureau of Energy Efficiency (BEE), the Ministry stated :-

"Schemes under implementation:

- Annual Energy Conservation Awards for recognizing both performing industries in various industrial and commercial sectors in 2007 awards were given for 33 categories. This helps in reducing energy intensity across the entire industrial activity range.

- Standards and Labelling Scheme targeting high energy end use equipment and appliances prescribing minimum energy performance standards (Targeted avoided capacity – 3000 MW).

- Energy Conservation Building Code (ECBC) for new commercial buildings targeting minimum energy performance standards by the buildings. (Targeted avoided capacity 500 MW).

- Operationalising Energy Conservation Act by Strengthening Institutional Capacity of State Designated Agencies (SDAs). The scheme seeks to build institutional capacity of the newly created SDAs to perform their regulatory, enforcement and facilitative functions in the respective states.

Schemes to be launched in the near future:

- The Bachat Lamp Yojana to promote energy efficient and high quality CFLs as replacement for incandescent bulbs in households. (Targeted avoided capacity 4000 MW).
- Agricultural and Municipal Demand Side Management (DSM) targeting replacement of inefficient pump sets, street lighting etc. (Targeted avoided capacity – 2000 MW).
- Energy Efficiency in Small and Medium Enterprises (SMEs) during XI Plan. Many energy-intensive SMEs clusters located in various states of the country have large potential for energy savings. (Targeted avided capacity – 500 MW).

Energy Efficiency Action Plan

BEE has prepared an action plan for the period 2007-12 with the aim of achieving 5% savings at the consumption end as a result of various initiatives. This is expected to result in an avoided capacity addition of 10,000 MW during the aforementioned period."

10.11 Giving details about the strategies for energy efficiency, the Ministry of Power have stated as under: -

"National Mission for Enhanced Energy Efficiency:

The National Action Plan on Climate Change (NAPCC) released by the Prime Minister on 30th June, 2008, recognizing the need to maintain a high growth rate for increasing living standards of the vast majority of people and reducing their vulnerability to the impacts of climate change. The National Action Plan outlines Eight National Missions, representing multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change. These missions are:

- National Solar Mission
- National Mission for Enhanced Energy Efficiency
- National Mission on Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a Green India
- National Mission for sustainable agriculture
- National Mission for Strategic Knowledge for climate change

The Energy Conservation Act of 2001 provides a legal mandate for the implementation of the energy efficiency measures through the institutional mechanism of the Bureau of Energy Efficiency (BEE) in the Central Government and designated agencies in each state. A number of schemes and programmes have been initiated and it is anticipated that these would result in a saving of 10,000 MW by the end of 11th Five Year Plan in 2012. To enhance energy efficiency, four new initiatives will be put in place. These are:

- A market based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy-intensive large industries and facilities, through certification of energy savings that could be traded.

- Accelerating the shift to energy efficient appliances in designated sectors through innovative measures to make the products more affordable.

- Creation of mechanisms that would help finance demand side management programmes in all sectors by capturing future energy savings.

- Developing fiscal instruments to promote energy efficiency."

10.12 When the Committee wanted to know from the Government regarding the energy intensity in the country and the efforts required to reduce the same, the Secretary Power during his appearance before the Committee stated the following information:-

> "I think, the need to focus very highly on efficiencies and demand-side management, particularly when fossil fuels are in short supply and the prices are going up. We should be spending a lot of time and energy on efficiency improvements – not only of generating equipment but also of the consuming equipment. We have launched a Star Labelling Programme. We are giving a star rating to products conforming to various levels of efficiency, from one star to five stars. This is meant to be a guide to consumers to be adopting the best available products in the market.

10.13 Explaining the steps taken, he further added the following:-

> "Last year also, in the Budget exercise, we made this very demand and we said it is only logical that we recognise efficiency after we have set up a statutory body by the name of Bureau of Energy Efficiency which has come into its own, is doing good work, and has set standards of efficiency and performance in labelling for various items which are on the increase. This year, we will have at least around eight equipment, which would be having standards and labels. My suggestion was that we should give duty concessions straightaway in accordance with the number of stars that one has so that it sends a very clear signal to the concerned."

10.14 Elaborating further, he added:-

> "The rating is done in consultation with the manufacturers, with the Bureau of Indian Standards. There is a technical body which fixes the standards after due consultation. Thereafter they fix parameters seeing what the available technology is. They also take into account what the level of technology available in the world today is. There has been very intense interaction between the Bureau and the main organisation which is the body called IEEMA (Indian Electrical and Electronic Equipment Manufacturers Association). That is the main body that is interfacing. There are a large number of manufacturers who need to turn to better technology. The transition is going to be painful for them. But they need to change. We have had extensive interaction with CII, FICCI and other organisations on the subject."

10.15 When asked about the energy intensity of the country, the Secretary stated:-

> "Luckily in our country our energy intensity figure is low. We are amongst the best still, at about 1.16 as compared to some of the best countries being in the range of 1.18, and others even higher. But that could be on account of the fact that a large number of our countrymen are still deprived of use of commercial energy or other forms of energy. Our per capita energy consumption is low. It is about 600 units of electricity. We need to take this up to about 1000. While doing so, we should be taking care that we are doing much more work than we have been doing with lesser energy. We have also formulated energy conservation building code. A lot of building activities is taking place. There is an evidence of glass glacier in tropical climate. We need to intensively promote better building designs where the need for air-condition is lower. We heed to have building materials that are insulating. There are possibilities of putting construction glass that can have solar films and generate some solar power there, at least, in buildings that require high cost. You mentioned about green corporation, I would say that it should be in confirmation to building green buildings rather than power guzzling buildings."

III). <u>Energy Conservation Act, 2001</u>

10.16 Asked to furnish the details regarding the Energy Conservation Act, 2001, the Ministry in their post evidence reply stated as under:

> "The Energy Conservation Act, 2001 came into force with effect from 1st March, 2002. The Act empowers the Central Government and in some instances the State Governments to:
>
> - ✓ Notify energy intensive industries, other establishments and commercial buildings as designated consumers.
> - ✓ Establish and prescribe energy consumption norms and standards for designated consumers.
> - ✓ Direct designated consumers to:
>   - Designate or appoint certified energy manager in charge of activities for efficient use of energy and its conservation.
>   - Get an energy audit conducted by an accredited energy auditor in the specified manner and intervals of time.
>   - Furnish information with regard to energy consumed and action taken on the recommendation of the accredited energy auditor to the designated agency.

- Comply with energy consumption norms and standards, and if not so, to prepare and implement schemes for efficient use of energy and its conservation.

✓ Prescribe energy conservation building codes for efficient use of energy and its conservation in commercial buildings.

✓ State Governments to amend the energy conservation building codes to suit regional and local climatic conditions.

✓ Direct owners or occupiers of commercial buildings to comply with the provisions of energy conservation building codes.

✓ Direct mandatory display of label on notified equipment and appliances.

Specify energy consumption standards for notified equipment and appliance."

IV). <u>Energy Audit System</u>

10.17 When the Committee asked the Ministry to give details regarding the energy audit system prevalent in this country, the Ministry in the post evidence written reply stated the following:-

"Energy Audit is the key to a systematic approach for decision-making in the area of energy management.

As per the Energy Conservation Act, 2001, Energy Audit is defined as "the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption".

Need for Energy Audit:

The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs. Energy Audit provides a "bench-mark" (Reference point) for managing energy in the organization and also provides the basis for planning a more effective use of energy throughout the organization.

Type of Energy Audit:

The type of Energy Audit to be performed depends on:

- Function and type of industry
- Depth to which final audit is needed, and

- Potential and magnitude of cost reduction desired

Thus Energy Audit can be classified into the following two types.

i) Preliminary Audit
ii) Detailed Audit

Preliminary Energy Audit Methodology:

Preliminary energy audit is a relatively quick exercise to:

- Establish energy consumption in the organization
- Estimate the scope for saving
- Identify the most likely (and the easiest areas for attention
- Identify immediate (especially no-/low-cost) improvements/ savings
- Set a 'reference point'
- Identify areas for more detailed study/measurement
- Preliminary energy audit uses existing, or easily obtained data

Detailed Energy Audit Methodology

A comprehensive audit provides a detailed energy project implementation plan for a facility, since it evaluates all major energy using systems.

This type of audit offers the most accurate estimate of energy savings and cost. It considers the interactive effects of all projects, accounts for the energy use of all major equipment, and includes detailed energy cost saving calculations and project cost."

10.18 In a comprehensive audit, one of the key elements is the energy balance. This is based on an inventory of energy using systems, assumptions of current operating conditions and calculations of energy use. This estimated use is then compared to utility bill charges.

C. CENTRAL ELECTRICITY AUTHORITY

I). Organization of CEA

10.19 The Central Electricity Authority (CEA) is a statutory organization originally constituted under section 3(1) of the repealed Electricity (Supply) Act, 1948 since substituted by section 70 of the Electricity Act, 2003. Considering the pivotal role of CEA in the development of power sector of the country, the CEA has acquired ISO:9001:2000 quality system certification to improve the quality and competency of CEA personnel.

10.20 The Electricity Act, 2003 requires CEA to frame a National Electricity Plan once in five years and revise the same from time to time. Towards optimum and coordinated development of power resources in the country and to assess the generating capacity addition requirement during 11th and 12th Plan period, CEA has formulated National Electricity Plan (NEP), which has been approved by Ministry of Power in July, 2007

10.21 CEA brings out an annual document titled as 'All India Electricity Statistics' giving all important parameters/statistics concerning generation, transmission, distribution and trading of electricity and the associated fields. This document is widely referred to internationally and within India.

10.22 The Electric Power Survey Committee is constituted periodically with an objective to forecast the electricity demand of the country on short and long term basis so as to incorporate the impacts of changes in the Government policies affecting electricity sector and trends of growth of consumption due to socio-economic and other requirements on electricity demand. The report of the Committee is widely referred to by the international and country's experts/scholars/agencies for various purposes. The report on 17th Electric Power Survey of India containing forecast of electricity demand year- wise, state-wise, region-wise and all- India for major consumption categories upto year 2011-12 and perspective forecast up to the end of 13th Five Year Plan (year 2021-22) has been published in March, 2007.

II). <u>Grid Operation & Management</u>

10.23 CEA monitors the power supply position all over the country. It also monitors all aspects of Grid Operation and Management. In order to expedite the power development in the country, CEA is facilitating formation of National Power Grid through inter-connecting of all the regional grids in the country with strong inter-regional and back-up Transmission system. CEA also recommends to MoP allocation of power from unallocated quota of Central Generating Stations to meet specific requirements of the States in contingencies. CEA prepares all India Monthly Power Supply Position Report giving details of requirement, availability and shortages of various States/ Regions in this respect. It also prepares operational planning programme for the next year in the form of Load Generation Balance Report.

10.24 CEA has been entrusted with the important functions of evaluation of financial performance of SEBs and undertaking studies concerning the economic and commercial aspects of power industry, including analyzing of tariff structure and publication of data relating to Power Sector.

D. CENTRAL ELECTRICITY REGULATORY COMMISSION

I). Introduction

10.25 The Central Electricity Regulatory Commission was constituted in July, 1998 in terms of the provisions of the erstwhile Electricity Regulatory Commissions Act, 1998 (- since repealed and replaced by the Electricity Act, 2003).

10.26 The primary responsibility of CERC under the ERC Act 1998 was tariff regulation. However, under the Electricity Act, 2003 the spectrum of responsibility of CERC has been widened and the Commission now has the powers of licensing, setting and monitoring performance standards, specifying grid code etc., in addition to the powers of regulating tariff.

Mandatory Functions:

(ii) to regulate the tariff of generating companies owned or controlled by the Central Government;

(iii) to regulate the tariff of generating companies other than those owned or controlled by the Central Government specified in clause (a), if such generating companies enter into or otherwise have a composite scheme for generating and sale of electricity in more than one State;

(iv) to regulate the inter-State transmission of electricity;

(v) to determine tariff for inter-State transmission of electricity;

(vi) to issue licenses to persons to function as transmission licensee and electricity trader with respect to their inter-State operations;

(vii) to adjudicate upon disputes involving generating companies or transmission licensee in regard to matters connected with clauses (a) to (d) above and to refer any dispute for arbitration;

(viii) to levy fees for the purposes of the Act;

(ix) to specify Grid Code having regard to Grid Standards;

(x) to specify and enforce the standards with respect to quality, continuity and reliability of service by licensees;

(xi) to fix the trading margin in the inter-State trading of electricity, if considered, necessary; and

(xii) to discharge such other functions as may be assigned under the Act.

Advisory Functions:

(i) on formulation of National Electricity Policy and Tariff Policy;

(ii) promotion of competition, efficiency and economy in the activities of the electricity industry;

(iii) promotion of investment in electricity industry; and

(iv) any other mater referred to the Central Commission by the Central Government.

10.27 The most salutary effect of the functioning of the institution like CERC has been in terms of **transparency, accountability and predictability** in the power sector.

10.28 The terms and conditions of tariff issued by CERC for the tariff period 2004-09 marked a clear trend towards regulation of tariff, based on norms. Reductions of Return on Equity (ROE) from 16% to 14%, tightening of operational norms for recovery of cost have led to tariff rationalization. Higher operating norms progressively determined by CERC have benefited the consumers.

10.29 Regulations on open access in inter-state transmission coupled with regulations on inter-state trading in electricity have facilitated trading and proper utilisation of power from surplus region to deficit region. The Commission has also issued guidelines for Power Exchanges.

10.30 The Indian Electricity Grid Code (IEGC) issued by the CERC has inter alia, facilitated operation, maintenance, development and planning of economic and reliable regional grid.

E. PUBLIC PRIVATE PARTNERSHIP (PPP)

10.31 Consequent upon decision of the Ministry of Finance, (DEA) to extend financial support to Public-Private-Partnerships (PPP) in infrastructure under its Viability Gap Funding Scheme, a decision has been taken in the Ministry of Power to set up a Public-Private-Partnerships (PPP) Cell.

10.32 The scheme of Public Private Partnership is a timely initiative taken by the Government. It is expected that with the support of a catalytic grant assistance of up to 20% of the capital cost under the above scheme of the Ministry of Finance, several infrastructure projects in Power Sector can become bankable and help mobilize the much needed private capital and efficiencies.

10.33 The National Electricity Policy, 2005 has recognized the inadequacy of generation in the power sector in India and it was envisioned that to provide

availability of over 1000 units of per capita electricity by year 2012, a capacity addition of more than 1,00,000 MW would be required during the period 2002-12.

10.34 It is further estimated that an investment of the order of Rs.10,50,000 crores is required for the 11th Plan generation, transmission, sub-transmission, distribution and rural electrification projects. Power being a most crucial infrastructure, public sector investments, both at the Central Government and State Governments, will have to be stepped up. Considering the magnitude of the expansion of the sector required, a sizeable part of the investments will also need to be brought in from the private sector.

10.35 Commenting on the investment in the power sector, the Secretary, Power during the oral evidence stated the following:

> "Luckily, at the moment, we have an excellent response from entrepreneurs for setting up new power projects in the thermal area. Our constraint is fuel linkage. It is my considered view in the matter that we must get into the habit of ordering 20,000 to 25,000 MW consistently every year so that even if there are a few slippages, there is adequate coverage for a while. We attained that figure in the first year of the 11th Five Year Plan. I think if we get fuel linkages from the Ministry of Coal going up to the second year of the 12th Five Year Plan because it takes about four to five years for a project to fructify and we cannot expect financial closure unless fuel linkage for the life of the plant is ensured. If I have steady fuel linkage, it is only then that I can dig deep into the money market. At the moment, there are close to 100,000 MW applicants who would like to get fuel linkage. If I were to assume that 50 per cent of them are not the very serious ones, at least, 50 per cent are those who need to be encouraged and my own suggestion in the matter is that fuel linkages should be given subject to certain identified milestones, which the project developer has to attain. The coal companies must give a fuel supply agreement with commitment to give 100 per cent of the coal and not 60 or 65 percent. We have to give opportunity to performers and those who are performing efficiently should be given linkages so that they can dispose their projects in time. That is my strategy."

I). PPP Opportunities

- Power Generation:
  - Policy Intervention to attract private investors in Captive and Merchant Power.
  - Mega Power Policy to provide fiscal incentives to large power project developers.
  - Ultra Mega Power Projects- Some implemented and some in pipe line.

- Backward Linkages:
  - Coal linkages to Private developers.
  - Joint ventures for coal mining.

- Power Sector Equipment Manufacturing.

- Forward Linkages:
  - Ash Utilization
    - Cement Plant , Brick Plants
    - Road and building

- Power Transmission & Distribution:
  - Augmentation of Transmission Lines
  - Distribution Franchisees.

- R&M & LE
  - Renovation and Modernization of running power projects for efficiency improvement.
  - Life Extension programs and renewal of life of the project.
  - PIE and APDRP for generating stations.

- Demand Side Efficiency Management
  - Technical Support by BEE for Energy Efficient lighting
  - Energy efficient building etc.
  - Knowledge dissemination and awareness regarding energy conservation.

- Clean Development Mechanism (CDM):
  - Private participants have the opportunity to take advantage of CDM benefits.

- Research & Development
  - New & Emerging Technologies in Generation: Super Critical and Advanced Super Critical Technologies.
  - Environmental Issues: GHG reduction
  - Clean Coal Technologies
    - IGCC for Indian Coal: Experimental Plant by joint collaboration of BHEL and APGENCO
    - Coal Gasification
    - Coal Beneficiation
    - Fuel Cells.
  - Power Sector Consultancy and Project Management.

10.36 When asked as to what are the challenges being faced by the Ministry in attracting investments in this key sector, the Ministry in its written reply stated the following:

"The major challenges in attracting private investment are:-

- Inability of most IPPs to achieve financial closure in spite of progressing well on the other inputs/clearances;

- Poor financial health of the state utilities who did not have the financial capabilities to support more private projects in terms of regular reimbursement of bills, opening of letter of credit and escrow accounts;

- Inordinate delays in finalization of Power Purchase Agreement; and
- High cost of power estimated for the projects.

As a result of various legislative, policy and administrative measures taken by the Ministry, there has been improvement in the private sector participation in power sector. During the current Five Year Plan (11th Plan), private sector power projects of 16363 MW are presently under construction. This capacity is about 23 % of the total capacity under construction. Out of 16363 MW, capacity of 750 MW has already been commissioned during 2007-08. Private sector capacity addition in the Eleventh Plan is expected to be much higher than before and is sufficient proof of the fact that private sector investment in the power sector has now taken off."

10.37 When asked to give the salient features of recent policy initiatives taken by the Ministry to attract investments in the power sector, the Ministry in their written reply stated as under:

"Following are the salient features of recent legislative, policy and administrative measures taken by the Ministry to attract investments in the power sector:

(i) Enactment of new Electricity Act, 2003;

(ii) De-licensing of thermal generation. Further captive generation is freely permitted;

(iii) Structural reforms for State Electricity Board;

(iv) Formation of Central & State Regulatory Commissions;

(v) Formulation of National Grid;

(vi) Open access in Transmission & Distribution;

(vii) Power trading being recognized as a distinct activity;

(viii) Accelerated Power Development & Reforms Programme;

(ix) Reduction in T&D losses;

(x) Mega Power Policy;

(xi) Issue of guidelines for competitive bidding for procurement of Power by distribution licensees under the Electricity Act;

(xii) Notification of Tariff Policy; and

(xiii) Notification of National Electricity Policy.

Further, the new Hydro Policy of 2008 seeks to provide a level playing field to private and public sector. Private Developers have been given the facility of 40% merchant power in the generation; the tariff of balance 60% being determined by the regulator on the same lines as in the case of public sector projects."

PART B

RECOMMENDATIONS/OBSERVATIONS OF THE COMMITTEE

RECOMMENDATION NO:1

ENERGY SCENARIO

The Committee note that Government is aiming an annual economic growth of about 7% to 8% in near future to eradicate poverty and improve the human development index in the country. To achieve the growth rate, it is imperative to have adequate and substantial supply of energy for meeting the various development goals. The Committee, however, note that as per World Energy Statistics, the per capita availability of electricity in India is as low as 619 units as compared to World Energy average of 2596 units which presents a dismal picture. The demand supply scenario of electricity is also not satisfactory and there is a general shortage of about 10.6% and a peak shortage of about 15%.

The Committee have been informed that in order to accelerate the development of power sector the Government brought out National Electricity Policy (NEP) 2005 which envisages to meet the full demand for power and eliminate all shortages by 2012. The Policy further aims at increasing the per capita availability of electricity to over 1000 units upto the same period. The Committee are of the view that though the targets are fully achievable but as compared to world average they are very low. They would like the Government to increase the targets to reach the World Energy average of 2596 by 2017.

The Committee further note that the energy mix in the present installed capacity of 146753 MW of the country, comprises 24% from hydro, 63% from thermal, less than 3% from nuclear and about 9% from renewable energy sources.

For 11th Plan a capacity addition of 78700 MW has been planned and a further capacity addition of 94500 MW has been planned during the 12th Plan with 70000 MW (74%) from thermal, 20,000 MW (21%) from hydro and 4500MW (5%) from nuclear energy. The Committee wish to point out that at present the installed capacity of renewable energy is at 13242 MW, which is quite significant but no capacity addition target for renewable energy has been indicated in the 12th Plan targets. Similarly looking at the contribution of nuclear energy in global fuel share which is nearly 15%, the Committee are confident that the country have scope to increase capacity addition to the nuclear sector too particularly through vigorous pursuit of the country's own three-stage nuclear power programme.

Considering the emerging challenge due to climate change concerns and carbon emissions, the Committee desire that the energy mix should move towards a balance of various energy sources so as to reduce dependence on fossil fuels. In the light of recent development in the nuclear energy sector following the civil nuclear cooperation agreements with various countries and the immense potential in the renewable energy sources of the country, the Committee feel that there is considerable scope for revising the targets for capacity addition especially from these sources.

In view of the above, the Committee are of the considered view that the Government should review the contribution of various energy sources for the 11th and 12th plan periods and recommend to substantially increase the share of nuclear and renewable energy so as to have an healthy mix of different energy sources in the overall power scenario thereby reducing the dependence on fossil fuels, and to enable the country to attain the world average in per capita availability of electricity and removal of power shortages.

RECOMMENDATION NO. 2

ROLE OF CPSUS IN ENERGY SECURITY OF THE COUNTRY

The Committee note that the Government in recent years have taken a lot of policy initiatives in the power sector like Electricity Act 2003, National Electricity Policy, UMPP, APDRP, National Tariff Policy etc. aimed at liberalizing power sector and to encourage more investments from private sector. In this regard, the Committee would like to point out that it is the Central and State PSUs that have so far shouldered the major responsibility contributing to 87% of total generation of power in the country. The Committee find that the central PSUs like NTPC and NPCIL have leadership position in thermal and nuclear sectors respectively as also NHPC, another Central PSU which has a significant share in the hydro electric power plants, but are dismayed to find that there is no Central PSUs in the renewable energy sector in the country.

During the 11th Plan target for capacity addition of 78700 MW, the Central and State PSUs are projected to add new capacity to the tune of 39865 MW and 27952 MW comprising about 51% and 30% of the total planned target. It is, therefore, evident that the capacity addition in the power sector is fully dependent on the ability of the CPSUs to complete their projects. The Committee while appreciating the central role of PSUs in power generation are disappointed by the lack of cognizance of this fact in the National Electricity Policy (NEP). A brief look at the NEP gives a very disheartening picture as no

proposal has been spelt out regarding the specific role of CPSUs to meet the challenges of power generation.

The Committee, therefore, recommend that the Government while encouraging the private sector to set up power projects should also come out with adequate measures to strengthen the power CPSUs by way of giving them more financial and administrative autonomy which will enable the country to make rapid progress in achieving the objectives enunciated in the National Electricity Policy (NEP). Any underestimation of the potential role of CPSU Power majors will harm the progress in this regard.

THERMAL POWER SECTOR

RECOMMENDATION NO. 3

STRENGTHENING OF NTPC

Out of the country's installed capacity of 146752 MW, power from thermal sources accounts for 92892 MW. NTPC has an installed capacity of 27904 MW, which is about 20% of the country's installed capacity and contributes close to 28% of the total generation of electricity. The Committee note that NTPC was set up in 1975 to promote and develop thermal power. Over the period, NTPC has grown consistently and has emerged as the premier power undertaking in the country. The Committee further note that NTPC has embarked upon an ambitious diversification plan to enlarge its power portfolio to hydro, nuclear and renewable energy also. The company has developed interest in the 'Power Value Chain' business. In this connection, the Committee would like to caution that while entering the other areas, the company should not lose sight of its core competency of thermal power generation where they have achieved leadership position with great aplomb.

NTPC have been mainly operating in a traditional cost plus return regime. With the new electricity policy in place, NTPC has to move towards competitive bidding based on tariff cost for future power projects. In this regard, the Committee would like to emphasis the need for NTPC to adapt itself to the changing competitive environment sooner rather than later.

The Committee also point out the fact that with the entry of private sector in the thermal power generation in a big way, the company is likely to face stiff competition to retain its leadership position. Under such a scenario, it became imperative on the part of NTPC to review its performance and improve efficiency in all spheres of its activities, so that they can continue to maintain the premier position in the power sector. In addition to this, the Committee would like to emphasis the need on the part of Ministry of Power to review the performance of NTPC periodically and strengthen it in all possible ways so that NTPC can continue to lead the power sector.

RECOMMENDATION NO. 4

CAPACITY ADDITION BY NTPC

The Committee is happy to note that the capacity utilization(plant load factor) of NTPC in coal plants is 84% and gas based plant is 71% which is quite satisfactory. The Committee further note that NTPC has major expansion plan and targets to build capacity of over 75000 MW by 2017 from the present installed capacity of 26350 MW. In the 10th Plan, NTPC added about 7155 MW capacity. For 11th Plan, a capacity addition of about 22350 MW has been envisaged out of which 500 MW has been commissioned and 13360 MW capacity has been scheduled for commissioning in the period from 2008-2012. However, new projects of capacity 8490 MW are at preliminary stages for want of clearances from various agencies.

Keeping in view the long gestation period of a thermal power plant, the Committee are apprehensive that NTPC achieving their 11th Plan target of capacity addition. The Committee desire that NTPC should expend all available resources at their command to complete these planned projects on schedule.

The Committee opine that if NTPC fails to achieve the targets of capacity addition, which is about 28% of the total 11th Plan target, the demand - supply position may deteriorate further and the Government may find it difficult to achieve the vision of power for all by 2012. Hence, the Committee recommend that Ministry should review all the Projects related to Capacity addition during the 11th Plan and coordinate with other departments in respect

of new projects to remove the bottlenecks so that these projects could be completed within the plan period.

RECOMMENDATION NO. 5

COAL AVAILABILITY

The Committee note that availability of coal on a continuous basis is the key to effective capacity utilisation of Thermal Power plants. Out of 27904 MW which is the country's installed capacity, about 22895 MW (73%) is generated from coal based stations. The Committee have been informed that coal supply to NTPC power stations will be based on long term linkages by Ministry of coal. However, the Committee are deeply concerned about the availability of coal at NTPC power stations. The coal requirement has been projected at 125.73 MT for 2007-08 and there is a gap of the order of 4.73 MT, which is being met through imports. The coal requirement is expected to rise to 212 MT in 2011-12 and it is expected that this shall be met through supplies from Coal India Limited(CIL). There is however a mismatch in development of linked mines by CIL and construction of NTPC units. The Committee are of the view that NTPC should insist on including penalty clauses in the agreements with CIL for supply of coal and bind Government to synchronize the development of coal mines.

The Committee also note that though NTPC have been allotted coal blocks for captive mining, which is likely to provide some relief to its problems. However, in the foreseeable future, to meet the demand and to build up sufficient coal stock, NTPC is increasingly expected to rely on both domestic and international sources for its coal requirements. Therefore, the Committee recommend that the Government should allot preferentially more

coal and coal blocks to NTPC to meet its requirement and also encourage NTPC either alone or in consortium with other PSUs like CIL, SAIL, etc. to buy coal mines and/or tie-ups with suppliers in foreign countries.

The Committee also note that NTPC have suggested for Regulatory Price mechanism for coal. The Committee desire that the Government should seriously look into this suggestion and help implement it for long term supply of coal to NTPC at fixed rates, so that power can also be supplied to the consumers at reasonable rates.

RECOMMENDATION NO. 6

GAS AVAILABILITY

The Committee have been informed that NTPC is having one naphtha based and six gas based power stations with total installed capacity of 3955 MW. The estimated gas requirement at 90% PLF for these stations is at 17.35 MMSCMD. NTPC has long term agreements with GAIL for supply of 12.93 MMSCMD gas to the six power stations and with BPCL for naphtha supply to run the plants. However, the Committee have been informed that during the year 2007-08, only 9.08 MMSCMD was supplied by GAIL and to meet the balance requirement, NTPC was forced to procure/arrange Spot Regassified Liquified Natural Gas from oil PSUs. Even with these arrangements NTPC could operate its power plants at a PLF of around 61%.

The Committee are dismayed that the NTPC could not operate their plants at higher Plant Load Factor(PLF) which has caused loss of power generation due to under utilisation of capacity and also deprive them of the opportunity to expand the capacity of gas based plants. The Committee note that NTPC has not planned any gas-based plant on domestic gas in the near future due to its non-availability.

The Committee have also been informed that in allocation of gas by the Government, the highest priority is accorded to Fertilizer sector, and Power sector is given the second preference and Ministry have sought that in view of large shortage of power in the country, higher allocation be made to NTPC in larger public interest. The Committee concur with the views of Ministry

regarding importance of power in economic development and recommend that insofar as in allocation of gas is concerned, power sector should be made at par with fertilizer sector and higher allocation be made to it by the Government.

The Committee also note that from the ongoing legal battle regarding the gas supply by Reliance Industries Limited to NTPC that commercial interest is taking precedence over national interest. In the opinion of the Committee, the Government should take early appropriate legal and legislative measures to ensure proper safeguards and to thwart such recurrences in future and protect nation's interest.

RECOMMENDATION NO. 7

UMPP AND NTPC

The Committee note that the Government has taken an important initiative to scale up the power generation capacity by launching the Ultra Mega Power Projects (UMPPs) which are of 4000 MW and above in size and are open for competitive bidding based on tariff cost per unit of power.

The Committee also note that NTPC being the country's premier public utility Company, also bid for the various UMPP's, but was not a successful bidder in any of the projects. The Committee were informed by NTPC that the present procurement system is subjected to the guidelines of CVC which has been a great limiting factor in participating at the competitive bidding process for UMPPs as the CVC guidelines do not allow the commercial secrecy of the bidding offers submitted to NTPC by the vendors.

The Committee note that the difficulties have been referred to CVC and CVC has responded to the issues thereunder. The Committee further note that CVC has now suggested NTPC for obtaining competitive pricing from empanelled vendors through limited tenders and tenders so received have been allowed to be opened confidentially by a high level Committee of NTPC officials. The Ministry have further informed the Committee that the suggestions of CVC would be considered by the Group of Directors constituted by NTPC for increasing competitiveness. The Committee feel that in the absence of proper feedback of NTPC on the stand point of level playing field vis-à-vis other private companies participating in the UMPP bidding

process, the Committee would expect that early steps need to be taken to remove the bottlenecks faced by NTPC in the competitive bidding process.

RECOMMENDATION NO. 8

SUPPLY OF EQUIPMENTS TO POWER PROJECTS

The Committee note that the country has an ambitious programme to increase the power generation capacity in the future. This will entail the need for equipment suppliers. The Committee are constrained to note that except BHEL, there are no major PSUs in the manufacturing and supply of critical equipments for power projects. Some of the projects of NTPC are getting delayed due to non-supply of equipments by BHEL forcing NTPC to re-schedule the completion dates of these projects. Though BHEL has been expanding their capacity, the demand for equipments are not being met on time. This forces NTPC to delay the commissioning of their projects thereby causing unpleasantness in the relationship with BHEL. The Committee are of the view that NTPC & BHEL both being PSU's themselves, should work in tandem with the spirit of mutual cooperation and understanding and the Government should sort out any problems that may arise between these PSU's.

The Committee have been informed that the Ministry is making efforts to attract international manufacturers so as to encourage more players for supply of critical equipment and their response has been encouraging. According to the Ministry, it would induce competition and bring about competitive pressure for performance.

While endorsing their viewpoint, the Committee feel that there should be more emphasis on building indigenous capability in manufacture of critical

equipments. Since there is a huge opportunity for manufacturing of equipments the Committee are of the opinion that Government should encourage other PSUs to enter into the manufacturing of equipments for power projects either in joint venture with international players or on other suitable mode of partnerships with emphasis on Supercritical Technology.

RECOMMENDATION NO. 9

NEED FOR A MECHANISM TO GRANT APPROVALS AND MONITORING OF POWER PROJECTS

The Committee note with concern that for implementation of CPSU's Power Projects, the time taken for the requisite clearances are causing avoidable delay adversely effecting their scheduled financial closure and completion of projects. The Committee are of the view that to achieve the targets for power production in various plan periods, the Government should grant approvals in a time bound manner to reduce the total time taken from conception to operationalization of the projects. In this regard, the Committee would like to point out that under the UMPP Policy, the responsibility of coordinating with agencies for ensuring coal linkage/environmental/forest clearances and water linkage, etc. lies with the Government. The Committee desire the same treatment to be offered to NTPC and other PSUs as this will not only ensure level playing field to them but also would enable them to focus on the Project implementation instead of spending time on obtaining clearances. To achieve this, the Committee recommend that appropriate mechanism be put in place by the Government to expedite approvals for the power projects and to review delay at regular intervals.

HYDRO POWER SECTOR

RECOMMENDATION NO. 10

CHALLENGES IN HYDRO POWER DEVELOPMENT

The Committee note that of the total power generated in the country, about 25% is from hydro power compared to the global hydro share of 14%. Out of the 36,000 MW of hydro capacity, about 4145 MW is operated by NHPC through 11 power stations. The Company has plans to add 5233 MW during XI Five Year Plan, which will augment its share to 20% of the country's total hydro electric power.

The Committee note that NHPC are executing many projects in NE Region. The Committee have undertaken visit to a project and have understood the difficulties being faced by CPSU's in terms of infrastructural challenges, logistic and locational difficulties, environmental concern, and construction and geological challenges. The Committee appreciate the achievements of NHPC which have completed some projects and despite serious difficulties have undertaken more ambitious projects in the region for the future.

The Committee also note that these PSU's also face law and order related problems, local problems, and challenges in implementation. There are also issues like payment of royalties, land/water sharing, boundary disputes between States, etc., which pose challenges to implementing agencies. The Committee desire that to resolve land/water sharing/boundary disputes arising in hydro projects, the Ministry should devise a suitable

mechanism like a council or forum with the concerned States to come together for resolving of such issues. Whenever required, NHPC should explore options like Special Purpose Vehicles (SPVs), Joint Venture (JV), Public Private Partnership(PPP) etc., with States which have potential of hydropower development. The Committee are of the view that this will ensure greater participation of State Governments in smooth implementation of hydro power projects and help address the local issues.

The Committee also recommend that Ministry of Power should interact with State governments and authorities concerned for provision of safety and security to projects and personnel working in the projects. Considering the difficult circumstances of the projects, the Committee recommend that the NHPC/Ministry of Power should provide adequate incentives to personnel working in such projects.

RECOMMENDATION NO. 11

PERFORMANCE OF NHPC

The Committee note that NHPC was incorporated in the year 1975 for the development of hydro power projects in the country. The installed capacity of the Company stands at 3145 MW. The Committee further note that NHPC has one of the largest capacity in the hydro power sector and once its plans for capacity addition in XI Plan are achieved, NHPC would have almost 20% of the hydro capacity of the country.

NHPC has plans to add 5233 MW of power during the XI Five Year Plan with a total plan outlay of Rs. 28000 crores. Out of this Rs. 10812 crore is proposed as equity and this is to be arranged from internal resources to the tune of Rs. 4870 crore and balance Rs. 5942 crore is to be infused as capital. NHPC has been permitted to raise capital by disinvesting the equity in the capital markets. But the current turmoil both in the international and national market does not warrant opting for any venture to mobilize capital from the capital market. In such a situation, the Committee desire that the Ministry should regularly review the performance of NHPC with special regard to their financial requirements and provide them all support necessary to achieve their plan targets.

RECOMMENDATION NO. 12

TECHNOLOGICAL ADEQUACY FOR HYDRO POWER DEVELOPMENT

The Committee note that the technology required for hydro power projects vary from project to project due to the fact that many parameters like geological history, weather, water flow, environmental challenges, etc, would all be different. The Committee have been informed by NHPC that it faces technological constraints in the areas like hydrological services, non-availability of hydro-metrological data, availability of state of the art equipments etc. The Committee have been further informed that Central Electricity Authority has prepared a National Power Plan wherein new areas for technology improvement and upgradation in the power sector have been prepared for the period 1997-2012.

As the National Power Plan for technology improvement and upgradation will end by 2012, the Committee recommend that CEA / MOP should immediately look at this aspect afresh and prepare a new plan for technology upgradation dovetailing the latest targets of capacity addition and geographical locations of future power projects.

The Committee also recommend that NHPC should scout and enter into alliances with national / international agencies who can provide technological support in case of specific requirements in a project, so that they can avail such services as and when required.

NUCLEAR POWER SECTOR

RECOMMENDATION NO. 13

DAE TO PURSUE INDIGENOUS DEVELOPMENT OF TECHNOLOGY

The Committee note that India is pursuing a three stage nuclear power programme and nuclear power in the total power generation is about 4120 MW which is about 3% compared to nearly 15% in the global energy mix. As per plan in the first stage, the country would install a capacity of 10000 MWe of PHWR reactors based on natural uranium resources in the country. In the second stage, the country would construct a series of Fast Breeder reactors. The fuel for these reactors would come out of the plutonium that will be separated from the spent fuel of the PHWR reactors by reprocessing. In the breeder reactors, Thorium 232, which our country has been well endowed with, will be utilized for conversion to Uranium 233 which will be available for use as fuel in the third stage of the nuclear programme. The Committee have been informed by DAE that development of nuclear energy is an important component in the long term energy security of the nation.

The Committee have been apprised that the DAE has successfully mastered the first phase of the programme and has embarked upon the second phase of the programme, namely, the construction of Fast Breeder Reactors. Nuclear Power Corporation of India Limited (NPCIL) have mastered the Pressurised Heavy Water Reactor(PHWR) technology and at present operate a series of reactors. The Committee has taken note of the fact that BHAVINI, a CPSU under DAE, have been formed to undertake construction of

Fast Breeder Reactors (FBR) based on breeder technology and has started the construction of the first prototype FBR. The Committee while commending the visionary approach of DAE, would like to caution that it may have to face a lot of challenges in terms of technology and systems in its second stage programme. The Committee therefore desire that DAE should explore all possible avenues to bring the second stage to fruition in a shorter period than envisaged.

The Committee also note that DAE have been pursuing a new programme called Advanced Heavy Water Reactor (AHWR). In the interest of commercialization and achieving self-reliance, AHWR programme needs to be pursued with due seriousness. The Committee would like to impress upon DAE not to abandon or slowdown any of the ongoing indigenous programmes for development of technology due to the recent international agreements in the field of nuclear energy. The Department should make every endeavour to expand its technological base for an early roll out of the second and third phases of the programme.

RECOMMENDATION NO. 14

PERFORMANCE OF NPCIL

The Committee note that NPCIL was formed in September, 1987 as a public sector enterprise under the Department of Atomic Energy with the objective of operating atomic power stations for generation of electricity in the country. The installed capacity of NPCIL is 4120 MWe. However, the Committee note that the power generated by the NPCIL is around 2000 MW only at a plant load factor of about 50%. The main reasons for this low capacity utilisation is non-availability of requisite fuel for these reactors.

The Committee note that the Indian Nuclear Power Programme based on the available uranium in the country has been estimated at an installed capacity of 10,000 MW of power production for a period of 40 years in the first phase of the three phase nuclear programme. However, due to various factors like environmental concerns and social resistance from local population, all the natural uranium resources available in the country have not yet been fully explored. The Committee recommend that the Government should address these issues in the right perspective and make necessary changes in law thereby empowering DAE to acquire the land in public interest for mining of Uranium.

The Committee note that NPCIL utilized Rs. 3692 crore out of Rs. 4700 crore in 2005-06 and Rs. 3215 crore out of Rs. 3400 crore in 2006-07 and Rs. 1775 crore out of Rs. 2698 crore in 2007-08 respectively. The Committee are concerned over the declining trend of fund allocation as well as its utilisation

by NPCIL over last three years. The Committee note that the Nuclear Supplier Group (NSG) Clearances may ease the availability of fuel. The Committee, therefore, desire that NPCIL should make capital expenditure plans and firm up their capacity addition in a time bound program. Also, the Committee desire that DAE should immediately step up budgetary support to NPCIL to enable them to scale up their new projects, which could not be taken up for want of fuel in the past, in the wake of the civil nuclear co-operation the country has obtained in recent months.

RECOMMENDATION NO. 15

UNINTERRUPTED FUEL SUPPLY AND FLEXIBILITY FOR USAGE OF FUEL

The Committee note that with the clearance from NSG in place, the country is poised to get co-operation in the field of nuclear power and supply of fuel from many countries around the globe. The NPCIL being the major and significant player in the sector, would be able to source reactors and other technological requirements.

In this regard, the Committee while appreciating the need for better technological access and latest equipments for the reactors, would like to caution NPCIL and DAE that while entering into commercial agreements with global players, they should seek to ensure uninterrupted fuel supply.

The Committee desire that the Government should encourage NPCIL to acquire Uranium mines or Companies having Uranium assets abroad so that it can run the reactors without any interruption and at full capacity. The Committee also recommend that DAE should insert clauses for transfer of technology for key equipments and spares to augment technological indigenisation in the reactors.

RECOMMENDATION NO. 16

REGULATORY REGIME FOR NUCLEAR ENERGY

The Committee note that with the recent clearances from the NSG, the country may have the opportunity to access co-operation in the nuclear energy sector with many countries. However, as of now, the Atomic Energy Act 1962 stipulates that power generation by nuclear energy is permitted by Government approved CPSUs only. Consequently only NPCIL and BHAVINI are operating in the nuclear energy sector for power generation. The Committee also note that some other CPSUs are also interested to enter this sector.

This may also entail that the technology for all these reactors may be different and hence their close supervision and monitoring would be required. The regulatory authority should be in readiness to face this additional responsibility. The Committee, therefore, suggests that the DAE should work in tandem with the regulatory authority to handle the additional activities effectively.

As the fuel and other related issues are sensitive and lot of stringent provisions are to be followed, the Committee recommend that the Government should put proper policy guidelines and regulatory regime in place before opening up the nuclear sector for private participation.

RENEWABLE ENERGY SECTOR

RECOMMENDATION NO. 17

NEED FOR A CPSU FOR HARNESSING RENEWABLE ENERGY SOURCES

The Committee note that adequate power is a key requirement for the country's economic growth. The power sector in the country has been dominated by Central and State Public Sector undertakings as they contribute about 87% of the total power generation. The Committee observe that the Central PSUs play a pivotal role.

The Committee further note that in the thermal power sector, NTPC has the leadership position with more than 25% of power generation with only 20% of installed capacity in the country, which is unlikely to change in the near future. The hydro sector, which alone accounts for about 25% of the power generation in which the role of NHPC is quite significant. As per the information furnished to the Committee regarding their future plans, the Central PSUs are likely to increase their share very significantly. In the nuclear power sector too, only the Central PSU, namely, NPCIL, is running all the country's nuclear power plants. However, in the case of renewables, which forms about 8 to 10% of the power generation, the scenario is totally different. To the dismay of the Committee, there are no PSUs in the renewable energy sector. The only PSU in renewable energy sector is IREDA which is primarily a financial institution that finances Renewable Energy projects. The Committee during their interaction with experts from various fields of the energy sector found that a Central PSU in the Renewable Energy Sector is the

need of the hour which would act as a catalyst and provide leadership role in exploring renewable energy sources and set up power plants for power generation.

The Committee also endorse the opinion that a Central PSU for Renewable Energy can provide greater thrust, and can also ensure better coordination with State Governments. The size of the projects undertaken by the PSUs may also impact cost of power positively. Above all, the Government can get important feedback about this promising and important sector. Considering the potential of renewable energy and the immense promise it holds for the future, particularly the exciting prospects in solar energy exploitation, the Committee recommend that the Government should set up a Central PSU to tap the renewable energy sources in the country and play a lead role in the sector.

RECOMMENDATION NO. 18

SOLAR MISSION

The Committee note that of late, climate change concerns have caught the attention of leaders and countries around the world. In this context, the renewable sources of energy like wind, solar and biomass have been getting increased attention. India has a natural advantage to harness renewable energy as the country is endowed with sunlight for over 300 days/ year and a strong wind regime in many parts of the country.

The Committee have been apprised that the PM's Council on climate change is preparing an action plan on National Solar Mission. The Committee are of the view that our country needs a strong actionable framework to intensify R&D in renewable energy sector to harness clean and green power, which could draw upon international cooperation as well, to enable the creation of more affordable and more convenient solar power systems and to promote innovations that enable the storage of solar power for sustained use. In this regard the Committee recommend that the Government should set up a Central Institute to coordinate R&D activities in renewable energy.

The Committee further note that at present the materials needed for solar cells are being imported. The Government should take steps to facilitate indigenous manufacturing of key materials by facilitating investments through incentives and concessions. The Committee also suggest that strong fiscal incentives for development of related technologies in solar energy should be

provided for attracting serious and interested players to invest and participate in this sunrise sector of the future.

The Committee have noted that, in the field of solar energy, another important factor is the cost of power produced from solar energy which has come down significantly during the last several years. The Committee believe that the cost could still come down from the present Rs. 15-20/kwh and desire that the government should encourage more investments for setting up solar power plants for power generation which would go a long way in meeting our energy requirements. In the backdrop of latest developments in nanotechnology the solar energy production may be cheaper in the coming days. But the Government needs to put in place encouraging subsidy measures to promote solar energy production

RECOMMENDATION NO. 19

EVACUATION OF POWER PRODUCED BY RENEWABLE ENERGY PRODUCERS

The Committee have been informed that the grid connectivity for power producers using Renewable energy sources is a problem area. The Ministry of New and Renewable Energy has admitted that there is a problem of evacuation of power of small energy projects. The Committee feel that this might discourage small producers because without grid connectivity, the power produced cannot be evacuated. The Committee understand that providing grid connectivity lie with the Electricity Boards/Corporation of the respective State Governments and Central Government has hardly any role. However, under the Electricity Act, the power produced by renewable energy sources can also be made available to grid connectivity.

The Committee are of the opinion that as power is a scarce commodity, it should be purchased and evacuated by the concerned agencies from the power producers without any delay. The Committee recommend that the Ministry of Power instead of abdicating its role on the issue should sensitise the states by convening meetings and by issuing necessary advisories in this regard.

RECOMMENDATION NO. 20

PERFORMANCE OF IREDA

The Committee note that IREDA was established as a Government of India enterprise in March 1987 under the administrative control of the Ministry of New and Renewable Energy (MNRE) to promote, develop and extend financial assistance to various renewable energy projects. IREDA is a profit making institution and has built up a sizeable portfolio of advances in various sectors in the renewable energy space.

The Committee note with concern that the Non Performing Assets (NPA) of IREDA are 20%, which is considerably high. The Committee, therefore, recommend that IREDA should be very vigilant and strengthen their loan appraisal and evaluation systems .The action taken in this regard may be intimated to the Committee.

The Committee understand that banks and other financial institutions are also now giving loans for renewable energy projects, thereby competing with IREDA. However, the Committee are dismayed to find that being an all India financial institution, IREDA has a very small network with only two branches outside Delhi. The Committee believe that renewable energy will be a very important area of business in the near future and therefore IREDA should capitalise on the business opportunities. In this regard, the Committee recommend that IREDA should look at expansion of their network to other important cities and regions where there is adequate potential for renewable energy projects.

One of the mandates of IREDA is promotion of renewable energy. The Committee desire that it should create awareness among the masses about the benefits of renewable energy and allocate more resources for promotion of such activities. The Committee further suggest that IREDA should conduct such promotional programmes on renewable energy in states where there is a good potential for such projects.

RECOMMENDATION NO. 21

LOW COST OF FUNDS AND EQUITY SUPPORT TO IREDA

The Committee has been informed by IREDA that the following measures would address their request for low cost funds:

(i) to charge concessional guarantee fee by Government of India.
(ii) to permit to issue tax free bonds and also issue bonds under Section 54E(b) of Income Tax Act, 1961.
(iii) to provide GoI guarantee to raise resources from bilateral/multilateral agencies.

The Committee feel that the above requests are genuine and well deserving and all fall under the ambit of Ministry of Finance. The Committee strongly recommend that Ministry of New and Renewable Energy should impress upon Ministry of Finance to consider all these requests favorably without any delay so that IREDA may be able to raise funds at lower cost, which in turn would reduce the costs for renewable energy sector.

The Committee note that IREDA has sought access to low cost funds so as to reduce the cost of capital to the important renewable energy sector. The high capital costs in this sector in turn increases the cost of power generated. The Committee therefore desire that Ministry of New and Renewable Energy (MNRE) should provide enhanced and adequate equity support to IREDA on annual basis so as to enable IREDA to achieve its targets.

The Committee note IREDA's suggestion that custom and excise duty may be exempted 100% for all equipments of renewable energy power projects. Ministry of Finance may consider this request favourably so as to provide necessary fillip to these activities. Also, the Committee further note that the generation based incentive for wind projects is available upto 49MW

only. In the opinion of the Committee, it is a very limited incentive and may dissuade potential investors from investing in new projects. In this regard the Committee recommend that these incentives should be extended by Government to all projects that are scheduled for installation and power generation during the 11th Plan period.

RELATED ISSUES IN POWER SECTOR

RECOMMENDATION NO. 22

RURAL ELECTRIFICATION PROGRAMME

The Committee note that the Ministry of Power had launched a program called Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY). This program basically aims at providing access to electricity to all rural households over a period of four years. Under this scheme, the Government provides 90% capital subsidy for rural electrification infrastructure and funding of electrification of all unelectrified BPL households with 100% capital subsidy. An expert in the field apprised the Committee about the lacunae under the rural electrification programme where for a village to be declared as electrified, the number of households electrified should be atleast 10% of the total number of households in the village, and once a village is declared as electrified, the capital subsidy made available to the projects or beneficiaries is discontinued.

The Committee are of the view that this is a serious lacuna which should be rectified if the Government's intention of village electrification has to succeed. This lacuna needs to be removed by the Government/Ministry and suitable changes made in the definitions so that subsidy for future beneficiaries may also be made available to provide them with electricity power.

RECOMMENDATION NO. 23

TRANSMISSION AND DISTRIBUTION

The Committee note that power produced in a power plant is transmitted and distributed to the end users by an extensive network system created for the purpose. Power Grid Corporation of India Ltd., a Central PSU, is the notified Central Transmission Utility of the country wheels about 45% of the total power generated and remaining are managed by the State utilities.

The Committee further note that to mitigate long distance transmission losses, use of higher voltage levels for transmission are planned in the 11th and 12th Plan period. The Committee would like to emphasize the need for expansion of transmission and distribution system in commensuration with the capacity addition targets in the plan periods by using latest technologies. To meet long term power transfer requirement, Power Grid Corporation of India Ltd., is developing ± 800 kV, 6000 MW HVDC as well as 1200kV AC system. The Committee further note that the country possesses technology for manufacturing of cables required upto 220 kV only and cables for transmission of higher voltages cables are imported. The Committee recommend that the Ministry of Power should encourage the industry by offering suitable incentives to manufacture such cables in the country.

The Committee have been informed that the transmission and distribution loss (T&D) for the year 2006-07 was 28.26% of the total energy available for sale which is considerably on the higher side whereas the T&D loss in many countries ranges from 6% to 17% which indicates that there is a

lot of scope for improvement. Further, it may be noted that the Aggregate, Technical and Commercial (AT&C) loss of the State utilities at the national level for 2006-07 was 33.07% of the total energy available for sale which includes technical loss, theft, pilferages and commercial losses due to poor metering and billing and non-realisation of dues. The Committee recommend that Government should strengthen the legal framework so that offenders are properly brought to book and desire that the Government should take effective steps for reduction of undermetering and also overdrawal of power by industries.

Another important step taken by the Government is that it launched Accelerated Power Development Reforms Programme (APDRP) with the objective of reducing AT&C losses, improving quality of supply of power and improving consumer satisfaction. The Committee have also noted that the target was to reduce AT&C losses to 15% in five years and the achievements have been mixed. The Committee have noted that the Government has approved a Restructured APDRP Plan with an outlay of Rs. 51,577 crore in the 11th Plan with focus on demonstrable performance on loss reduction. The Committee recommend that information technology solutions may be applied in this sector so as to reduce losses in distribution. The Committee recommend that the Ministry should keep a strict vigil over the progress of the plan and may entrust the supervision of the scheme to agencies like Central Electricity Authority.

The Committee are of the view that since the Central PSUs have expertise in generation and transmission, therefore, the Government should consider setting up of a distribution company under the aegis of a CPSU and entrust it to assist States in improvement of distribution system.

RECOMMENDATION NO. 24

ENERGY CONSERVATION AND EFFICIENCY

The Committee note that the peak power shortage in the country is around 15% and feel that by efficient use of power, this shortage can be managed in a much better way. The Committee note that Energy Conservation Act, 2001 provides for the implementation of energy efficiency measures through Bureau of Energy Efficiency (BEE) and other designated agencies. The BEE has been functioning for the past several years to promote energy conservation and efficiency efforts.

The Committee have been informed that BEE has prepared an action plan for the period 2007-2012 with the aim of achieving 5% savings to result in an avoided capacity addition of 10,000 MW during the period. The Committee note that the Government has started the Standards & Labelling Scheme to provide the consumer an informed choice about energy saving and cost saving potential in household and other equipments. The Committee appreciate such initiatives and recommend that more and more gadgets and household products which consume high energy should be included under such schemes and consumers should also be educated about the benefits through awareness campaigns. The Committee further recommend that BEE should be expanded and its scope and activities should be widened so as to make it more effective.

The Committee have noted that BEE has made certain proposals for tax/duty exemption for promotion of energy efficiency and the same are being

considered by Ministry of Finance for inclusion in the budget proposal (2009-10). The Committee desire that Ministry of Power should closely pursue these proposals with the Ministry of Finance. The Committee recommend that an appropriate fiscal incentive scheme be put in place by the Ministry of Power to reward for use of energy efficient gadgets.

The Committee understand that the Government has initiated a dialogue with the manufacturers of energy related products for improving energy efficiency. The Committee note that most of the manufacturers belong to unorganized sector and hence would like to advise the Government to tread cautiously as this will have an socio-economic impact. The Committee therefore recommend that the Ministry may provide incentives and concessions for the manufacturers and encourage access to energy efficient technologies.

The Committee desire that awareness of energy conservation and energy efficiency should be more vigorously pursued and all sections of the society especially the youth, children, women and industry should be targeted in the awareness campaigns. The Committee desire that the performance of Bureau of Energy Efficiency should be periodically reviewed and any gap is its performance should be plugged. The support of civil society groups like NGO's, PSU's, Government agencies, etc. may be enlisted in the pursuit and demonstration of energy efficiency and conservation measures. The Ministry may look at fund requirement and increase allocation in an appropriate manner for these activities.

RECOMMENDATION NO. 25

NEED FOR AN R&D INSTITUTE FOR POWER SECTOR

The Committee believe that Research and Development is key to achieving the long-term goals in any field. R&D in the energy sector will increase our energy independence and allow us to achieve reasonable levels of energy security. The Committee are dismayed to note that barring nuclear energy, there are no institutions for R&D activities in any of the power sectors like thermal, hydel and renewable energy. As pointed out in the Integrated Energy Policy, basic research leading to a fundamental breakthrough may open up possibilities of applications and R&D is a prerequisite to developing new concepts.

The Committee take further note of the fact that the R&D expenditure by the PSUs is in the range of 0.1 to 0.5 percent of the net profit which is inadequate. The Committee are disappointed with the poor allocation of resources for R&D purposes by PSUs. In this regard the Committee recommend that the Government should create an Institute of Excellence where energy related R&D be undertaken. The CPSU's should be asked to contribute financially and can award their R&D projects to the institution. This will also help to focus and enable the institution to tie-up with International agencies wherever required and create a talent pool in R&D activities for power sector.

RECOMMENDATION NO. 26

SETTING UP OF INSTITUTES TO CREATE SKILLED MANPOWER FOR THE POWER SECTOR

The Committee note that one of the key resources for any sector is the human resource. At present, this is also the most important challenge for most of the sectors of the economy. The Committee have been informed that due to the boom in IT/ITES, many sectors which are in need of huge skilled manpower have been complaining of attrition or non-availability of manpower. The Committee are of the view that for a specialized sector like power, availability of skilled manpower is going to be a challenge in the foreseeable future. However, as huge growth plans are lined up in this sector, action needs to be taken to attract and retain skilled manpower so that planned growth is not hampered.

In this regard, experts who deposed before the Committee have also underscored the point that manpower in PSUs needs to be given proper exposure in leadership skills and decision making processes so that they may be able to compete and take quick and right decisions, as PSUs compete with large and successful private sector companies.

The Committee also note that the Government have taken some initiatives for addressing the problem of skill deficit for the industrial sector. The Committee are of the view that PSUs in the power sector may consider starting educational institutions catering to different disciplines of power sector at their different plant locations. A consortium approach among the PSUs in this regard to start institutes like engineering colleges, polytechnics,

ITI's etc for captive manpower requirements could be a step in this direction. This would not only result in a very useful CSR initiative for the CPSUs but may also be useful in utilizing the expertise of retired personnel of these PSUs whose expertise in training people can be tapped gainfully.

RECOMMENDATION NO. 27

COST OF POWER

The Committee note that power is one of the key services used by all sections of the society. The cost of power is an important concern for consumers of electricity. The Committee note that the power tariff charged by the distribution companies is determined by the State Electricity Regulatory Commissions (SERC's) and includes power purchase cost, Aggregate Technical and Commercial (AT&C) losses etc.

The Committee have been informed that some of the steps required to reduce the cost of power are reduction in T&D losses, commercial losses and fuel price. The Committee are however of the view that in addition to reducing input costs, measures such as lower cost of capital and completion of projects within schedule could go a longway in reducing the cost of production of power.

The Committee desire that the Ministry of Power should press upon Ministry of Finance for concessions for power projects like lower interest rate on capital, lower tax rates and duty concessions for equipments used, etc. All these measures would reduce the cost of production of power. Transportation costs of coal can also be scrutinized for possible reduction, which will reduce the cost of coal. All these measures might lower the realization of revenue for Government, but it may well benefit a huge number of consumers and also increase the demand, playing a beneficial role in the economic development of the country.

Hence, the Committee recommend that the Ministry of Power may constitute a Committee of Experts to make a cost-benefit analysis of granting fiscal incentives/concessions for power sector.

As regards cost of nuclear power and renewable energy, the Committee desire that the Department of Atomic Energy and Ministry of New and Renewable Energy should look at ways of reducing the cost of power by improving efficiencies and by introduction of new technologies, economy of size and possible reduction in taxes and duties.

New Delhi……
December 2008
Agrahayana 1930(S)

RUPCHAND PAL
CHAIRMAN
COMMITTEE ON PUBLIC UNDERTAKINGS

Annexure-I

NATIONAL ELECTRICITY POLICY (NEP)

The Gazette of India

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RESOLUTION

No. 23/40/2004-R&R (Vol.II)

1.0 INTRODUCTION

1.1 In compliance with section 3 of the Electricity Act 2003 the Central Government hereby notifies the National Electricity Policy.

1.2 Electricity is an essential requirement for all facets of our life. It has been recognized as a basic human need. It is a critical infrastructure on which the socio-economic development of the country depends. Supply of electricity at reasonable rate to rural India is essential for its overall development. Equally important is availability of reliable and quality power at competitive rates to Indian industry to make it globally competitive and to enable it to exploit the tremendous potential of employment generation. Services sector has made significant contribution to the growth of our economy. Availability of quality supply of electricity is very crucial to sustained growth of this segment.

1.3 Recognizing that electricity is one of the key drivers for rapid economic growth and poverty alleviation, the nation has set itself the target of providing access to all households in next five years. As per Census 2001, about 44% of the households do not have access to electricity. Hence meeting the target of providing universal access is a daunting task requiring significant addition to generation capacity and expansion of the transmission and distribution network.

1.4 Indian Power sector is witnessing major changes. Growth of Power Sector in India since its Independence has been noteworthy. However, the demand for power has been outstripping the growth of availability. Substantial peak and energy shortages prevail in the country. This is due to inadequacies in generation, transmission & distribution as well as inefficient use of electricity. Very high level of technical and commercial losses and lack of commercial approach in management of utilities has led to unsustainable financial operations. Cross-subsidies have risen to unsustainable levels. Inadequacies in distribution networks has been one of the major reasons for poor quality of supply.

1.5 Electricity industry is capital-intensive having long gestation period. Resources of power generation are unevenly dispersed across the country. Electricity is a commodity that can not be stored in the grid where demand and supply have to be continuously balanced. The widely distributed and rapidly increasing demand requirements of the country need to be met in an optimum manner.

1.6 Electricity Act, 2003 provides an enabling framework for accelerated and more efficient development of the power sector. The Act seeks to encourage competition with appropriate regulatory intervention. Competition is expected to yield efficiency gains and in turn result in availability of quality supply of electricity to consumers at competitive rates.

1.7 Section 3 (1) of the Electricity Act 2003 requires the Central Government to formulate, inter alia, the National Electricity Policy in consultation with Central Electricity Authority (CEA) and State Governments. The provision is quoted below:

> *"The Central Government shall, from time to time, prepare the National Electricity Policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy".*

Section 3 (3) of the Act enables the Central Government to review or revise the National Electricity Policy from time to time.

1.8 The National Electricity Policy aims at laying guidelines for accelerated development of the power sector, providing supply of electricity to all areas and protecting interests of consumers and other stakeholders keeping in view availability of energy resources, technology available to exploit these resources, economics of generation using different resources, and energy security issues.

1.9 The National Electricity Policy has been evolved in consultation with and taking into account views of the State Governments, Central Electricity Authority (CEA), Central Electricity Regulatory Commission (CERC) and other stakeholders.

2.0 AIMS & OBJECTIVES

- The National Electricity Policy aims at achieving the following objectives:
- Access to Electricity - Available for all households in next five years
- Availability of Power - Demand to be fully met by 2012. Energy and peaking shortages to be overcome and adequate spinning reserve to be available.
- Supply of Reliable and Quality Power of specified standards in an efficient manner and at reasonable rates.
- Per capita availability of electricity to be increased to over 1000 units by 2012.
- Minimum lifeline consumption of 1 unit/household/day as a merit good by year 2012.
- Financial Turnaround and Commercial Viability of Electricity Sector.
- Protection of consumers' interests.

3. NATIONAL ELECTRICITY PLAN

3.1 Assessment of demand is an important pre-requisite for planning capacity addition. Section 3 (4) of the Act requires the Central Electricity Authority (CEA) to frame a National Electricity Plan once in five years and revise the same from time to time in accordance with the National Electricity Policy. Also, section 73 (a) provides that formulation of short-term and perspective plans for development of the electricity system and coordinating the activities of various planning agencies for the optimal utilization of resources to subserve the interests of the national economy shall be one of the functions of the CEA. The Plan prepared by CEA and approved by the Central Government can be used by prospective generating companies, transmission utilities and transmission/distribution licensees as reference document.

3.2 Accordingly, the CEA shall prepare short-term and perspective plan. The National Electricity Plan would be for a short-term framework of five years while giving a 15 year perspective and would include:

- Short-term and long term demand forecast for different regions;

- Suggested areas/locations for capacity additions in generation and transmission keeping in view the economics of generation and transmission, losses in the system, load centre requirements, grid stability, security of supply, quality of power including voltage profile etc. and environmental considerations including rehabilitation and resettlement;
- Integration of such possible locations with transmission system and development of national grid including type of transmission systems and requirement of redundancies; and
- Different technologies available for efficient generation, transmission and distribution.
- Fuel choices based on economy, energy security and environmental considerations.

3.3 While evolving the National Electricity Plan, CEA will consult all the stakeholders including state governments and the state governments would, at state level, undertake this exercise in coordination with stakeholders including distribution licensees and STUs. While conducting studies periodically to assess short-term and long-term demand, projections made by distribution utilities would be given due weightage. CEA will also interact with institutions and agencies having economic expertise, particularly in the field of demand forecasting. Projected growth rates for different sectors of the economy will also be taken into account in the exercise of demand forecasting.

3.4 The National Electricity Plan for the ongoing 10th Plan period and 11th Plan and perspective Plan for the 10th, 11th & 12th Plan periods would be prepared and notified after reviewing and revising the existing Power Plan prepared by CEA. This will be done within six months.

4.0 ISSUES ADDRESSED

The policy seeks to address the following issues:

- Rural Electrification
- Generation
- Transmission
- Distribution
- Recovery of Cost of services & Targetted Subsidies.
- Technology Development and Research and Development (R&D)
- Competition aimed at Consumer Benefits
- Financing Power Sector Programmes Including Private Sector Participation.
- Energy Conservation
- Environmental Issues
- Training and Human Resource Development
- Cogeneration and Non-Conventional Energy Sources
- Protection of Consumer interests and Quality Standards

5.1 RURAL ELECTRIFICATION

5.1.1 The key development objective of the power sector is supply of electricity to all areas including rural areas as mandated in section 6 of the Electricity Act. Both the central government and state governments would jointly endeavour to achieve this objective at the earliest. Consumers, particularly those who are ready to pay a tariff which reflects efficient costs have the right to get uninterrupted twenty four hours supply of quality power. About 56% of rural households have not yet been electrified even though many of these households are willing to pay for electricity. Determined efforts should be made to ensure that the task of rural electrification for securing electricity access to all households and also ensuring that electricity reaches poor and marginal sections of the society at reasonable rates is completed within the next five years.

5.1.2 Reliable rural electrification system will aim at creating the following:

(a) Rural Electrification Distribution Backbone (REDB) with at least one 33/11 kv (or 66/11 kv) substation in every Block and more if required as per load, networked and connected appropriately to the state transmission system

(b) Emanating from REDB would be supply feeders and one distribution transformer at least in every village settlement.

(c) Household Electrification from distribution transformer to connect every household on demand.

(d) Wherever above is not feasible (it is neither cost effective nor the optimal solution to provide grid connectivity) decentralized distributed generation facilities together with local distribution network would be provided so that every household gets access to electricity. This would be done either through conventional or non-conventional methods of electricity generation whichever is more suitable and economical. Non-conventional sources of energy could be utilized even where grid connectivity exists provided it is found to be cost effective.

(e) Development of infrastructure would also cater for requirement of agriculture & other economic activities including irrigation pump sets, small and medium industries, khadi and village industries, cold chain and social services like health and education.

5.1.3 Particular attention would be given in household electrification to dalit bastis, tribal areas and other weaker sections.

5.1.4 Rural Electrification Corporation of India, a Government of India enterprise will be the nodal agency at Central Government level to implement the programme for achieving the goal set by National Common Minimum Programme of giving access to electricity to all the households in next five years. Its role is being suitably enlarged to ensure timely implementation of rural electrification projects.

5.1.5 Targetted expansion in access to electricity for rural households in the desired timeframe can be achieved if the distribution licensees recover at least the cost of electricity and related O&M expenses from consumers, except for lifeline support to households below the poverty line who would need to be adequately subsidized. Subsidies should be properly targeted at the intended beneficiaries in the most efficient manner. Government recognizes the need for providing necessary capital subsidy and soft long-term debt finances for investment in rural electrification as this would reduce the cost of supply in rural areas. Adequate funds would need to be made available for the same through the Plan process. Also commensurate organizational support would need to be created for timely implementation. The Central Government would assist the State Governments in achieving this.

5.1.6 Necessary institutional framework would need to be put in place not only to ensure creation of rural electrification infrastructure but also to operate and maintain supply system for securing reliable power supply to consumers. Responsibility of operation & maintenance and cost recovery could be discharged by utilities through appropriate arrangements with Panchayats, local authorities, NGOs and other franchisees etc.

5.1.7 The gigantic task of rural electrification requires appropriate cooperation among various agencies of the State Governments, Central Government and participation of the community. Education and awareness programmes would be essential for creating demand for electricity and for achieving the objective of effective community participation.

5.2 GENERATION

5.2.1 Inadequacy of generation has characterized power sector operation in India. To provide availability of over 1000 units of per capita electricity by year 2012 it had been estimated that need based capacity addition of more than 1,00,000 MW would be required during the period 2002-12.

5.2.2 The Government of India has initiated several reform measures to create a favourable environment for addition of new generating capacity in the country. The Electricity Act 2003 has put in place a highly liberal framework for generation. There is no requirement of licensing for generation. The requirement of techno-economic clearance of CEA for thermal generation project is no longer there. For hydroelectric generation also, the limit of capital expenditure, above which concurrence of CEA is required, would be raised suitably from the present level. Captive generation has been freed from all controls.

5.2.3 In order to fully meet both energy and peak demand by 2012, there is a need to create adequate reserve capacity margin. In addition to enhancing the overall availability of installed capacity to 85%, a spinning reserve of at least 5%, at national level, would need to be created to ensure grid security and quality and reliability of power supply.

5.2.4 The progress of implementation of capacity addition plans and growth of demand would need to be constantly monitored and necessary adjustments made from time to time. In creating new generation capacities, appropriate technology may be considered keeping in view the likely widening of the difference between peak demand and the base load.

Hydro Generation

5.2.5 Hydroelectricity is a clean and renewable source of energy. Maximum emphasis would be laid on the full development of the feasible hydro potential in the country. The 50,000 MW hydro initiative has been already launched and is being vigorously pursued with DPRs for projects of 33,000 MW capacity already under preparation.

5.2.6 Harnessing hydro potential speedily will also facilitate economic development of States, particularly North-Eastern States, Sikkim, Uttaranchal, Himachal Pradesh and J&K, since a large proportion of our hydro power potential is located in these States. The States with hydro potential need to focus on the full development of these potentials at the earliest.

5.2.7 Hydel projects call for comparatively larger capital investment. Therefore, debt financing of longer tenure would need to be made available for hydro projects. Central Government is committed to policies that ensure financing of viable hydro projects.

5.2.8 State Governments need to review procedures for land acquisition, and other approvals/clearances for speedy implementation of hydroelectric projects.

5.2.9 The Central Government will support the State Governments for expeditious development of their hydroelectric projects by offering services of Central Public Sector Undertakings like National Hydroelectric Power Corporation (NHPC).

5.2.10 Proper implementation of National Policy on Rehabilitation and Resettlement (R&R) would be essential in this regard so as to ensure that the concerns of project-affected families are addressed adequately.

5.2.11 Adequate safeguards for environmental protection with suitable mechanism for monitoring of implementation of Environmental Action Plan and R&R Schemes will be put in place.

Thermal Generation

5.2.12 Even with full development of the feasible hydro potential in the country, coal would necessarily continue to remain the primary fuel for meeting future electricity demand.

5.2.13 Imported coal based thermal power stations, particularly at coastal locations, would be encouraged based on their economic viability. Use of low ash content coal would also help in reducing the problem of fly ash emissions.

5.2.14 Significant Lignite resources in the country are located in Tamil Nadu, Gujarat and Rajasthan and these should be increasingly utilized for power generation. Lignite mining technology needs to be improved to reduce costs.

5.2.15 Use of gas as a fuel for power generation would depend upon its availability at reasonable prices. Natural gas is being used in Gas Turbine /Combined Cycle Gas Turbine (GT/CCGT) stations, which currently accounts for about 10 % of total capacity. Power sector consumes about 40% of the total gas in the country. New power generation capacity could come up based on indigenous gas findings, which can emerge as a major source of power generation if prices are reasonable. A national gas grid covering various parts of the country could facilitate development of such capacities.

5.2.16 Imported LNG based power plants are also a potential source of electricity and the pace of their development would depend on their commercial viability. The existing power plants using liquid fuels should shift to use of Natural Gas/LNG at the earliest to reduce the cost of generation.

5.2.17 For thermal power, economics of generation and supply of electricity should be the basis for choice of fuel from among the options available. It would be economical for new generating stations to be located either near the fuel sources e.g. pithead locations or load centres.

5.2.18 Generating companies may enter into medium to long-term fuel supply agreements specially with respect to imported fuels for commercial viability and security of supply.

Nuclear Power

5.2.19 Nuclear power is an established source of energy to meet base load demand. Nuclear power plants are being set up at locations away from coalmines. Share of nuclear power in the overall capacity profile will need to be increased significantly. Economics of generation and resultant tariff will be, among others, important considerations. Public sector investments to create nuclear generation capacity will need to be stepped up. Private sector partnership would also be facilitated to see that not only targets are achieved but exceeded.

Non-conventional Energy Sources

5.2.20 Feasible potential of non-conventional energy resources, mainly small hydro, wind and bio-mass would also need to be exploited fully to create additional power generation capacity. With a view to increase the overall share of non-conventional energy sources in the electricity mix, efforts will be made to encourage private sector participation through suitable promotional measures.

Renovation and Modernization (R&M)

5.2.21 One of the major achievements of the power sector has been a significant increase in availability and plant load factor of thermal power stations specially over the last few years. Renovation and modernization for achieving higher efficiency levels needs to be pursued vigorously

and all existing generation capacity should be brought to minimum acceptable standards. The Govt. of India is providing financial support for this purpose.

5.2.22 For projects performing below acceptable standards, R&M should be undertaken as per well-defined plans featuring necessary cost-benefit analysis. If economic operation does not appear feasible through R&M, then there may be no alternative to closure of such plants as the last resort.

5.2.23 In cases of plants with poor O&M record and persisting operational problems, alternative strategies including change of management may need to be considered so as to improve the efficiency to acceptable levels of these power stations.

Captive Generation

5.2.24 The liberal provision in the Electricity Act, 2003 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.

5.2.25 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.

5.2.26 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. Towards this end, non-conventional energy sources including co-generation could also play a role. 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.

5.3 TRANSMISSION

5.3.1 The Transmission System requires adequate and timely investments and also efficient and coordinated action to develop a robust and integrated power system for the country.

5.3.2 Keeping in view the massive increase planned in generation and also for development of power market, there is need for adequately augmenting transmission capacity. While planning new generation capacities, requirement of associated transmission capacity would need to be worked out simultaneously in order to avoid mismatch between generation capacity and transmission facilities. The policy emphasizes the following to meet the above objective:

- The Central Government would facilitate the continued development of the National Grid for providing adequate infrastructure for inter-state transmission of power and to ensure that underutilized generation capacity is facilitated to generate electricity for its transmission from surplus regions to deficit regions.
- The Central Transmission Utility (CTU) and State Transmission Utility (STU) have the key responsibility of network planning and development based on the National Electricity Plan in

coordination with all concerned agencies as provided in the Act. The CTU is responsible for the national and regional transmission system planning and development. The STU is responsible for planning and development of the intra-state transmission system. The CTU would need to coordinate with the STUs for achievement of the shared objective of eliminating transmission constraints in cost effective manner.

- Network expansion should be planned and implemented keeping in view the anticipated transmission needs that would be incident on the system in the open access regime. Prior agreement with the beneficiaries would not be a pre-condition for network expansion. CTU/STU should undertake network expansion after identifying the requirements in consultation with stakeholders and taking up the execution after due regulatory approvals.

- Structured information dissemination and disclosure procedures should be developed by the CTU and STUs to ensure that all stakeholders are aware of the status of generation and transmission projects and plans. These should form a part of the overall planning procedures.

- The State Regulatory Commissions who have not yet notified the grid code under the Electricity Act 2003 should notify the same not later than September 2005.

5.3.3 Open access in transmission has been introduced to promote competition amongst the generating companies who can now sell to different distribution licensees across the country. This should lead to availability of cheaper power. The Act mandates non-discriminatory open access in transmission from the very beginning. When open access to distribution networks is introduced by the respective State Commissions for enabling bulk consumers to buy directly from competing generators, competition in the market would increase the availability of cheaper and reliable power supply. The Regulatory Commissions need to provide facilitative framework for non-discriminatory open access. This requires load dispatch facilities with state-of-the art communication and data acquisition capability on a real time basis. While this is the case currently at the regional load dispatch centers, appropriate State Commissions must ensure that matching facilities with technology upgrades are provided at the State level, where necessary and realized not later than June 2006.

5.3.4 The Act prohibits the State transmission utilities/transmission licensees from engaging in trading in electricity. Power purchase agreements (PPAs) with the generating companies would need to be suitably assigned to the Distribution Companies, subject to mutual agreement. To the extent necessary, such assignments can be done in a manner to take care of different load profiles of the Distribution Companies. Non-discriminatory open access shall be provided to competing generators supplying power to licensees upon payment of transmission charge to be determined by the appropriate Commission. The appropriate Commissions shall establish such transmission charges no later than June 2005.

5.3.5 To facilitate orderly growth and development of the power sector and also for secure and reliable operation of the grid, adequate margins in transmission system should be created. The transmission capacity would be planned and built to cater to both the redundancy levels and margins keeping in view international standards and practices. A well planned and strong transmission system will ensure not only optimal utilization of transmission capacities but also of generation facilities and would facilitate achieving ultimate objective of cost effective delivery of power. To facilitate cost effective transmission of power across the region, a national transmission tariff framework needs to be implemented by CERC. The tariff mechanism would be sensitive to distance, direction and related to quantum of flow. As far as possible, consistency needs to be maintained in transmission pricing framework in inter-State and intra-State systems. Further it should be ensured that the present network deficiencies do not result in unreasonable transmission loss compensation requirements.

5.3.6 The necessary regulatory framework for providing non-discriminatory open access in transmission as mandated in the Electricity Act 2003 is essential for signalling efficient choice in locating generation capacity and for encouraging trading in electricity for optimum utilization of generation resources and consequently for reducing the cost of supply.

5.3.7 The spirit of the provisions of the Act is to ensure independent system operation through NLDC, RLDCs and SLDCs. These dispatch centers, as per the provisions of the Act, are to be operated by a Government company or authority as notified by the appropriate Government. However, till such time these agencies/authorities are established the Act mandates that the CTU or STU, as the case may be, shall operate the RLDCs or SLDC. The arrangement of CTU operating the RLDCs would be reviewed by the Central Government based on experience of working with the existing arrangement. A view on this aspect would be taken by the Central Government by December 2005.

5.3.8 The Regional Power Committees as envisaged in section section 2(55) would be constituted by the Government of India within two months with representation from various stakeholders.

5.3.9 The National Load Despatch Centre (NLDC) along with its constitution and functions as envisaged in Section 26 of the Electricity Act 2003 would be notified within three months. RLDCs and NLDC will have complete responsibility and commensurate authority for smooth operation of the grid irrespective of the ownership of the transmission system, be it under CPSUs, State Utility or private sector.

5.3.10 Special mechanisms would be created to encourage private investment in transmission sector so that sufficient investments are made for achieving the objective of demand to be fully met by 2012.

5.4 DISTRIBUTION

5.4.1 Distribution is the most critical segment of the electricity business chain. The real challenge of reforms in the power sector lies in efficient management of the distribution sector.

5.4.2 The Act provides for a robust regulatory framework for distribution licensees to safeguard consumer interests. It also creates a competitive framework for the distribution business, offering options to consumers, through the concepts of open access and multiple licensees in the same area of supply.

5.4.3 For achieving efficiency gains proper restructuring of distribution utilities is essential. Adequate transition financing support would also be necessary for these utilities. Such support should be arranged linked to attainment of predetermined efficiency improvements and reduction in cash losses and putting in place appropriate governance structure for insulating the service providers from extraneous interference while at the same time ensuring transparency and accountability. For ensuring financial viability and sustainability, State Governments would need to restructure the liabilities of the State Electricity Boards to ensure that the successor companies are not burdened with past liabilities. The Central Government would also assist the States, which develop a clear roadmap for turnaround, in arranging transition financing from various sources which shall be linked to predetermined improvements and efficiency gains aimed at attaining financial viability and also putting in place appropriate governance structures.

5.4.4 Conducive business environment in terms of adequate returns and suitable transitional model with predetermined improvements in efficiency parameters in distribution business would be necessary for facilitating funding and attracting investments in distribution. Multi-Year Tariff (MYT) framework is an important structural incentive to minimize risks for utilities and consumers, promote efficiency and rapid reduction of system losses. It would serve public interest through economic efficiency and improved service quality. It would also bring greater predictability to consumer tariffs by restricting tariff adjustments to known indicators such as power purchase prices and inflation indices. Private sector participation in distribution needs to be encouraged for achieving the requisite reduction in transmission and distribution losses and improving the quality of service to the consumers.

5.4.5 The Electricity Act 2003 enables competing generating companies and trading licensees, besides the area distribution licensees, to sell electricity to consumers when open access in distribution is introduced by the State Electricity Regulatory Commissions. As required by the Act, the SERCs shall notify regulations by June 2005 that would enable open access to distribution networks in terms of sub-section 2 of section 42 which stipulates that such open access would be allowed, not later than five years from 27th January 2004 to consumers who require a supply of electricity where the maximum power to be made available at any time exceeds one mega watt. Section 49 of the Act provides that such consumers who have been allowed open access under section 42 may enter into agreement with any person for supply of electricity on such terms and conditions, including tariff, as may be agreed upon by them. While making regulations for open access in distribution, the SERCs will also determine wheeling charges and cross-subsidy surcharge as required under section 42 of the Act.

5.4.6 A time-bound programme should be drawn up by the State Electricity Regulatory Commissions (SERC) for segregation of technical and commercial losses through energy audits. Energy accounting and declaration of its results in each defined unit, as determined by SERCs, should be mandatory not later than March 2007. An action plan for reduction of the losses with adequate investments and suitable improvements in governance should be drawn up. Standards for reliability and quality of supply as well as for loss levels shall also be specified ,from time to time, so as to bring these in line with international practices by year 2012.

5.4.7 One of the key provisions of the Act on competition in distribution is the concept of multiple licensees in the same area of supply through their independent distribution systems. State Governments have full flexibility in carving out distribution zones while restructuring the Government utilities. For grant of second and subsequent distribution licence within the area of an incumbent distribution licensee, a revenue district, a Municipal Council for a smaller urban area or a Municipal Corporation for a larger urban area as defined in the Article 243(Q) of Constitution of India (74th Amendment) may be considered as the minimum area. The Government of India would notify within three months, the requirements for compliance by applicant for second and subsequent distribution licence as envisaged in Section 14 of the Act. With a view to provide benefits of competition to all section of consumers, the second and subsequent licensee for distribution in the same area shall have obligation to supply to all consumers in accordance with provisions of section 43 of the Electricity Act 2003. The SERCs are required to regulate the tariff including connection charges to be recovered by a distribution licensee under the provisions of the Act. This will ensure that second distribution licensee does not resort to cherry picking by demanding unreasonable connection charges from consumers.

5.4.8 The Act mandates supply of electricity through a correct meter within a stipulated period. The Authority should develop regulations as required under Section 55 of the Act within three months.

5.4.9 The Act requires all consumers to be metered within two years. The SERCs may obtain from the Distribution Licensees their metering plans, approve these, and monitor the same. The SERCs should encourage use of pre-paid meters. In the first instance, TOD meters for large consumers with a minimum load of one MVA are also to be encouraged. The SERCs should also put in place independent third-party meter testing arrangements.

5.4.10 Modern information technology systems may be implemented by the utilities on a priority basis, after considering cost and benefits, to facilitate creation of network information and customer data base which will help in management of load, improvement in quality, detection of theft and tampering, customer information and prompt and correct billing and collection . Special emphasis should be placed on consumer indexing and mapping in a time bound manner. Support is being provided for information technology based systems under the Accelerated Power Development and Reforms Programme (APDRP).

5.4.11 High Voltage Distribution System is an effective method for reduction of technical losses, prevention of theft, improved voltage profile and better consumer service. It should be promoted to reduce LT/HT ratio keeping in view the techno economic considerations.

5.4.12 SCADA and data management systems are useful for efficient working of Distribution Systems. A time bound programme for implementation of SCADA and data management system should be obtained from Distribution Licensees and approved by the SERCs keeping in view the techno economic considerations. Efforts should be made to install substation automation equipment in a phased manner.

5.4.13 The Act has provided for stringent measures against theft of electricity. The States and distribution utilities should ensure effective implementation of these provisions. The State Governments may set up Special Courts as envisaged in Section 153 of the Act.

5.5 RECOVERY OF COST OF SERVICES & TARGETTED SUBSIDIES

5.5.1 There is an urgent need for ensuring recovery of cost of service from consumers to make the power sector sustainable.

5.5.2 A minimum level of support may be required to make the electricity affordable for consumers of very poor category. Consumers below poverty line who consume below a specified level, say 30 units per month, may receive special support in terms of tariff which are cross-subsidized. Tariffs for such designated group of consumers will be at least 50 % of the average (overall) cost of supply. This provision will be further re-examined after five years.

5.5.3 Over the last few decades cross-subsidies have increased to unsustainable levels. Cross-subsidies hide inefficiencies and losses in operations. There is urgent need to correct this imbalance without giving tariff shock to consumers. The existing cross-subsidies for other categories of consumers would need to be reduced progressively and gradually.

5.5.4 The State Governments may give advance subsidy to the extent they consider appropriate in terms of section 65 of the Act in which case necessary budget provision would be required to be made in advance so that the utility does not suffer financial problems that may affect its operations. Efforts would be made to ensure that the subsidies reach the targeted beneficiaries in the most transparent and efficient way.

5.6 TECHNOLOGY DEVELOPMENT AND R&D

5.6.1 Effective utilization of all available resources for generation, transmission and distribution of electricity using efficient and cost effective technologies is of paramount importance. Operations and management of vast and complex power systems require coordination among the multiple agencies involved. Effective control of power system at state, regional and national level can be achieved only through use of Information Technology. Application of IT has great potential in reducing technical & commercial losses in distribution and providing consumer friendly services. Integrated resource planning and demand side management would also require adopting state of the art technologies.

Special efforts would be made for research, development demonstration and commercialization of non-conventional energy systems. Such systems would need to meet international standards, specifications and performance parameters.

5.6.2 Efficient technologies, like super critical technology, IGCC etc and large size units would be gradually introduced for generation of electricity as their cost effectiveness is established.

Simultaneously, development and deployment of technologies for productive use of fly ash would be given priority and encouragement.

5.6.3 Similarly, cost effective technologies would require to be developed for high voltage power flows over long distances with minimum possible losses. Specific information technology tools need to be developed for meeting the requirements of the electricity industry including highly sophisticated control systems for complex generation and transmission operations, efficient distribution business and user friendly consumer interface.

5.6.4 The country has a strong research and development base in the electricity sector which would be further augmented. R&D activities would be further intensified and Missions will be constituted for achieving desired results in identified priority areas. A suitable funding mechanism would be evolved for promoting R& D in the Power Sector. Large power companies should set aside a portion of their profits for support to R&D.

5.7 COMPETITION AIMED AT CONSUMER BENEFITS

5.7.1 To promote market development, a part of new generating capacities, say 15% may be sold outside long-term PPAs . As the power markets develop, it would be feasible to finance projects with competitive generation costs outside the long-term power purchase agreement framework. In the coming years, a significant portion of the installed capacity of new generating stations could participate in competitive power markets. This will increase the depth of the power markets and provide alternatives for both generators and licensees/consumers and in long run would lead to reduction in tariff.

For achieving this, the policy underscores the following:-

a. It is the function of the Central Electricity Regulatory Commission to issue license for inter-state trading which would include authorization for trading throughout the country.

b. The ABT regime introduced by CERC at the national level has had a positive impact. It has also enabled a credible settlement mechanism for intra-day power transfers from licenses with surpluses to licenses experiencing deficits. SERCs are advised to introduce the ABT regime at the State level within one year.

c. Captive generating plants should be permitted to sell electricity to licensees and consumers when they are allowed open access by SERCs under section 42 of the Act .

d. Development of power market would need to be undertaken by the Appropriate Commission in consultation with all concerned.

e. The Central Commission and the State Commissions are empowered to make regulations under section 178 and section 181 of the Act respectively. These regulations will ensure implementation of various provisions of the Act regarding encouragement to competition and also consumer protection. The Regulatory Commissions are advised to notify various regulations expeditiously.

f. Enabling regulations for inter and intra State trading and also regulations on power exchange shall be notified by the appropriate Commissions within six months.

5.8 FINANCING POWER SECTOR PROGRAMMES INCLUDING PRIVATE SECTOR PARTICIPATION

5.8.1 To meet the objective of rapid economic growth and “power for all” including household electrification, it is estimated that an investment of the order of Rs.9,00,000 crores at 2002-03 price

level would be required to finance generation, transmission, sub-transmission, distribution and rural electrification projects. Power being most crucial infrastructure, public sector investments, both at the Central Government and State Governments, will have to be stepped up. Considering the magnitude of the expansion of the sector required, a sizeable part of the investments will also need to be brought in from the private sector. The Act creates a conducive environment for investments in all segments of the industry, both for public sector and private sector, by removing barrier to entry in different segments. Section 63 of the Act provides for participation of suppliers on competitive basis in different segments which will further encourage private sector investment. Public service obligations like increasing access to electricity to rural households and small and marginal farmers have highest priority over public finances.

5.8.2 The public sector should be able to raise internal resources so as to at least meet the equity requirement of investments even after suitable gross budgetary support from the Government at the Centre and in the states in order to complete their on-going projects in a time-bound manner. Expansion of public sector investments would be dependent on the financial viability of the proposed projects. It would, therefore, be imperative that an appropriate surplus is generated through return on investments and, at the same time, depreciation reserve created so as to fully meet the debt service obligation. This will not only enable financial closure but also bankability of the project would be improved for expansion programmes, with the Central and State level public sector organizations, as also private sector projects, being in a position to fulfil their obligations toward equity funding and debt repayments.

5.8.3 Under sub-section (2) of Section 42 of the Act, a surcharge is to be levied by the respective State Commissions on consumers switching to alternate supplies under open access. This is to compensate the host distribution licensee serving such consumers who are permitted open access under section 42(2), for loss of the cross-subsidy element built into the tariff of such consumers. An additional surcharge may also be levied under sub-section (4) of Section 42 for meeting the fixed cost of the distribution licensee arising out of his obligation to supply in cases where consumers are allowed open access. The amount of surcharge and additional surcharge levied from consumers who are permitted open access should not become so onerous that it eliminates competition that is intended to be fostered in generation and supply of power directly to consumers through the provision of Open Access under Section 42(2) of the Act. Further it is essential that the Surcharge be reduced progressively in step with the reduction of cross-subsidies as foreseen in Section 42(2) of the Electricity Act 2003.

5.8.4 Capital is scarce. Private sector will have multiple options for investments. Return on investment will, therefore, need to be provided in a manner that the sector is able to attract adequate investments at par with, if not in preference to, investment opportunities in other sectors. This would obviously be based on a clear understanding and evaluation of opportunities and risks. An appropriate balance will have to be maintained between the interests of consumers and the need for investments.

5.8.5 All efforts will have to be made to improve the efficiency of operations in all the segments of the industry. Suitable performance norms of operations together with incentives and disincentives will need to be evolved along with appropriate arrangement for sharing the gains of efficient operations with the consumers . This will ensure protection of consumers' interests on the one hand and provide motivation for improving the efficiency of operations on the other.

5.8.6 Competition will bring significant benefits to consumers , in which case, it is competition which will determine the price rather than any cost plus exercise on the basis of operating norms and parameters. All efforts will need to be made to bring the power industry to this situation as early as possible, in the overall interest of consumers. Detailed guidelines for competitive bidding as stipulated in section 63 of the Act have been issued by the Central Government.

5.8.7 It will be necessary that all the generating companies, transmission licensees and distribution licensees receive due payments for effective discharge of their operational obligations as also for

enabling them to make fresh investments needed for the expansion programmes. Financial viability of operations and businesses would, therefore, be essential for growth and development of the sector. Concerted efforts would be required for restoring the financial health of the sector. For this purpose, tariff rationalization would need to be ensured by the SERCs. This would also include differential pricing for base, intermediate and peak power.

5.8.8 Steps would also be taken to address the need for regulatory certainty based on independence of the regulatory commissions and transparency in their functioning to generate investor's confidence.

5.8.9 Role of private participation in generation, transmission and distribution would become increasingly critical in view of the rapidly growing investment needs of the sector. The Central Government and the State Governments need to develop workable and successful models for public private partnership. This would also enable leveraging private investment with the public sector finances. Mechanisms for continuous dialogue with industry for streamlining procedures for encouraging private participation in power sector need to be put in place.

Transmission & Distribution Losses

5.8.10 It would have to be clearly recognized that Power Sector will remain unviable until T&D losses are brought down significantly and rapidly. A large number of States have been reporting losses of over 40% in the recent years. By any standards, these are unsustainable and imply a steady decline of power sector operations. Continuation of the present level of losses would not only pose a threat to the power sector operations but also jeopardize the growth prospects of the economy as a whole. No reforms can succeed in the midst of such large pilferages on a continuing basis.

The State Governments would prepare a Five Year Plan with annual milestones to bring down these losses expeditiously. Community participation, effective enforcement, incentives for entities, staff and consumers, and technological upgradation should form part of campaign efforts for reducing these losses. The Central Government will provide incentive based assistance to States that are able to reduce losses as per agreed programmes.

5.9 ENERGY CONSERVATION

5.9.1 There is a significant potential of energy savings through energy efficiency and demand side management measures. In order to minimize the overall requirement, energy conservation and demand side management (DSM) is being accorded high priority. The Energy Conservation Act has been enacted and the Bureau of Energy Efficiency has been setup.

5.9.2 The potential number of installations where demand side management and energy conservation measures are to be carried out is very large. Bureau of Energy Efficiency (BEE) shall initiate action in this regard. BEE would also make available the estimated conservation and DSM potential, its staged implementation along with cost estimates for consideration in the planning process for National Electricity Plan.

5.9.3 Periodic energy audits have been made compulsory for power intensive industries under the Energy Conservation Act. Other industries may also be encouraged to adopt energy audits and energy conservation measures. Energy conservation measures shall be adopted in all Government buildings for which saving potential has been estimated to be about 30% energy. Solar water heating systems and solar passive architecture can contribute significantly to this effort.

5.9.4 In the field of energy conservation initial approach would be voluntary and self-regulating with emphasis on labelling of appliances. Gradually as awareness increases, a more regulatory approach of setting standards would be followed.

5.9.5 In the agriculture sector, the pump sets and the water delivery system engineered for high efficiency would be promoted. In the industrial sector, energy efficient technologies should be used and energy audits carried out to indicate scope for energy conservation measures. Motors and drive system are the major source of high consumption in Agricultural and Industrial Sector. These need to be addressed. Energy efficient lighting technologies should also be adopted in industries, commercial and domestic establishments.

5.9.6 In order to reduce the requirements for capacity additions, the difference between electrical power demand during peak periods and off-peak periods would have to be reduced. Suitable load management techniques should be adopted for this purpose. Differential tariff structure for peak and off peak supply and metering arrangements (Time of Day metering) should be conducive to load management objectives. Regulatory Commissions should ensure adherence to energy efficiency standards by utilities.

5.9.7 For effective implementation of energy conservation measures, role of Energy Service Companies would be enlarged. Steps would be taken to encourage and incentivise emergence of such companies.

5.9.8 A national campaign for bringing about awareness about energy conservation would be essential to achieve efficient consumption of electricity.

5.9.9. A National Action Plan has been developed. Progress on all the proposed measures will be monitored with reference to the specific plans of action.

5.10 ENVIRONMENTAL ISSUES

5.10.1 Environmental concerns would be suitably addressed through appropriate advance action by way of comprehensive Environmental Impact Assessment and implementation of Environment Action Plan (EAP).

5.10.2 Steps would be taken for coordinating the efforts for streamlining the procedures in regard to grant of environmental clearances including setting up of ‘Land Bank’ and ‘Forest Bank’.

5.10.3 Appropriate catchment area treatment for hydro projects would also be ensured and monitored.

5.10.4 Setting up of coal washeries will be encouraged. Suitable steps would also be taken so that utilization of fly ash is ensured as per environmental guidelines.

5.10.5 Setting up of municipal solid waste energy projects in urban areas and recovery of energy from industrial effluents will also be encouraged with a view to reducing environmental pollution apart from generating additional energy.

5.10.6 Full compliance with prescribed environmental norms and standards must be achieved in operations of all generating plants.

5.11 TRAINING AND HUMAN RESOURCE DEVELOPMENT

In the new reforms framework ushered by Electricity Act 2003, it is particularly important that the electricity industry has access to properly trained human resource. Therefore, concerted action would be taken for augmenting training infrastructure so that adequate well-trained human resource is made available as per the need of the industry. Special attention would need to be paid by the industry for establishing training infrastructure in the field of electricity distribution, regulation, trading and power

markets. Efforts should be made so that personnel of electricity supply industry both in the private and public sector become more cost-conscious and consumer-friendly.

5.12 COGENERATION AND NON-CONVENTIONAL ENERGY SOURCES

5.12.1 Non-conventional sources of energy being the most environment friendly there is an urgent need to promote generation of electricity based on such sources of energy. For this purpose, efforts need to be made to reduce the capital cost of projects based on non-conventional and renewable sources of energy. Cost of energy can also be reduced by promoting competition within such projects. At the same time, adequate promotional measures would also have to be taken for development of technologies and a sustained growth of these sources.

5.12.2 The Electricity Act 2003 provides that co-generation and generation of electricity from non-conventional sources would be promoted by the SERCs by providing suitable measures for connectivity with grid and sale of electricity to any person and also by specifying, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee. Such percentage for purchase of power from non-conventional sources should be made applicable for the tariffs to be determined by the SERCs at the earliest. Progressively the share of electricity from non-conventional sources would need to be increased as prescribed by State Electricity Regulatory Commissions. Such purchase by distribution companies shall be through competitive bidding process. Considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the Commission may determine an appropriate differential in prices to promote these technologies.

5.12.3 Industries in which both process heat and electricity are needed are well suited for cogeneration of electricity. A significant potential for cogeneration exists in the country, particularly in the sugar industry. SERCs may promote arrangements between the co-generator and the concerned distribution licensee for purchase of surplus power from such plants. Cogeneration system also needs to be encouraged in the overall interest of energy efficiency and also grid stability.

5.13 PROTECTION OF CONSUMER INTERESTS AND QUALITY STANDARDS

5.13.1 Appropriate Commission should regulate utilities based on pre-determined indices on quality of power supply. Parameters should include, amongst others, frequency and duration of interruption, voltage parameters, harmonics, transformer failure rates, waiting time for restoration of supply, percentage defective meters and waiting list of new connections. The Appropriate Commissions would specify expected standards of performance.

5.13.2 Reliability Index (RI) of supply of power to consumers should be indicated by the distribution licensee. A road map for declaration of RI for all cities and towns up to the District Headquarter towns as also for rural areas, should be drawn by up SERCs. The data of RI should be compiled and published by CEA.

5.13.3 It is advised that all State Commissions should formulate the guidelines regarding setting up of grievance redressal forum by the licensees as also the regulations regarding the Ombudsman and also appoint/designate the Ombudsman within six months.

5.13.4 The Central Government, the State Governments and Electricity Regulatory Commissions should facilitate capacity building of consumer groups and their effective representation before the Regulatory Commissions. This will enhance the efficacy of regulatory process.

6.0 COORDINATED DEVELOPMENT

6.1 Electricity being a concurrent subject, a well-coordinated approach would be necessary for development of the power sector. This is essential for the attainment of the objective of providing electricity-access to all households in next five years and providing reliable uninterrupted quality power supply to all consumers. The State Governments have a major role, particularly in creation of generation capacity, state level transmission and distribution. The Central Government would assist the States in the attainment of this objective. It would be playing a supportive role in fresh capacity addition and a major role in development of the National Grid. The State Governments need to ensure the success of reforms and restoration of financial health in distribution, which alone can enable the creation of requisite generation capacity. The Regulatory Commissions have the responsibility of ensuring that the regulatory processes facilitate the attainment of this objective. They also have a developmental role whose fulfillment would need a less formal and a consultative process.

The Electricity Act, 2003 also provides for mechanisms like “Coordination forum” and “Advisory Committees” to facilitate consultative process. The Act also requires the Regulatory Commissions to ensure transparency in exercise of their powers and in discharge of their functions. This in no way means that the Regulatory Commissions should follow formal judicial approach. In fact, quick disposal of matters would require an approach involving consultations with stakeholders.

6.2 Under the Act, the Regulatory Commissions are required to perform wide-ranging responsibilities. The appropriate Governments need to take steps to attract regulatory personnel with required background. The Govt. of India would promote the institutional capability to provide training to raise regulatory capacity in terms of the required expertise and skill sets. The appropriate Governments should provide financial autonomy to the Regulatory Commissions. The Act provides that the appropriate Government shall constitute a Fund under section 99 or section 103 of the Act, as the case may be, to be called as Regulatory Commission Fund. The State Governments are advised to establish this Fund expeditiously.

(Ajay Shankar)
Additional Secretary to the Government of India

Source: http://powermin.nic.in/indian_electricity_scenario/national_electricity_policy.htm

ANNEXURE - II

SALIENT FEATURES OF NEW HYDRO POLICY

- ❖ Policy seeks to create a level playing field for private and public hydro projects.

- ❖ The exemption from tariff based competitive bidding which is currently available only to PSU projects upto Jan 2011 will also be made available to private hydro project.

- ❖ As a result tariff for private hydro projects will also be decided by the appropriate Regulatory Commission under Section 62 of the Electricity Act 2003.

- ❖ Any upfront payment or similar payment made to State Governments for getting the site allocated will not form part of the project cost for the purpose of fixing tariff.

- ❖ However, the developer will have the facility of merchant sale of upto 40% of the saleable energy. This would reduce by 5% for every six months of delay by the project developer.

- ❖ Concurrence by CEA, all clearances, financial closures and award of work have to take place before Jan. 2011.

- ❖ The above dispensation will be available only if:

(i) The site is allotted by the State through a transparent process.

(ii) An additional 1% free power over and above 12% will be earmarked for a Local Area Development Fund aimed at providing a regular stream of revenue for income generation, infrastructure creation and welfare schemes in the affected areas.

(iii) Each project affected family (PAF) will get 100 unit of electricity every month for a period of 10 years after commissioning of the project, free of charge.

(iv) Project authorities will bear the 10% state contribution under the Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) for electrification of the affected area.

(v) Project authorities will construct houses at resettled sites for project affected persons."

Source: Ministry of Power, Written Replies, Preliminary Material, Pgs. 14-15, Q13

Annexure III

MINUTES OF THE 19th SITTING OF THE COMMITTEE ON PUBLIC UNDERTAKINGS HELD ON 11th MARCH, 2008

The Committee sat from 1600 hours to 1900 hours.

PRESENT

Chairman

Shri Rupchand Pal

Members, Lok Sabha

2 Shri Ramdas Bandu Athawale
3 Shri Francis K. George
4 Dr. Vallabhbhai Kathiria
5 Ch. Lal Singh
6 Shri Kashiram Rana
7 Shri Srinivas Patil

Members, Rajya Sabha

8 Prof. Ram Deo Bhandary
9 Shri Mahendra Mohan
10 Shri Ajay Maroo
11 Shri K. Chandran Pillai

Secretariat

1	Shri J.P. Sharma	Joint Secretary
2	Smt. Anita Jain	Director
3	Shri N.S. Hooda	Deputy Secretary
4	Shri Ajay Kumar	Deputy Secretary-II

Representatives of NTPC

1	Shri T. Sankaralingam	CMD
2	Shri Chandan Roy	Director (Operations)
3	Shri R.S. Sharma	Director (Commercial)
4	Shri R.K. Jain	Director (Technical)

Representatives of NHPC

1	Shri S.K. Dodeja	Director (Projects)
2	Shri A.B.L. Srivastava	Director (Finance)
3	Shri S.C. Gupta	E.D. (CPMG)
4	Shri T.N. Gopalkrishna	E.D. (Finance)

2. The Committee took separate oral evidence of the representatives of NTPC and NHPC in connection with the examination of physical and financial performance of power generating PSUs.

3. At first, the Committee took oral evidence of NTPC Limited. At the outset, the Chairman welcomed the representatives of NTPC and also drew their attention to direction 58 of the Directions by the Speaker relating to evidence before the Parliamentary Committees. Thereafter, the representatives of NTPC made an audio-visual presentation about the various aspects of the Corporation. After the audio-visual presentation, Members raised queries on various aspects pertaining to the subject and the explanations/ clarifications on the same were made by the representatives of NTPC. Information on some of the points raised by the Committee was not readily available with the representatives of NTPC. It was, however, promised by them that the same would be furnished to the Committee Secretariat in due course.

4. The Chairman then thanked the representatives of NTPC for providing all the material/information on the subject matter as desired by the Committee.

5. The witnesses then withdrew.

6. Thereafter, the Committee took oral evidence of the representatives of NHPC. The Chairman welcomed the representatives of NHPC and also drew their attention to direction 58 of the Directions by the Speaker relating to evidence before the Parliamentary Committees. Thereafter, the representatives of NHPC made an audio-visual presentation on the functioning of the Corporation. After the audio-visual presentation, the Chairman and Members raised queries on various aspects pertaining to the subject and the representatives of NHPC gave explanations/ clarifications on the same. However, Information to some of the queries raised by the Committee was not readily available. It was, however, promised by the officials of NHPC that the same would be furnished to the Secretariat in due course.

7. The Chairman then thanked the representatives of NHPC for providing the material/information on the subject matter as desired by the Committee.

8. The witnesses then withdrew.

9. The Committee then adjourned.

10. A copy of the verbatim proceedings has been kept on record separately.

MINUTES OF THE 20th SITTING OF THE COMMITTEE ON PUBLIC UNDERTAKINGS HELD ON 19th MARCH, 2008 AT COMMITTEE ROOM 'D', PARLIAMENT HOUSE ANNEXE

The Committee sat from 1630 hours to 1720 hours.

PRESENT

Chairman

Shri Rupchand Pal

Members, Lok Sabha

2 Shri Gurudas Dasgupta
3 Smt. Sangeeta Kumari Singh Deo
4 Shri Francis K. George
5 Dr. Vallabhbhai Kathiria
6 Ch. Lal Singh
7 Shri Kashiram Rana
8 Shri Ram Kripal Yadav

Members, Rajya Sabha

9 Prof. Ram Deo Bhandary

Secretariat

1	Shri S.K. Sharma	Additional Secretary
2	Shri J.P. Sharma	Joint Secretary
3	Smt. Anita Jain	Director
4	Shri N.S. Hooda	Deputy Secretary
5	Shri Ajay Kumar	Deputy Secretary-II

Representatives of IREDA

1	Shri Debashish Majumdar	CMD
2	Shri S.P. Reddi	Director (Finance)
3	Shri K.S. Popli	Director (Technical)
4	Shri A.A. Khatana	CGM (TS)
5	Shri B.V. Rao	GM (TS)

2. The Committee took oral evidence of the representatives of Indian Renewable Energy Development Agency Limited (IREDA) in connection with the examination of physical and financial performance of power generating PSUs.

3. At the outset, the Chairman welcomed the representatives of IREDA and also drew their attention to direction 58 of the Directions by the Speaker relating to evidence before the Parliamentary Committees. Thereafter, the representatives of IREDA made an audio-visual presentation about the various aspects of the Agency.

(Due to some urgent work, the Chairman left the meeting and nominated a member, Shri Francis K. George to chair the meeting)

After the audio-visual presentation, Members raised queries on various aspects pertaining to the subject and the explanations/ clarifications on the same were made by the representatives of IREDA. Information on some of the points was not readily available with the representatives of IREDA. It was, however, promised by them that the same would be furnished to the Committee Secretariat in due course.

4. The Acting Chairman then thanked the representatives of IREDA for providing all the material/information on the subject matter as desired by the Committee.

5. The witnesses then withdrew.

6. A copy of the verbatim proceedings has been kept on record separately.

MINUTES OF THE 4th SITTING OF THE COMMITTEE ON PUBLIC UNDERTAKINGS HELD ON 19th AUGUST 2008

The Committee sat from 1130 hours to 1330 hours.

PRESENT

Chairman

Shri Rupchand Pal

Members, Lok Sabha

2 Shri Ramesh Bais
3 Shri Gurudas Dasgupta
4 Shri Francis K. George
5 Dr. Vallabhbhai Kathiria
6 Shri Harikewal Prasad
7 Shri Kashiram Rana
8 Smt. Pratibha Singh
9 Shri Rajesh Verma
10 Shri Mohan Rawale
11 Shri Ram Kripal Yadav

Members, Rajya Sabha

12 Shri R.K. Dhawan
13 Shri Vijaykumar Rupani

Secretariat

1	Shri S.K. Sharma	Additional Secretary
2	Shri J.P. Sharma	Joint Secretary
3	Smt. Anita Jain	Director
4	Shri N.S. Hooda	Deputy Secretary
5	Shri Ajay Kumar	Deputy Secretary-II

List of Experts

1.	Dr. Leena Srivastava	Executive Director, The Energy and Resources Institute (TERI), New Delhi
2.	Shri S.P. Gon Chaudhary	Managing Director, West Bengal Green Energy Development Corporation Limited, Kolkata

2. The Committee took oral evidence of non-official witnesses namely Dr. Leena Srivastava, Executive Director, TERI, an expert in the field of power and Shri S.P. Gon Chaudhary, MD, West Bengal Green Energy Development Corporation Limited, an expert in the field of renewable energy in connection with examination of physical and financial performance of power generating PSUs.

3. The Chairman welcomed the non-official witness, Dr. Leena Srivastava and outlined the subject physical and financial performance of power generating PSUs under examination of the Committee. The expert made a presentation pointing out the challenges and roles in an emerging energy order, future scenario of the energy sector of the country, challenges due to climate change, role of PSUs, suggestions to improve the performance of PSUs, lack of R&D and technological improvements, action needed to meet the challenges etc.

4. The Members raised many queries on the subject and the some of these were replied to by the expert. On some of the points which could not be answered by the expert, the Committee requested her to furnish the same in the form of written note in fifteen days. The Chairman thanked the expert for briefing the Committee.

5. The witness then withdrew.

6. Thereafter, the second expert Shri S.P. Gon Chaudhary was invited and the Chairman welcomed the expert and outlined the subject that is currently under examination of the Committee. The expert then made a brief presentation in which he pointed out the various schemes of the Government in the Village Electrification Programme, lacunae in the scheme, lack of coverage of electricity to all rural and remote hamlets and villages, renewable energy options, and the possibilities of renewable energy to tackle the challenge of power availability to all, etc. Members raised queries and the same were replied to by the expert.

7. The Chairman then thanked the expert for providing information on the subject matter as desired by the Committee.

8. The witness then withdrew.

9. A copy of the verbatim proceedings has been kept on record.

10. The Committee then adjourned.

MINUTES OF THE 5th SITTING OF THE COMMITTEE ON PUBLIC UNDERTAKINGS HELD ON 27th AUGUST 2008

The Committee sat from 1400 hours to 1530 hours.

PRESENT

Chairman

Shri Rupchand Pal

Members, Lok Sabha

2 Shri Francis K. George
3 Shri Kashiram Rana
4 Shri Mohan Rawale
5 Shri Ram Kripal Yadav

Members, Rajya Sabha

6 Shri Sharad Anantrao Joshi
7 Shri K. Chandran Pillai
8 Shri Arjun Kumar Sengupta
9 Shri Amar Singh

Secretariat

1	Shri J.P. Sharma	Joint Secretary
2	Smt. Anita Jain	Director
3	Shri N.S. Hooda	Deputy Secretary
4	Shri Ajay Kumar	Deputy Secretary-II

Expert

Dr. Kirit. S. Parikh Member, Planning Commission

2. The Committee took oral evidence of non-official witness - Dr. Kirit S. Parikh, Member, Planning Commission, and an expert in the field of energy, in connection with examination of the subject 'physical and financial performance of power generating PSUs'.

3. At the outset, the Chairman welcomed Dr. Kirit S. Parikh and drew his attention to Direction 58 of the Directions by the Speaker, Lok Sabha regarding evidence before the Parliamentary Committees. The Chairman briefly outlined the subject 'physical and financial performance of power generating PSUs' under examination of the Committee. He emphasized on the challenges faced by the

country in the energy sector and other issues like role of renewables, losses in distribution & transmission, subsidy in the power sector etc.

4. Thereafter, the Members raised certain queries related to the subject which were aptly replied to by the expert.

5. The Chairman then thanked the expert for providing information on the subject matter as desired by the Committee.

6. The witness then withdrew.

7. The verbatim record of the proceedings has been kept.

MINUTES OF THE 7th SITTING OF THE COMMITTEE ON PUBLIC UNDERTAKINGS HELD ON 18th SEPTEMBER, 2008

The Committee sat from 1130 hours to 1330 hours.

PRESENT

Chairman

Shri Rupchand Pal

Members, Lok Sabha

2 Shri Francis K. George
3 Shri Kashiram Rana
4 Shri K.C. Singh 'Baba'
5 Smt. Pratibha Singh
6 Shri Bharatsinh Madhavsinh Solanki
7 Shri K.V. Thangkabalu
8 Shri Mohan Rawale

Members, Rajya Sabha

9 Shri Sharad Anantrao Joshi
10 Shri K. Chandran Pillai
11 Shri Vijaykumar Rupani
12 Shri Arjun Kumar Sengupta
13 Shri Amar Singh

Secretariat

1	Shri J.P. Sharma	Joint Secretary
2	Smt. Anita Jain	Director
3	Shri N.S. Hooda	Deputy Secretary
4	Shri Ajay Kumar	Deputy Secretary-II

Representatives of Nuclear Power Corporation of India Limited

1.	Dr. S.K. Jain	Chairman & Managing Director
2.	Shri J.K. Ghai	Director (Finance)
3.	Shri S. Thakur	ED (Corporate Planning)
4.	Shri B.B. Mittal	Station Director, Narora Atomic Power Station

2. XXXXXXX XXXXXX XXXXX XXXXX

3. Then, the Committee took oral evidence of the representatives of Nuclear Power Corporation of India Limited (NPCIL) in connection with examination of physical and financial performance of power generating PSUs.

4. At the outset, the Chairman welcomed the representatives of NPCIL and drew their attention to Direction 58 of the Directions by the Speaker relating to evidence before the Parliamentary Committees. Then, the representatives of NPCIL made a brief power point presentation on the subject before the Committee. Thereafter, Members raised various important issues like technological adequacy, perspective planning, problems in capacity utilisation, etc. relating to the performance of NPCIL. Clarifications on some of those issues were made by the representatives of NPCIL. Information on some of the points raised by the Committee that was not readily available were promised by them that the same would be furnished to the Committee Secretariat in due course.

5. The Chairman then thanked the representatives of NPCIL for providing information on the subject matter to the Committee.

6. The witnesses then withdrew.

7. A verbatim copy of the proceedings has been kept on records separately.

MINUTES OF THE 9th SITTING OF THE COMMITTEE ON PUBLIC UNDERTAKINGS HELD ON 30th SEPTEMBER 2008 AT COMMITTEE ROOM 'B', PHA

The Committee sat from 1415 hours to 1530 hours.

PRESENT

Chairman

Shri Rupchand Pal

Members, Lok Sabha

2 Smt. Sangeeta Kumari Singh Deo
3 Shri Francis K. George
4 Dr. Vallabhbhai Kathiria
5 Shri Harikewal Prasad
6 Shri Kashiram Rana
7 Smt. Pratibha Singh
8 Shri K.V. Thangkabalu
9 Shri Ram Kripal Yadav

Members, Rajya Sabha

10 Shri Vijaykumar Rupani
11 Shri Amar Singh

Secretariat

1	Shri J.P. Sharma	Joint Secretary
2	Smt. Anita Jain	Director
3	Shri N.S. Hooda	Deputy Secretary

Representatives of Ministry of New and Renewable Energy

1	Shri Deepak Gupta	Secretary
2	Shri D. Majumdar,	CMD, IREDA
3	Shri K.P. Sukumaran	Scientist
4	Shri S.P. Reddy	Director (Finance), IREDA

2. The Committee took oral evidence of the representatives of Ministry of New and Renewable Energy in connection with examination of physical and financial performance of power generating PSUs.

3. At the outset, the Chairman welcomed the representatives of Ministry of New and Renewable Energy and drew their attention to Direction 58 of the Directions by the Speaker relating to evidence before the Parliamentary Committee. Then, the representatives of Ministry made a brief presentation on the subject before the Committee. Thereafter, Members raised queries on various issues pertaining to the subject. Clarifications on some of those issues were made by the representatives of Ministry. Information on some of the points raised by the Committee was not readily available. However, the same was promised to be furnished to the Committee Secretariat.

4. The Chairman then thanked the representatives of Ministry for providing information on the subject matter as desired by the Committee.

5. The witnesses then withdrew.

6. A copy of the verbatim proceedings has been kept on record separately.

7. The Committee then adjourned.

MINUTES OF THE 10TH SITTING OF THE COMMITTEE ON PUBLIC UNDERTAKINGS HELD ON 20TH OCTOBER 2008 AT COMMITTEE ROOM 'D', PHA

The Committee sat from 1610 hours to 1950 hours.

PRESENT

Chairman

Shri Rupchand Pal

Members, Lok Sabha

2 Shri Ramesh Bais
3 Shri Francis K. George
4 Shri Harikewal Prasad
5 Shri Kashiram Rana
6 Shri Bharatsinh Madhavsinh Solanki

Members, Rajya Sabha

7 Shri Rahul Bajaj
8 Shri Sharad Anantrao Joshi
9 Shri K.Chandran Pillai
10 Shri Vijaykumar Rupani
11 Shri Arjun Kumar Sengupta
12 Shri Amar Singh

Secretariat

1	Shri J.P. Sharma	Joint Secretary
2	Smt. Anita Jain	Director
3	Shri N.S. Hooda	Deputy Secretary
4	Shri Ajay Kumar	Deputy Secretary-II

Representatives of Department of Atomic Energy

1	Dr. Anil Kakodkar	Secretary, DAE
2	Dr. S.K. Jain	CMD, NPCIL
3	Shri S. Thakur	ED (Corporate Planning), NPCIL
4	Dr. P. Mukharjee	Joint Secretary, DAE

Representatives of Ministry of Power

1	Shri Anil Razdan	Secretary (Power)
2	Shri Anil Kumar	Addl. Secretary

3	Shri G.B. Pradhan	Addl. Secretary
4	Shri Rakesh Nath	Chairperson, Central Electricity Authority
5	Shri R.S. Sharma	CMD, NTPC
6	Shri S.K. Garg	CND, NHPC
7	Shri H.K. Sharma	CMD, SJVNL
8	Shri R.S.T. Sai,	CMD, THDC
9	Shri V.K. Abbey	CMD, NEEPCO
10	Shri U.C. Mishara	Chairman, BBMB
11	Shri A.K. Barman	Chairman, DVC

2. The Committee first took oral evidence of the representatives of Department of Atomic Energy in connection with examination of physical and financial performance of power generating PSUs.

3. At the start of the sitting, the Chairman of the Committee being engaged in House proceedings, the members elected Shri Amar Singh, M.P. to Chair the sitting. He welcomed the representatives of Department of Atomic Energy and drew their attention to Direction 58 of the Directions by the Speaker relating to evidence before the Parliamentary Committees. The representatives of Department of Atomic Energy made a brief power point presentation on the subject before the Committee. In the meantime, the Chairman of the Committee, Shri Rupchand Pal joined the Committee and chaired it. Thereafter, Members raised queries on various issues pertaining to the subject. Clarifications on some of those issues were made by the representatives of Deptt. of Atomic Energy. Information on some of the points raised by the Committee was not readily available. However, the same was promised to be furnished to the Committee Secretariat.

4. The Chairman then thanked the representatives of Department of Atomic Energy for providing information on the subject matter as desired by the Committee.

5. The witnesses then withdrew.

6. The Committee then called in the representatives of Ministry of Power to depose in connection with examination of physical and financial performance of power generating PSUs.

7. At the outset, the Chairman welcomed the representatives of Ministry of Power and drew their attention to direction 58 of the Directions by the Speaker relating to evidence before the Parliamentary Committees. Then, the representatives of Ministry of Power made a brief power point presentation giving out information related to the subject under examination before the Committee. Thereafter, Members sought clarifications on various issues relating to the subject. The Ministry officials replied to some of the issues raised by the Members. Information on some of the points raised by the Committee were not readily available. However, the same was promised to be furnished by them to the Committee Secretariat in due course.

8. The witnesses then withdrew.

9. A copy of the verbatim proceedings has been kept on record separately.

10. The Committee then adjourned.

MINUTES OF THE 13th SITTING OF THE COMMITTEE ON PUBLIC UNDERTAKINGS HELD ON 19 DECEMBER, 2008

The Committee sat from 1500 hours to 1600 hours.

PRESENT
Chairman

Shri Rupchand Pal

Members, Lok Sabha

2 Shri Ramesh Bais
3 Shri Francis K. George
4 Shri Harikewal Prasad
5 Shri Kashiram Rana
6 Smt. Pratibha Singh
7 Shri K.V. Thangkabalu
8 Shri Ram Kripal Yadav

Members, Rajya Sabha

9. Shri Rahul Bajaj
10. Shri Sharad Anantrao Joshi

Secretariat

1	Shri J.P. Sharma	Joint Secretary
2	Smt. Anita Jain	Director
3	Shri Ajay Kumar	Deputy Secretary-II
4	Shri H.Ram Prakash	Under Secretary

2. The Committee considered the following two draft reports and adopted both with minor modification:

(i) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX;

(ii) Draft Report on Physical and Financial Performance of the Power Generating PSUs.

3. The Committee authorized the Chairman to finalize the above Reports for presentation to the House.

4. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

5. The Committee then adjourned.