

1 Annexure 2: PLANS OF APTransco

REPRESENTATIVE SYSTEM LOAD CURVES

1 Requirement in the Guidelines

Representative system load curves for weekdays and weekends for various seasons (such as summer, winter and monsoon). Indicate in case if any load restriction was imposed. Also provide expected system load curves for the ensuing year and indicate the expected supply curves in each case. (Guidelines – 10a)

2 APTransco's Response

Three sets of representative daily system load curves merged with supply curves for weekdays (where maximum seasonal peak demand was recorded) and weekends (Sunday) registered during summer, monsoon and winter seasons of FY 2006-07 are enclosed as annexure 1a to 1f and for 2007-08 as annexure 1g to 1L

For 2006-07

Sl. No	Season	Date
1	Typical full load day in summer	18 th March 2007
2	Typical week end day in summer	28 th May 2006
3	Typical full load day during monsoon	27 th August 2006
4	Typical week end day in monsoon	2 nd July 2006
5	Typical full load day in winter	24 th October 2006
6	Typical week end day in winter	2 nd November 2006

For 2007-08

Sl. No	Season	Date
1	Typical full load day in summer	20 th March 2008
2	Typical week end day in summer	13 th April 2007
3	Typical full load day during monsoon	18 th August 2007
4	Typical week end day in monsoon	23 rd June 2007
5	Typical full load day in winter	11 th January 2008
6	Typical week end day in winter	25 th Nov 2007

The highest system peak demand of 8641 MW was recorded at 06:00 AM on 18-03-2007 for 2006-07, which is 402 MW more than the previous year (2005-06) system peak of 8237 MW, recorded on 25-3-2006.

The highest system peak demand of 9161 MW was recorded at 06:00 AM on 20-03-2008 for 2007-08, which is 520 MW more than the previous year (2006-07) system peak of 8641 MW, recorded on 18-03-2007.

A brief analysis of system demand for all seasons of the year 2006-07 and 2007-08 are furnished in the following sections:

For 2006-07

PEAK GRID DEMAND				
SEASON	Max MW	Min MW	Max Date	Min Date
SUMMER	8641	4284	18-03-2007	28-05-2006
MONSOON	8281	4536	27-08-2006	02-07-2006
WINTER	8158	4714	24-10-2006	02-11-2006

For 2007-08

PEAK GRID DEMAND				
SEASON	Max MW	Min MW	Max Date	Min Date
SUMMER	9162	4768	20-03-2008	13-04-2007
MONSOON	8607	4214	18-08-2007	23-06-2007
WINTER	8656	4729	11-01-2008	25-11-2006

3 Summer season

For 2006-07

From the daily system load curves on the day when the highest system peak was recorded, it can be seen that the system peak load is continuously maintained above 6187 MW throughout the day and the maximum demand recorded was 8641MW on March 18th 2007. The demand variation in dry summer was between 4284MW and 8641 MW. The minimum system demand on 28th May 2006 was 4284 MW, and is the lowest recorded in this season.

For 2007-08

From the daily system load curves on the day when the highest system peak was recorded, it can be seen that the system peak load is continuously maintained above 6729 MW throughout the day and the maximum demand recorded was 9161MW on March 20th 2008. The demand variation in dry summer was between 4768MW and

9161 MW. The minimum system demand on 13th April 2007 was 4768 MW, and is the lowest recorded in this season.

4 Winter season

For 2006-07

In winter the daily load variations were between 4714 MW - 8158 MW in 2006-07. The load curves depict the demand incident on the system. System demand on 24th October 2006 was 8158 MW, and is the highest recorded in this season. System demand on 2nd November 2006 was 4714 MW, and is the lowest recorded in this season. System reaches peak during the morning hours during this season for most of the days.

For 2007-08

In winter the daily load variations were between 4729 MW - 8656 MW in 2007-08. The load curves depict the demand incident on the system. System demand on 11th January 2008 was 8656 MW, and is the highest recorded in this season. System demand on 25th November 2007 was 4729 MW, and is the lowest recorded in this season. System reaches peak during the morning hours during this season for most of the days.

5 Monsoon season

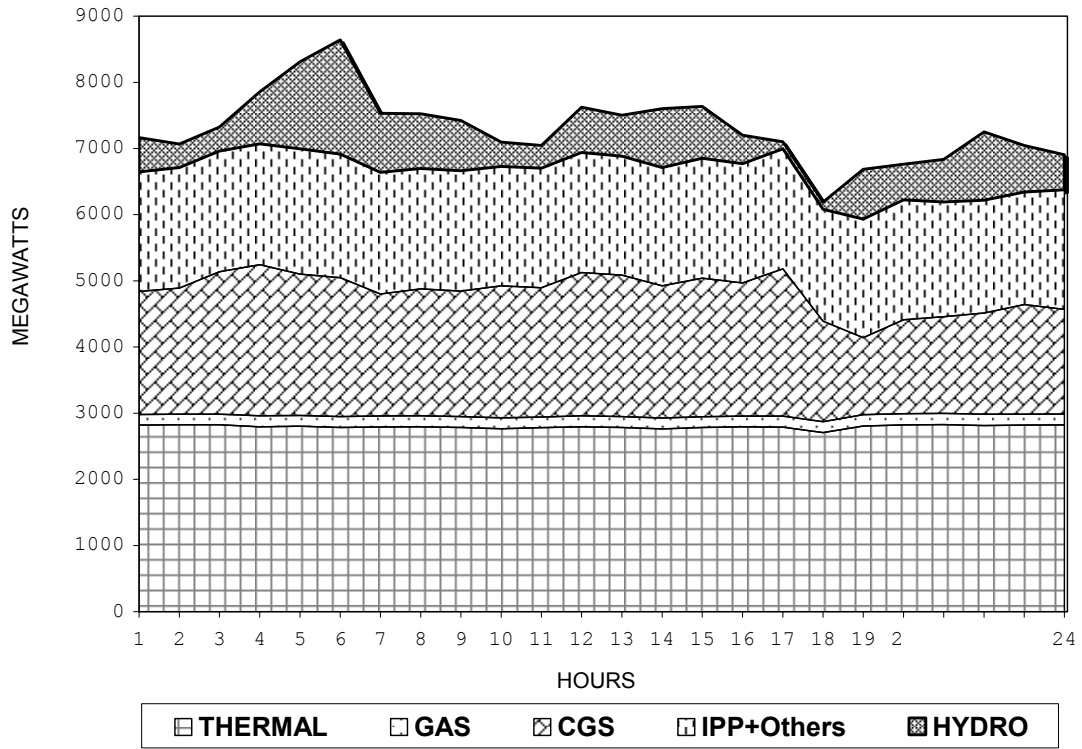
For 2006-07

In Monsoon, the daily load variations were between 4536 MW – 8281 MW in 2006-07. The load curves depict the demand incident on the system. System demand on 27th August 2006 was 8281 MW, and is the highest recorded in this season. System demand on 2nd July 2006 was 4536 MW, and is the lowest recorded in this season.

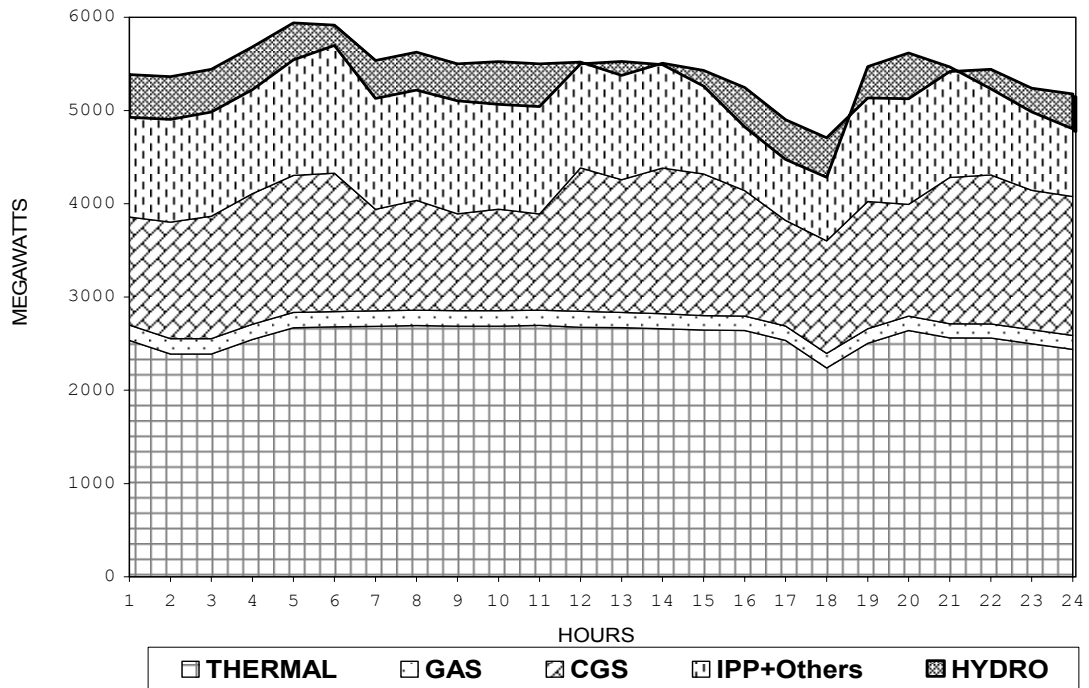
For 2007-08

In Monsoon, the daily load variations were between 4214 MW – 8607 MW in 2007-08. The load curves depict the demand incident on the system. System demand on 18th August 2007 was 8607 MW, and is the highest recorded in this season. System demand on 23rd June 2007 was 4214 MW, and is the lowest recorded in this season

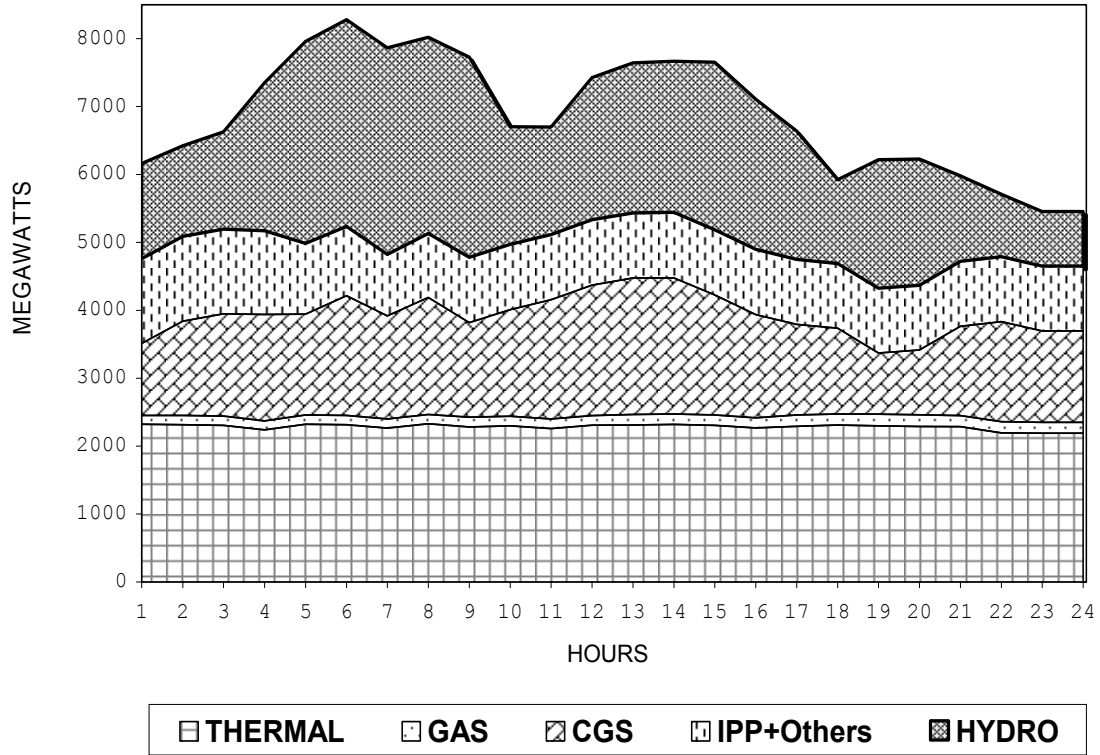
1(a) A.P TRANSCO- L.D. CENTRE
DEMAND CURVE ON 18 - MARCH - 2007



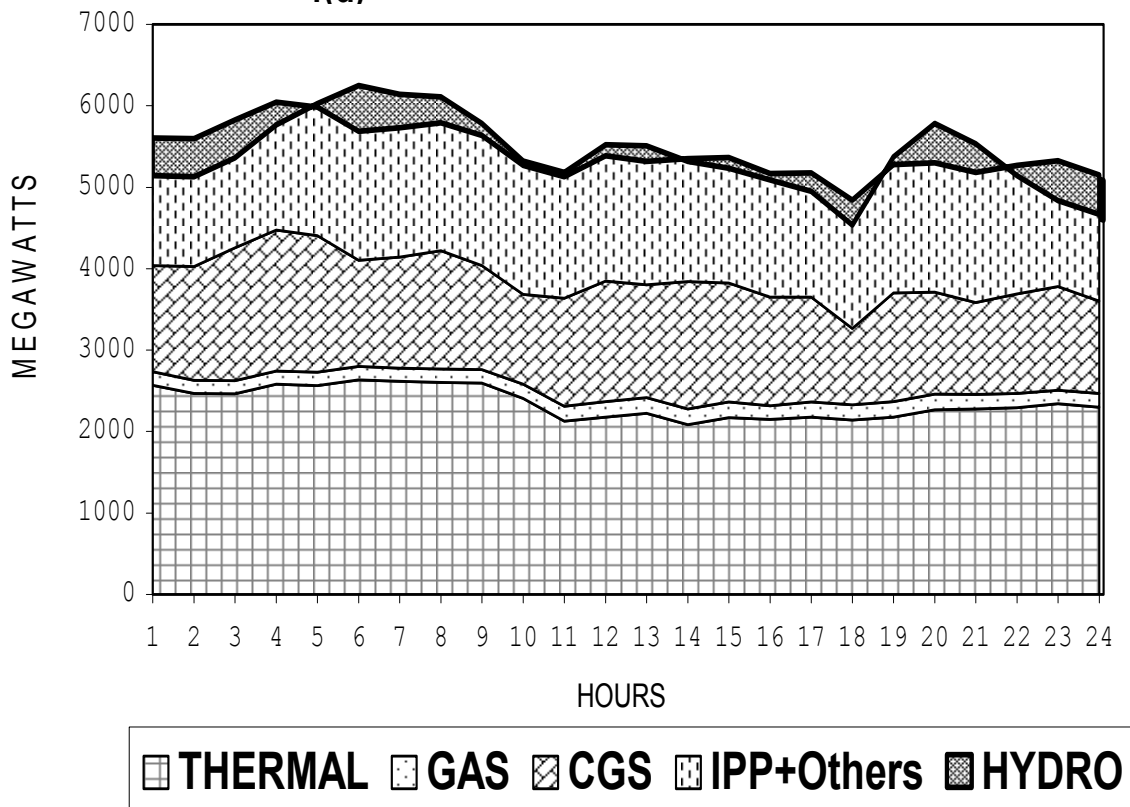
1(b) A.P TRANSCO- L.D. CENTRE
DEMAND CURVE ON 28 - MAY - 2006



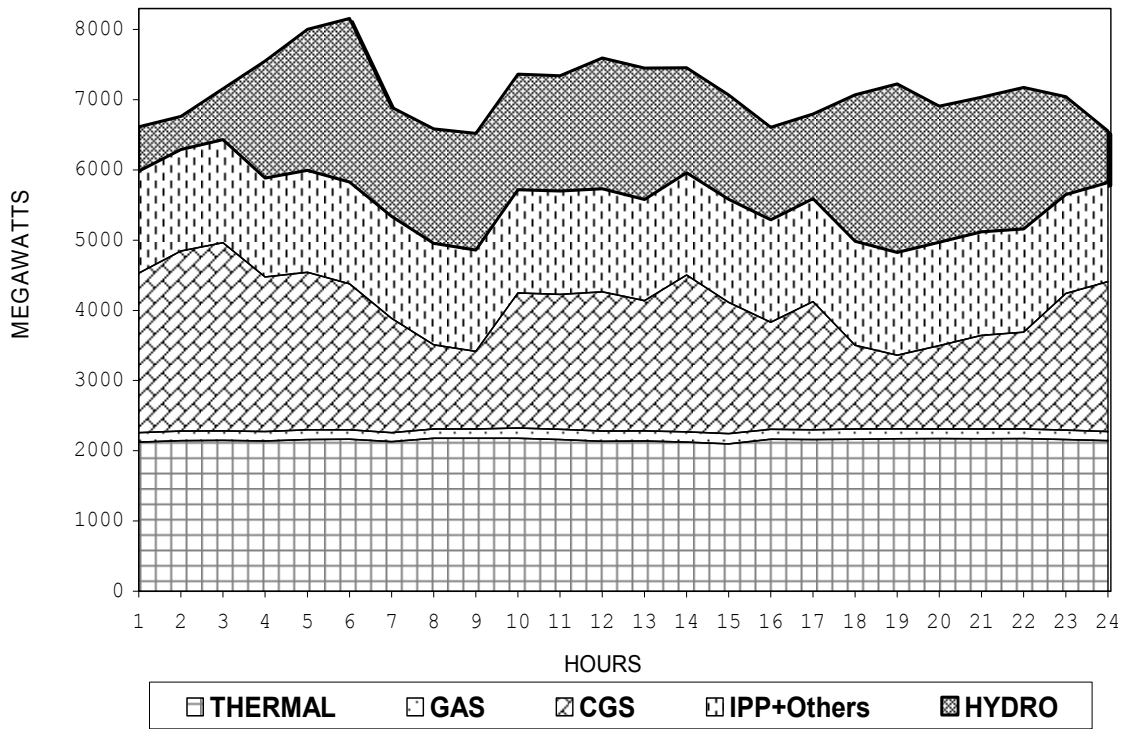
A.P TRANSCO- L.D. CENTRE
1(c) DEMAND CURVE ON 27 - AUGUST - 2006



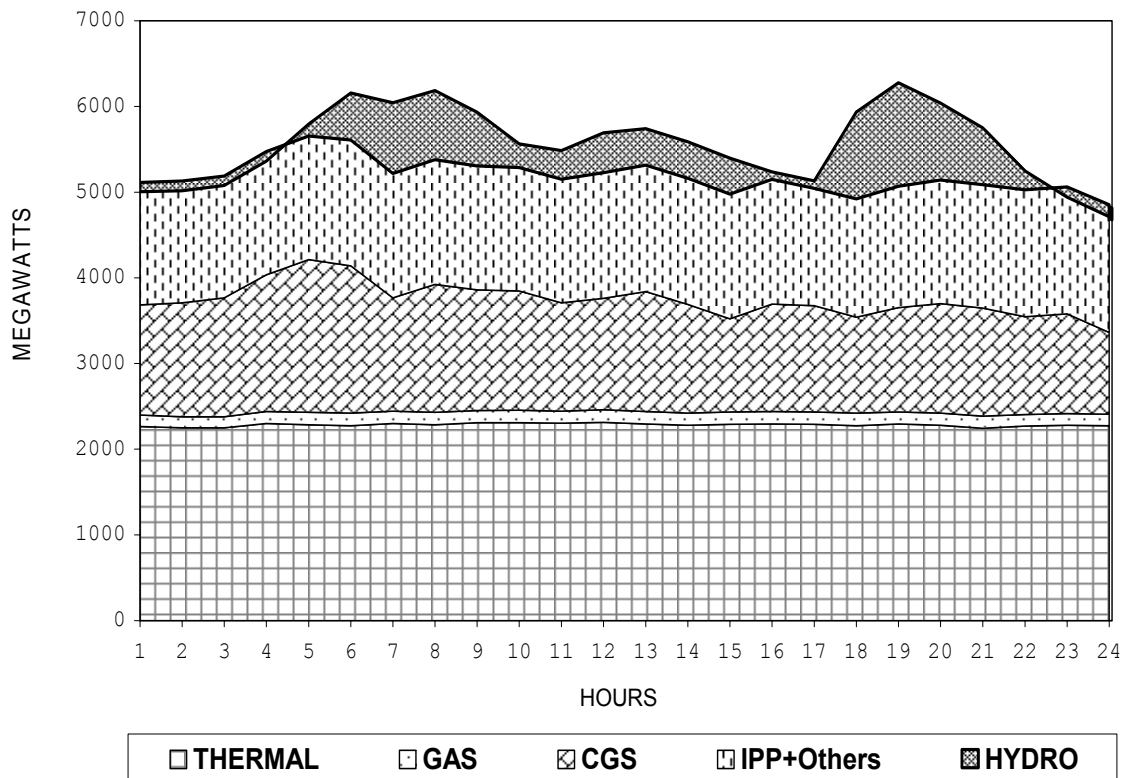
A.P TRANSCO- L.D. CENTRE
1(d) DEMAND CURVE ON 02 - JULY - 2006



**1(e) A.P TRANSCO- L.D. CENTRE
DEMAND CURVE ON 24 - OCTOBER - 2006**

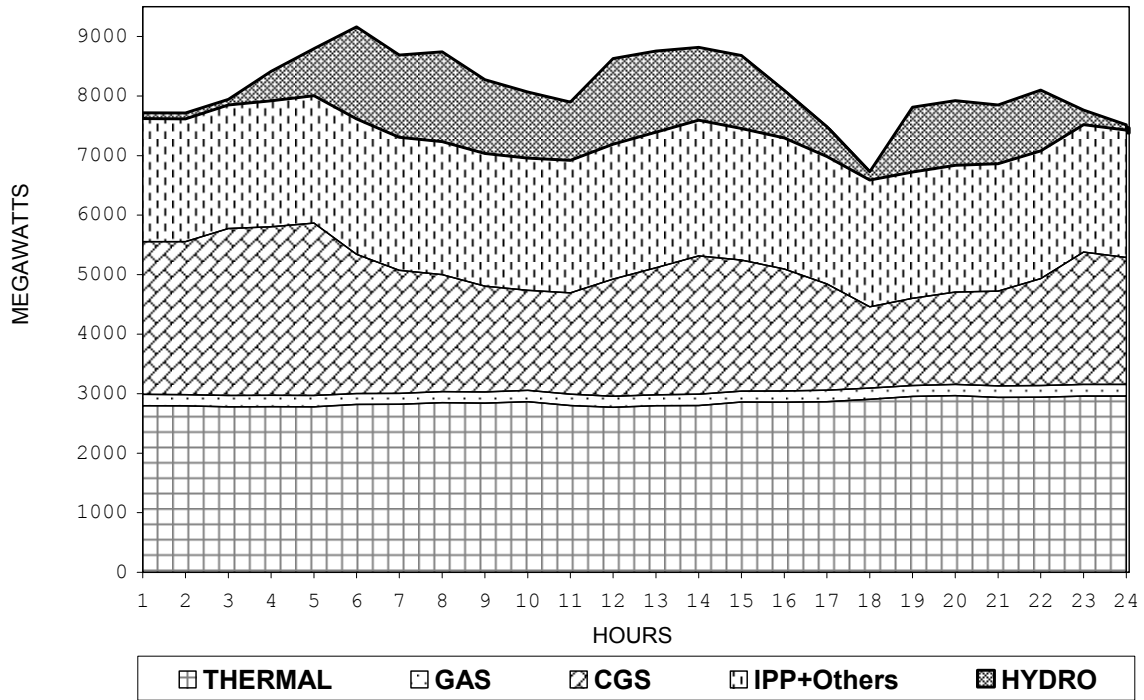


**1(f) A.P TRANSCO- L.D. CENTRE
DEMAND CURVE ON 02 - NOVEMBER - 2006**



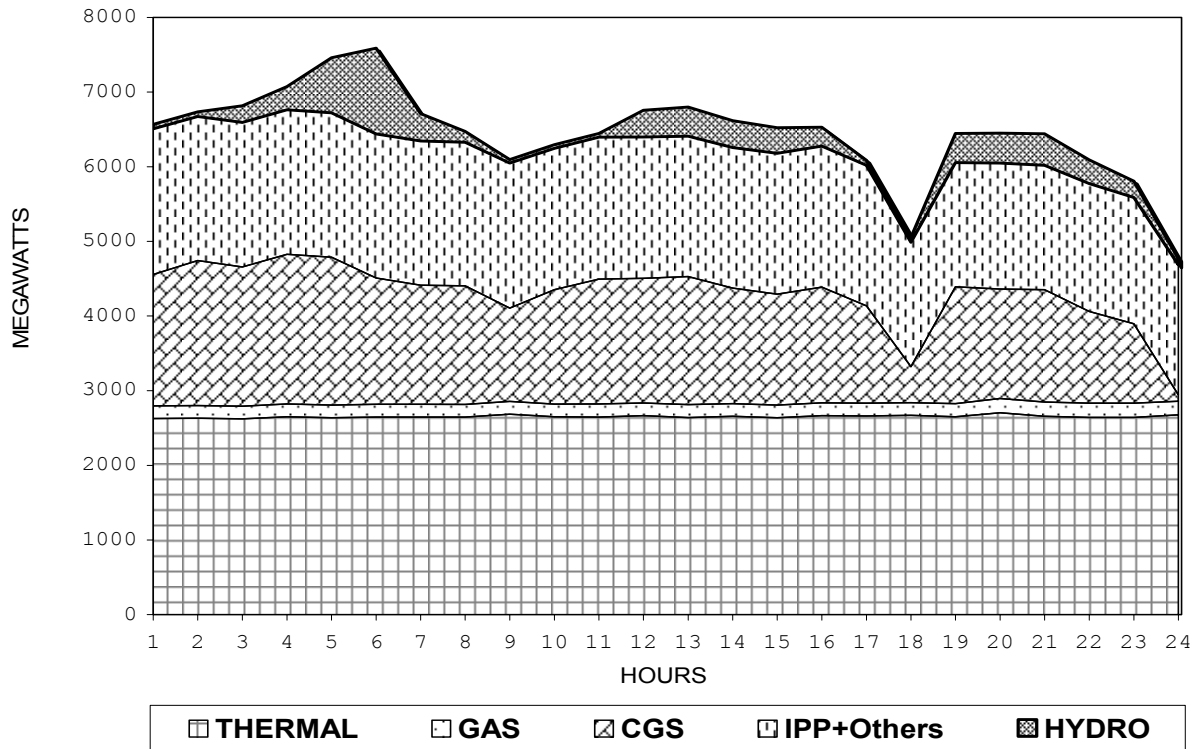
1(g)

A.P TRANSCO- L.D. CENTRE
DEMAND CURVE ON 20 - MARCH - 2008

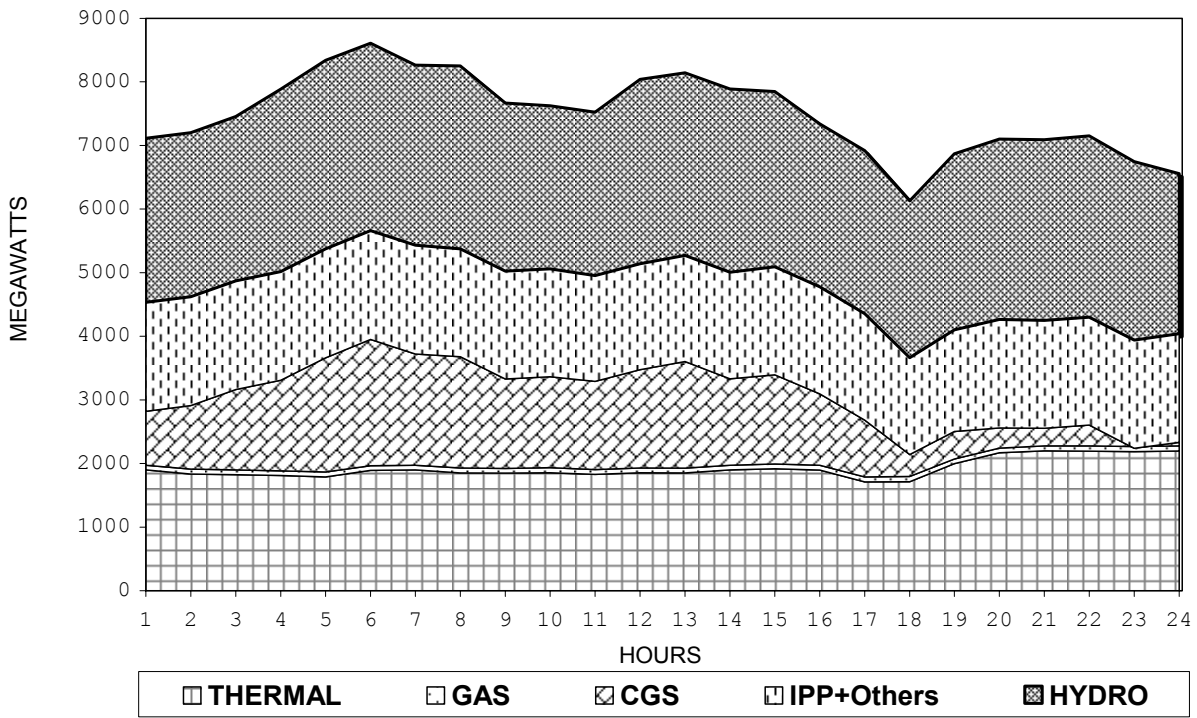


1(h)

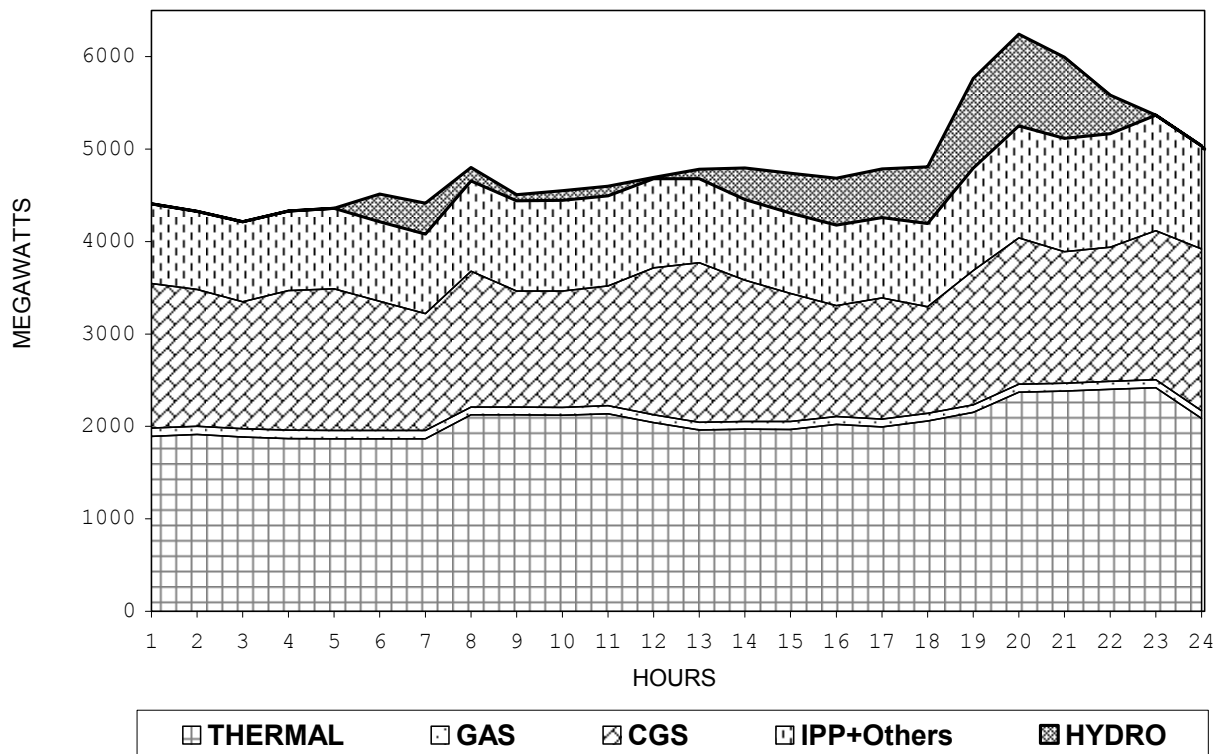
A.P TRANSCO- L.D. CENTRE
DEMAND CURVE ON 13 - APRIL - 2007



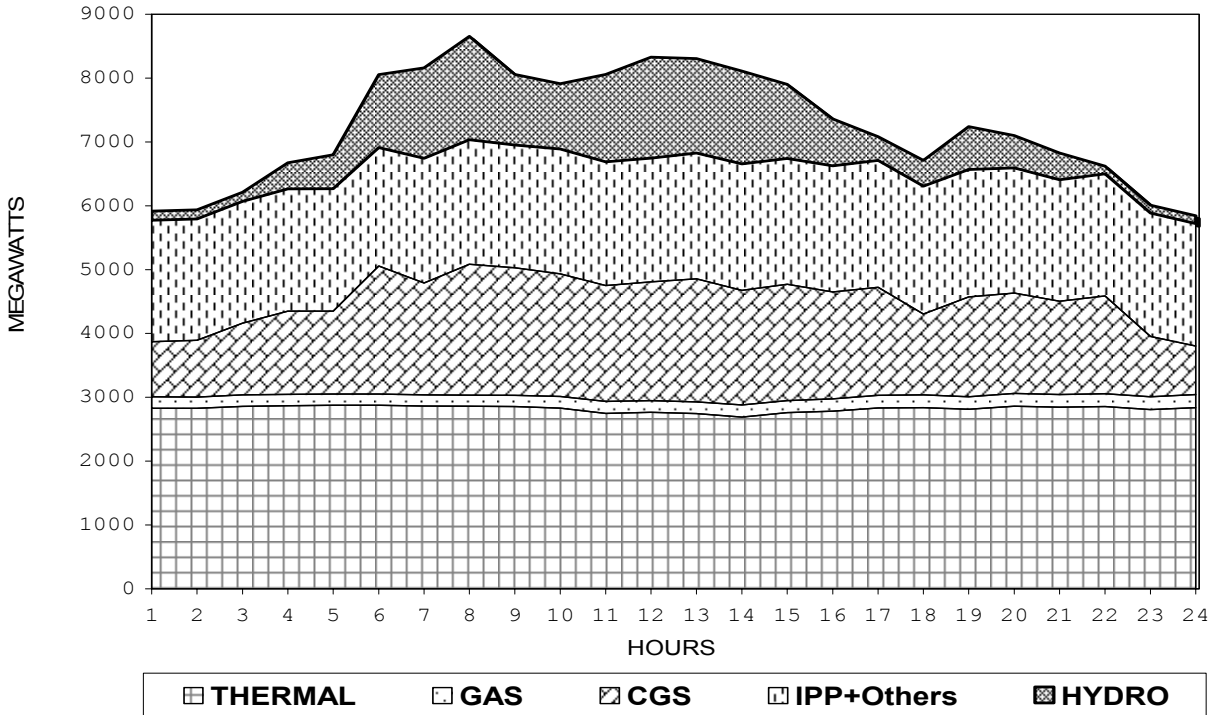
**1(i) A.P TRANSCO- L.D. CENTRE
DEMAND CURVE ON 18 - AUGUST - 2007**



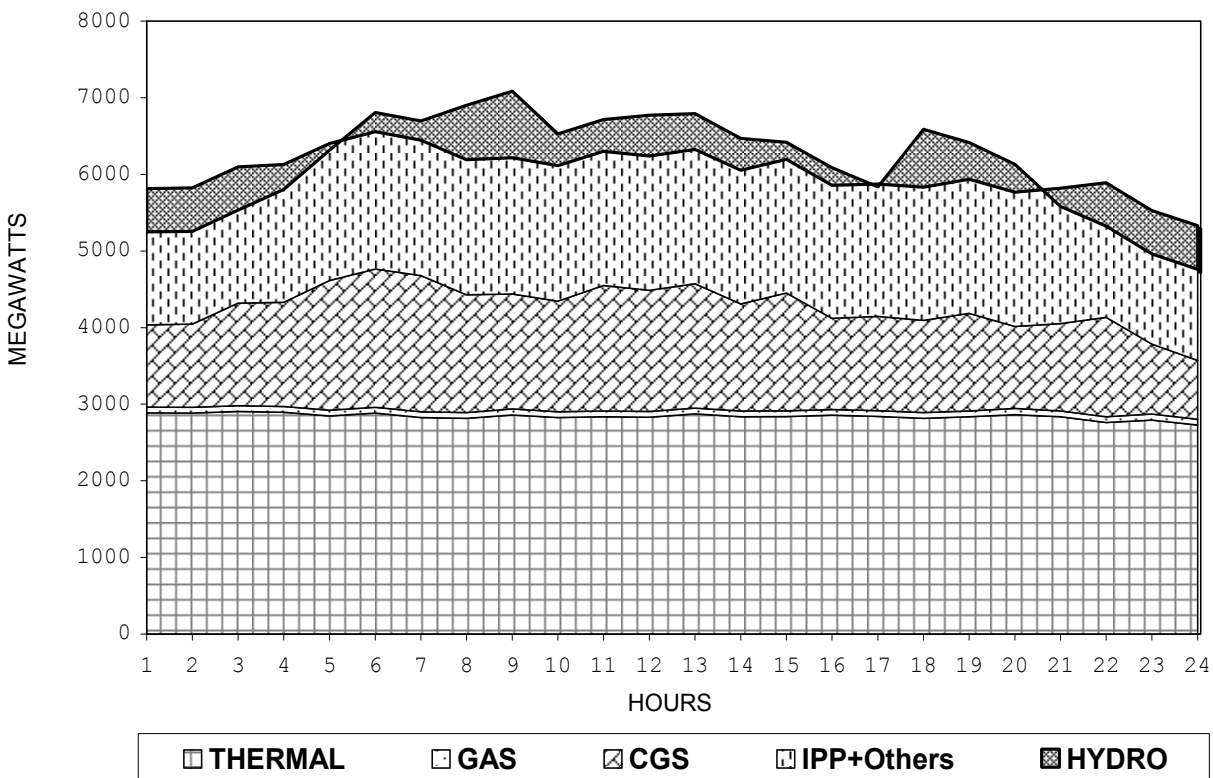
**1(j) A.P TRANSCO- L.D. CENTRE
DEMAND CURVE ON 23 - JUNE - 2007**



**1(k) A.P TRANSCO- L.D. CENTRE
DEMAND CURVE ON 11 - JANUARY - 2008**



**1(L) A.P TRANSCO- L.D. CENTRE
DEMAND CURVE ON 25 - NOVEMBER - 2007**



LOAD DURATION CURVES

1. Requirement in the guidelines

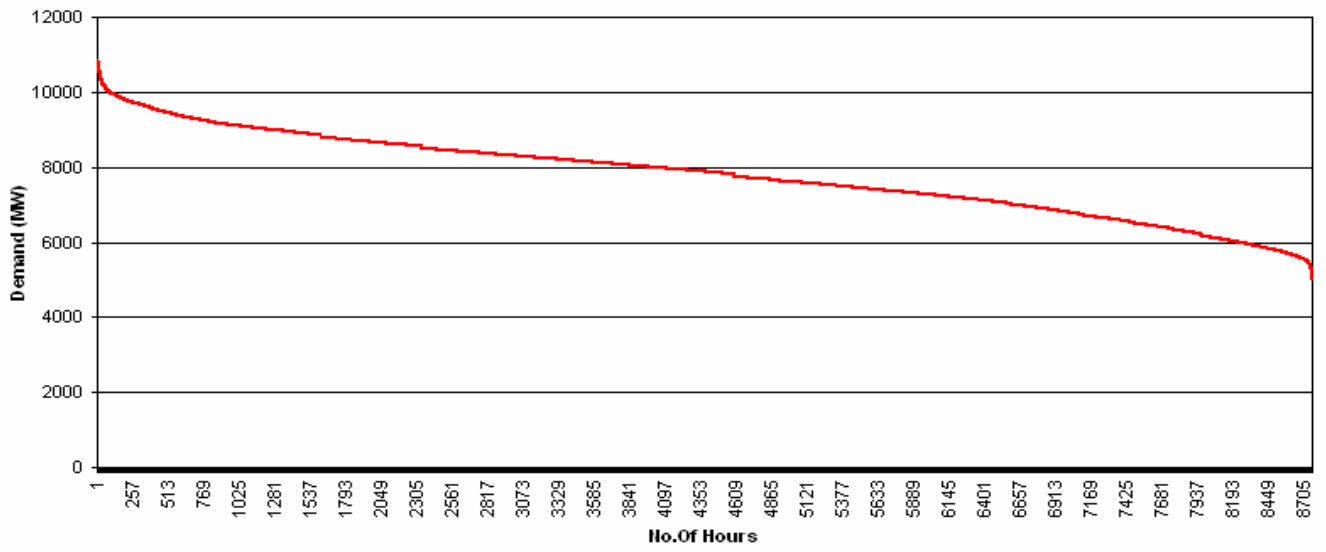
Load duration curves for the past year and current year and expected load duration curve for the ensuing year. Indicate energy unserved on the load duration curves. (Guidelines – 10b)

2. APTransco's Response:

The expected unserved energy is the energy loss to the consumers due to the insufficient generation of power. Central Electricity Authority (CEA) as given the target expected unserved energy (EUE) as 0.15% of energy requirement. The unserved energy during the financial year 2008-09 which is the starting year of 2nd control period would be around 3837.9 MU and it is attained, due to the delay in commissioning of the combined cycle gas projects. It is presumed that the gas will be available from January, 2009 onwards and all the future gas based projects will be running at full blast i.e. stipulated PLF as per the Power purchase agreement. The expected unserved energy for the financial year 2008-09 is 3837.9 MU (5.63%) and it is gradually reduced to 1360.7 MU (1.20%) by the end of 2nd control period i.e. FY 2013-14. This is due to the addition of 10249.35 MW of committed gross capacity under state, private and central sector programme of projects, which are at various stages of development. Even after addition of more than 10,000 MW of capacity additions, our system is not able to meet the required level of criteria. The current and ensuing year's load duration curves for 2nd control period are enclosed in annexure.No's. 2a to 2f.

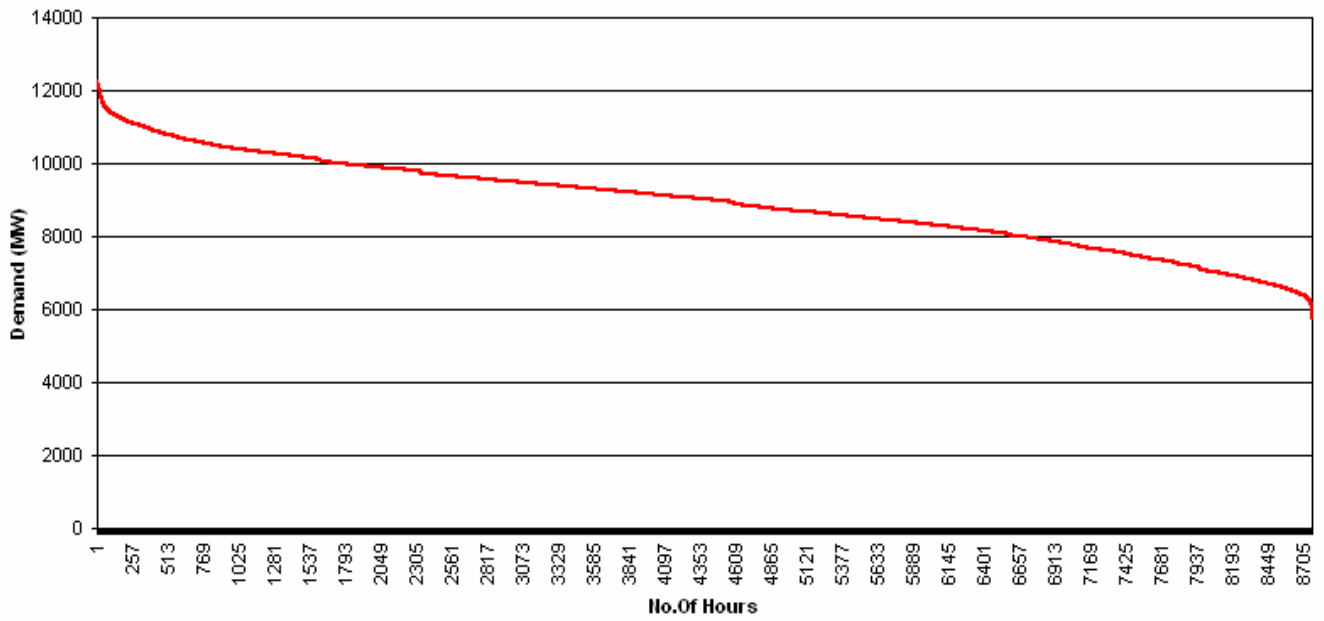
2(a)

Load Duration Curve For The Year 2008 - 2009

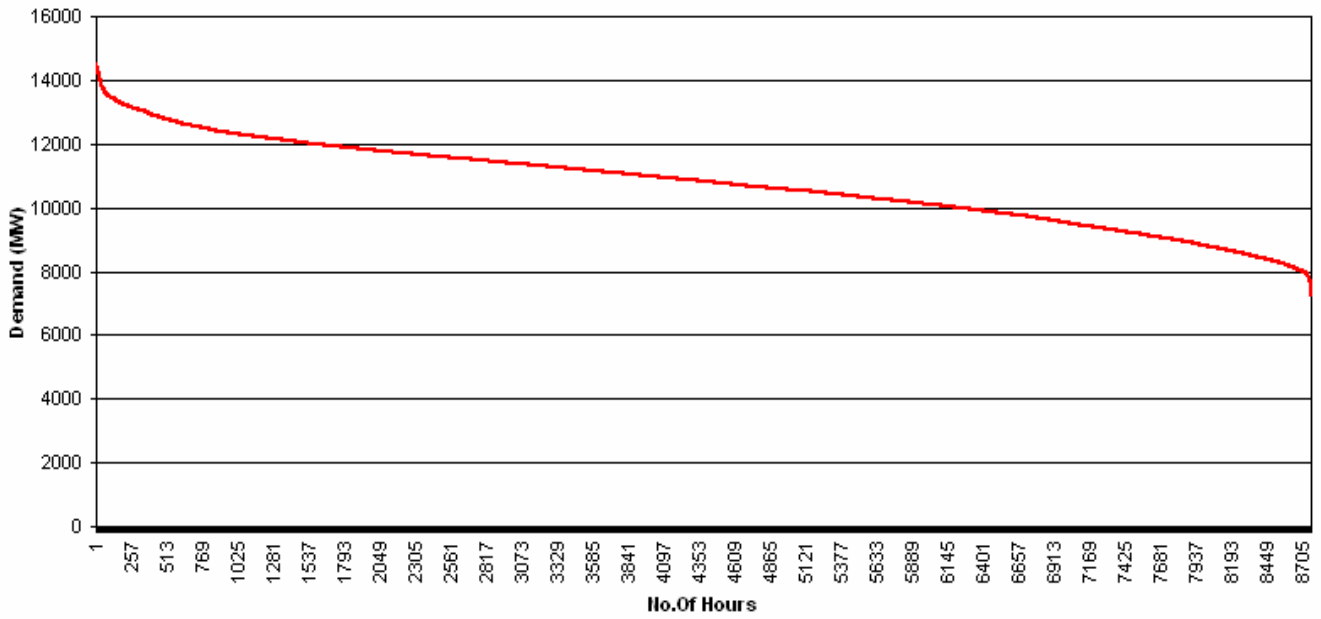


2(b)

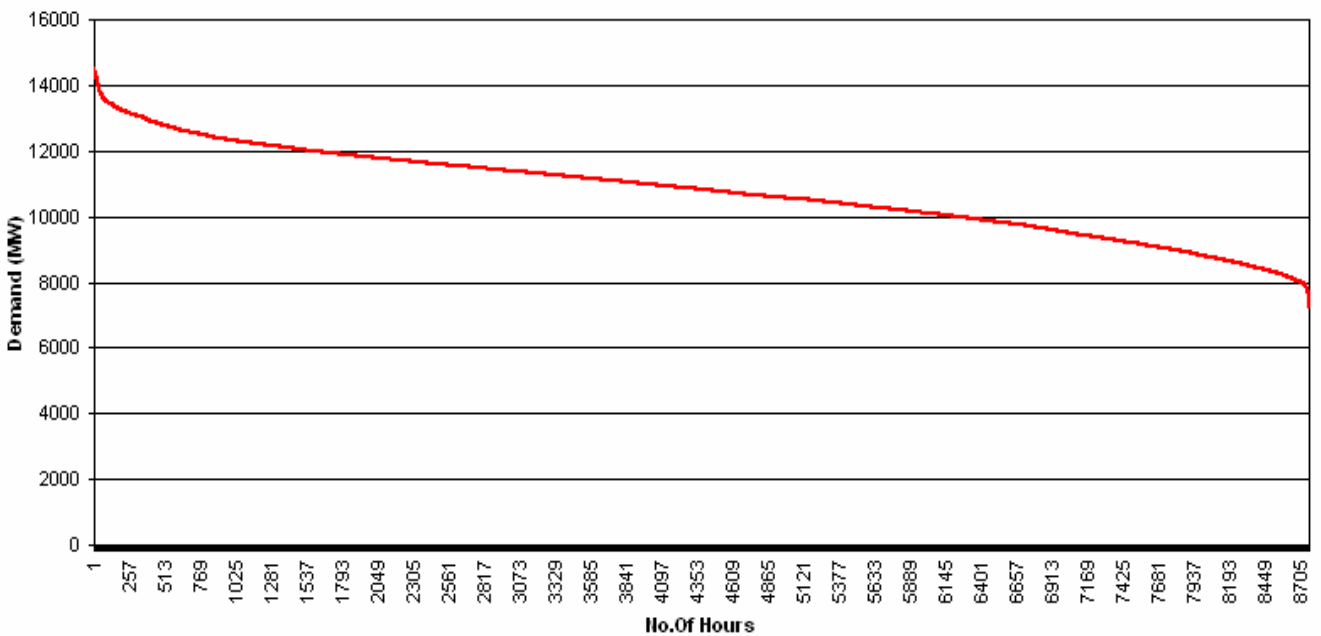
Load Duration Curve For The Year 2009 - 2010



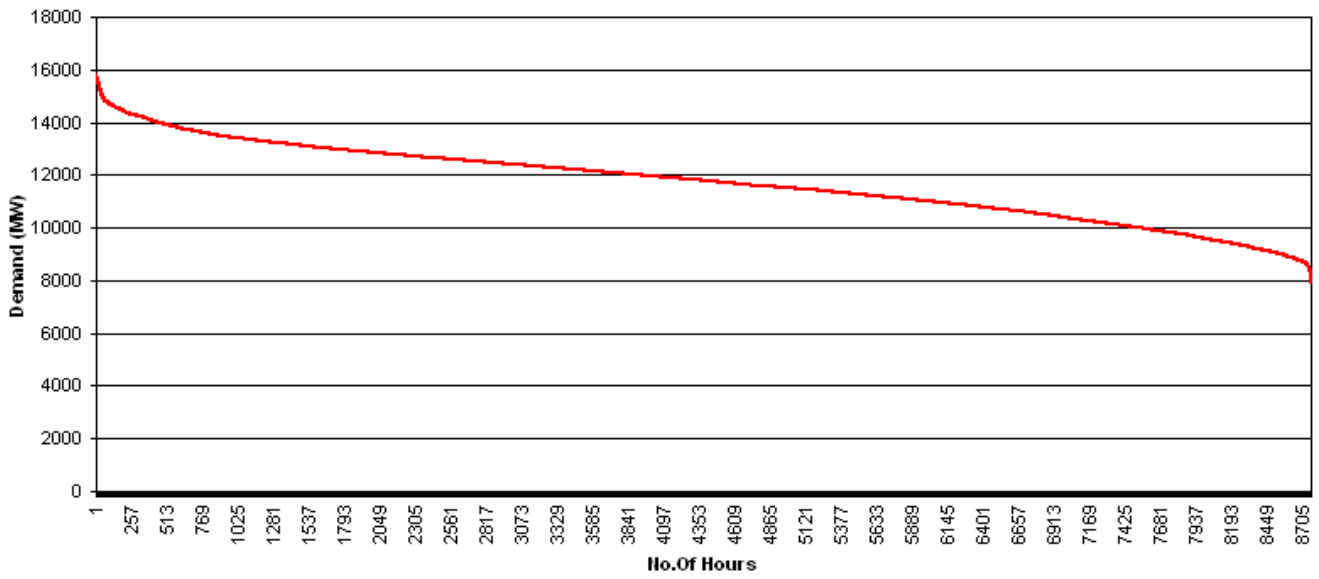
2(c) Load Duration Curve For The Year 2010 - 2011



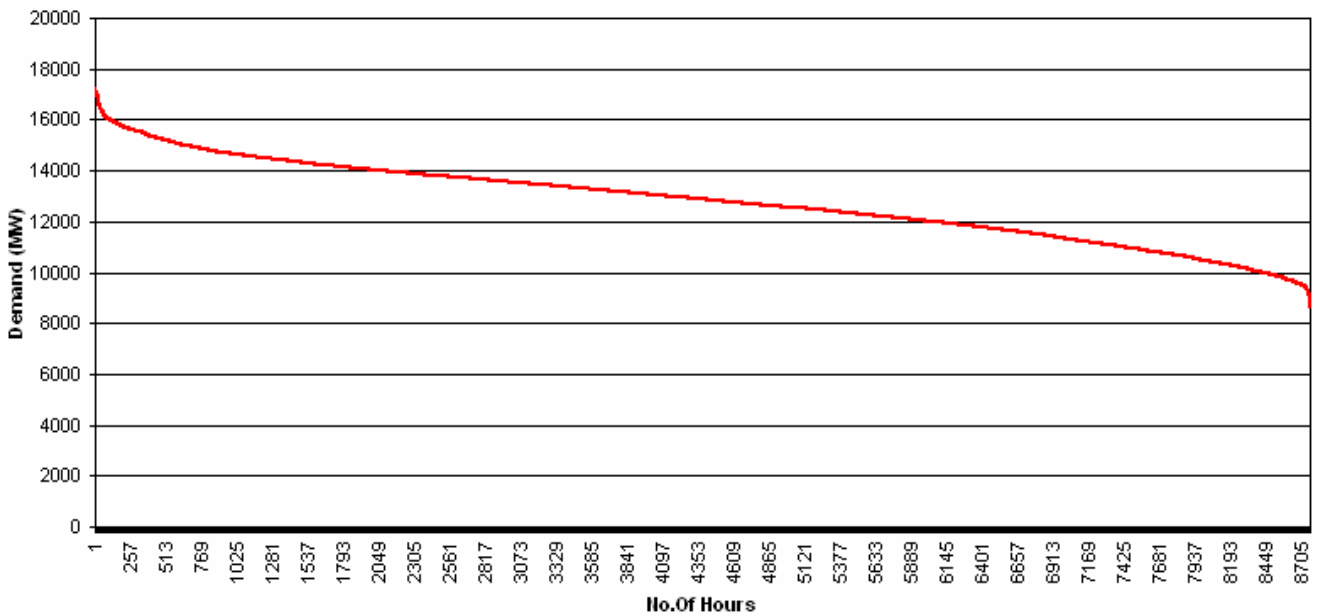
2(d) Load Duration Curve For The Year 2011 - 2012



2(e) Load Duration Curve For The Year 2012 - 2013



2(f) Load Duration Curve For The Year 2013 - 2014



PLANS FOR RATIONALISATION OF EXISTING MANPOWER

1. Requirement in the Guidelines

Plans both short term and long term for rationalization existing manpower (Guide lines-10c)

2. APTRANSCO response :

Initiatives for rationalization of existing manpower for 2nd Control Period for 2009-14 for both short term and long term plan:

- a) The Technical Committee was reconstituted for review and examination out sourcing practices in APTRANSCO.
- b) Following measures are taken while arriving posts proposed to be sanctioned & filled:
 - As per the Technical Committee report dt.09-09-2005 norms, posts are evolved for the lines & Sub-Stations to be commissioned in future, which are being treated as additional posts required.
 - Retirements are taken @ 3% for Financial Year.
 - As per the decision of Technical Committee and regular practice, 50% vacancies are proposed to be filled in AE & JAO cadre. For remaining cadres, no recruitment.
 - As ascertained, compassionate appointments are very meager i.e., 25 in 2006-07 & 10 in 2007-08. Hence not taken in to consideration.
- c) With reference to outsourcing functions, the following measure are being taken in usual practice:
 - The Operation & Maintenance of EHT Sub-Stations and lines that are to be commissioned in future in APTRANSCO, will be out sourced till such time regular posts are sanctioned and regular staff is recruited based on the instructions of the Govt.

- Non-Core functions such as House keeping, Watch and ward, Sweeper cum Gardening, Typing and Data Entry Operators are being outsourced, where sufficient regular staff is not available.
 - Further certain core functions such as assisting in shift and maintenance activities in Sub-Stations & Lines and MRT are also being out sourced.
- d) Considering all the above measures following is the man power projections in APTRANSCO.

Sl.No	Date	Sanctioned	Filled	Vacant
1	31.03.2008	7716	3598	4118
2	31.03.2014	8659	3907	4752

PLANS TO IMPROVE TRANSMISSION SYSTEM PERFORMANCE

1. Requirement in the Guidelines

Plans to improve transmission system performance. (Guidelines –10d).

2. APTransco's Response:

The transmission system of APTransco as of March 31, 2008 consists of 2988 Circuit kms of 400 kV lines and 12236 Circuit kms of 220 kV lines and 14706 Circuit kms of 132 kV lines. There are 8 Nos. 400 kV sub-stations, 90Nos. 220 kV sub-stations and 264 Nos. 132 kV sub-stations. In addition to the above, new lines of 95 Ckm of 400kV line, 358 Ckm of 220 kV lines, 462 ckm of 132 kV lines and new substations of 1 nos 400kV substation, 7 nos. 220 kV substation and 12 nos. 132 kV substations expected to be added during 2008-09, thereby increasing the overall transmission efficiency which is also one of the performance indicators of the System like transmission system availability, etc.

The transmission system is continuously growing since decades, but is not able to keep abreast of the growing system requirements mainly due to various reasons such as right of way problems while construction of transmission lines and difficulties in acquisition of land for construction of Sub-stations in urban areas, resource crunch and non-availability of adequate funds. While there are no major bottlenecks faced in evacuation of power from generating stations to the load centers.

During 2007-08, a sum of Rs482.06 Crs. was incurred for strengthening of Transmission network, which resulted in the addition of the following assets.

400 kV lines	172 circuit km.
220 kV lines	452 circuit km.
132 kV lines	392 circuit km
400 kV sub-stations	1 No
220 kV sub-stations	8 Nos.
132 kV sub-stations	8 Nos.

Measures to strengthen the existing transmission system would continue in the year 2008-09 at a total cost of Rs 969 Crs. by adding the following:

400 kV lines	95 Ckm
220 kV lines	358 Ckm
132 kV lines	462 Ckm
400 kV sub stations	1 No's
220 kV sub stations	7 No's.
132 kV sub stations	12 No's.

It is proposed to invest an amount of Rs. 7336 crores during Second Control Period i.e., from 2009-14 to strengthen the Transmission System by adding the following assets which includes the XLPE cable and GIS sub-stations in the twin cities.

400 kV lines	3031 Ckm
220 kV lines	2427 Ckm
132 kV lines	1401 Ckm
400 kV sub stations	4 No.
220 kV sub stations	27 No's.
132 kV sub stations	45 No's.

With the above strengthening measures of the Transmission system, it is expected that the transmission system would greatly improve and the voltage profile of the system will improve to a considerable extent.

LOAD PROFILES

1. Requirement in the Guidelines

Submit load profiles for sub-stations segregated by voltage levels and supplied parties. (Guidelines – 10e).

2. APTransco's response

Load curves for peak load days during summer, monsoon and winter seasons have been enclosed as Annexures 1a to 1L . These curves represents hourly demand in MW recorded at various voltage levels, on the days of the highest system peak was recorded for the respective seasons at various representative sub-stations as indicated below:

Mamidipalli – 400 kV
Gunadala – 220 kV
Erragadda – 132 kV
Shapurnagar – 220 kV
Chandrayanagutta – 220 kV
Gajuwaka – 220 kV
Bommur – 220 kV
Gachchi Bowli – 220 kV
Warangal – 220 kV
Cuddapah – 220 kV

At this stage, APTransco has provided the above data for representative sub-stations. It is respectfully submitted that providing such data for all the sub-stations in voltage levels and supplied parties would be a very voluminous and time-consuming process. In the event that the Hon'ble Commission requires such data for any other specific sub-station, APTransco would be glad to provide such data as may be directed.

PLANS FOR DETERMINING LOAD PROFILES

1. Requirement in the Guidelines

If information in (e) above is incomplete or non-existent, submit plans for determining load profiles on grid sub-stations and to determine system peak at different voltage levels. (Guidelines – 10f)

2. APTransco's response

At this stage, APTransco has provided the representative load curves at various voltage levels, recorded at some of the 220 kV and 132 kV sub-stations. However, as the erstwhile SEB was a vertically integrated utility in the past, it was not considered necessary at that time to record the system peak at various voltage levels. After the unbundling of the utility into a number of separate entities, operational metering will have to be introduced at various voltage levels in a phased manner. 0.5 class accuracy meters are provided at major 220/132 kV sub-stations. They have to be replaced with 0.2 class accuracy meters. Till such times these meters are made operational, the data logged at the sub-stations manually can be provided on request.

As on March 31,2008, there are 8 Nos. 400 kV SSs, 90 Nos. 220 kV sub-stations and 264 No's 132kV sub-stations in APTransco system. Data on hourly load profiles recorded at these sub-stations is being maintained manually. However, such data is not being used for determining the system peak load on a voltage level. Since the data is extremely voluminous and not computerized, and would result in substantial manual effort in collecting this data from the numerous sub-stations in the system, APTransco requests the Hon'ble Commission to grant a waiver from the requirement to submit system peak load at different voltage levels for this filing.

APTRANSCO State Load Dispatch Center at Hyderabad is formed under ULDC scheme of Southern Region with Four Sub-Load Dispatch Centers at Hyderabad, Kadapa, Vijayawada and Warangal. The Hardware and Software was supplied by the M/s GE Harris USA.

The XA 21 EMS/ SCADA system in the five hierarchical control centers integrating Remote Terminal Units located at 91 strategic substations and generating stations spread across the A.P. Grid for polling Real Time Data for efficient Energy Management System, Merit Order Dispatch and Stable System Operation.

As and when new feeders/ PTRs are commissioned in the existing RTU stations, they are being accommodated to acquire both analog and digital data in the existing RTUs itself. Already steps have been taken for procuring 27 Nos. RTUs for already commissioned/ upcoming 220 kv substations and generating stations.

The Substation Monitoring System of M/s ABB at newly commissioned 400kV Substations at Vemagiri, Chittoor, Nellore, Vellatur and Ditchpally is also integrated with the XA21 SCADA system of the SLDC. The data from the 400 kV Substation at Gajwel, is also being acquired from the local SMS system.

With the above data being made available at the centralized State Load Dispatch Center through reliable communication network and efficient EMS/ SCADA system, regular Grid Operations are being carried out in more secured and reliable manner.

Incorporation of latest advances in the technologies / Up gradation of the existing XA21 EMS/ SCADA as proposed by the Power Grid is being planned during the second control period of SLDC commencing from 2009-10 to 2013-14.

PLANS FOR CAPITAL EXPENDITURE

1. Requirement in the Guidelines.

Plans for all Capital Expenditure. (Guidelines – 10g)

2. AP Transco's Response

(1) PLANS FOR CAPITAL EXPENDITURE for 220KV and 132 KV Schemes

Capital works are being taken up for Strengthening of the Transmission System and to improve the system voltage profile and also to enhance the reliability of the system. In order to cope with the above, a number of new 220 kV & 132 kV substations and Augmentation of Transformer Capacities at various 220 kV & 132 kV existing substations are being erected under REC/PFC/JICA/Commercial Banks and Internal Funding under Normal Plan.

3. SCHEME UNDER PFC FUNDING:

(A) Old Schemes:

- Works are completed for erection of 220/132 kV substations at Shadnagar, Kondamallepalli, Kalayandurg, Tekkali, Kamavarapurkota, Bhimavaram are commissioned. Works are under progress in respect of 220/132 kV substations at Bellampalli and Palamaneru and are programmed for completion by March 2010.

(B) Schemes sanctioned and works are under execution:

- To cope with the load growth by establishing the number of Industrial, Commercial and residential loads in Erragadda & Chilakalaguda area in twin cities, a Scheme for erection of 2 Nos. 220 kV GIS substations at Erragadda & Chilakalaguda along with connected XLPE UG cable lines has approved by APTRANSCO at an estimated cost of Rs. 510.00 Cr. Since all the proposed substations are located in highly populated areas where availability of sufficient land and necessary clearances for take off for overhead transmission lines is difficult due to the right of way problems hence, it is proposed to erect SF6 Gas Insulated Switchgear (GIS) substations with 220 kV Under Ground XLPE cable lines. The above works are programmed for completion by August 2010.

- Augmentation of Transformer capacities are proposed to meet the immediate load growth in 5 Nos. 220 kV & 5 Nos. 132 kV sub-stations by enhancing the capacity from 100 MVA to 160 MVA in 5 Nos. 220 kV sub-stations, 50 MVA to 80 MVA in 1 No. 132 kV sub-station and erection of additional 50 MVA in 4 Nos. 132 kV sub-stations. The total scheme cost is Rs. 91.50 Cr. The works are under progress and programmed for completion by March 2009.
- Augmentation of Transformer Capacity in 21 Nos. 132 kV sub-stations are proposed at a scheme cost of Rs. 27.20 Cr. The works are under progress and expected to be completed by March 2009.

3. SCHEME UNDER REC FUNDING:

- So far 4 Nos. 132 kV SS in Mahaboobnagar, 7 Nos. 132 kV SS in Nalgonda, 6 Nos. in Karimnagar, 2 Nos. in Adilabad district and various 23 Nos. 132 kV sub-station in the state are commissioned under REC funding. Works are under progress for the schemes in respect of Avanigadda, Rajanagaram, Karampudi, Mantralayam and leeza and are programmed for completion during 2008-09 to 2009-10.
- Augmentations of Transformer Capacities in various 63 Nos. 132 kV existing substations are proposed to meet immediate load demand at an estimated cost of Rs. 111.09 Cr. The works are under progress and are expected to be completed by March 2010.

4. SCHEME UNDER JICA FUNDING:

To develop the Transmission Network in the twin cities of Hyderabad & Secunderabad, so as to cope up with the load growth in the twin cities and to provide quality power supply and to avoid low voltage problem, a Scheme for erection of 3 Nos. 220 kV substations (2 Nos. conventional & 1 No. GIS) and 5 Nos. 132 kV GIS substations along with connected XLPE UG Cable lines & bay extensions was proposed and was approved by APTRANSCO at an estimated cost of Rs. 1195.50 Cr.

Since all the proposed substations are located in highly populated areas of the twin Cities where availability of sufficient land and necessary clearances for take off for overhead transmission lines is difficult due to the right of way problems, hence it is proposed to erect SF6 Gas Insulated Switchgear (GIS) substations with 220 kV or 132 kV Under Ground XLPE cables.

The above works are being taken with financial assistance from M/s Japan International Co-operation Agency. The loan Agreement was signed between Gol and M/s JICA on 30th March 2007 for loan amount of Rs. 940.00 Cr. The balance estimated amount will be met from own funds i.e. Normal Plan. As per the loan Agreement the works are to be completed by December 2010. Hence provision was made in the ARR accordingly.

5. SCHEME FUNDED BY OTHER FINANCIAL INSTITUTIONS:

- For system improvement in twin cities a scheme was formulated for erection of 2 Nos. 132 kV GIS substations at Fever Hospital and Narayanaguda with XLPE UG cable lines and 1 No. 220 kV substation at Bachupalli along with connected XLPE UG cable lines to meet the load demand of IT Parks in and around the project area. The estimated cost is Rs. 279.10 Cr. The works are programmed to be completed by March 2012.
- APTRANSCO has approved for erection of 220/132 kV sub-station at Pulivendula along with connected 220 kV and 132 kV lines for evacuation of power from RTPP stage – III at a total scheme cost of Rs. 103.37 Cr. The works are programmed to be completed by June 2010.
- APTRANSCO has approved for erection of 220/132 kV sub-station at Jurala along with connected 220 kV and 132 kV lines for evacuation of power from Priyadarshini Jurala Hydro Electric Project (6x39 MW) at a total scheme cost of Rs. 45.37 Cr. The works are programmed to be completed by February 2010.
- APTRANSCO has approved for erection of 220/132 kV sub-station at Rentachintala along with connected 220 kV and 132 kV lines for evacuation of power from Nagarjuna Sagar Tail Pond Dam (2 x 25 MW) at a total scheme cost of Rs. 30.70 Cr. The works are programmed to be completed during 2008-09.

- For evacuation of power from Lower Jurala Hydro Electric Project (6x40 MW), a Double circuit was proposed from the Lower Jurala Hydro Electric Project (6 x 40 MW) to 220/132 kV Jurala sub-station at an estimated cost of Rs. 35.00 Cr. The works are programmed to be completed by March 2013.
- Augmentation of Transformer capacities at various 220 kV & 132 kV substations are proposed to meet immediate load demand and are programmed to be completed during 2008-09 to 2010-2011.
- Further, various 132 kV and 220 kV substations are proposed to meet the growing load demand in rural and urban areas and are being funded by various commercial Banks.

Details of the commissioned lines and substations pertains to 220 kv and 132 kV Schemes during first control period are mentioned below.

Description	Fy 05-06	Fy 06-07	Fy 07-08	Fy 08-09	
				Upto 10/08	11/08 - 03/09
220 kV lines in CKM	107.86	214.31	446.40	70.77	287
220 kV Substations	1	3	11	-	7
132 kV lines in CKM	543.839	418.74	387.20	120	342
132 kV Substations	17	13	8	2	10
Capacitor Banks (MVAR)	10	160	15	5	10
Augmentation (MVA)	1429.50	1365	1595.00	859	600

(II) PLANS FOR CAPITAL EXPENDITURE for 400kV Schemes

Capital Works of 400 kV Transmission Schemes are being taken up for,

1. Evacuation of power from the Power Projects,
2. System improvement i.e. to meet the additional load demand and for improvement of voltage profile, Voltage control and reduction of Transmission Losses.

Capital works are mainly funded by JBIC (Japan), Power Finance Corporation Limited, Rural Electrification Corporation Limited & now recently from various Commercial Banks.

The transmission schemes under execution and new schemes proposed and status of the works are indicated below.

A) Schemes undertaken for evacuation of power (On-going) :

1. Short Gestation Power Transmission Scheme-II is taken up for evacuation of power from the Short Gestation Power Projects, beyond Vemagiri 400/220 kV Substation.

- The scheme consists of erection of 400/220kV Substation at Narasaraopeta with 2x315 MVA transformer capacity and 170 ckm of 400kV Lines;
 - a) LILO from Nunna-Srisailam (LBPH) 400kV D/C Line to Narasaraopeta 400kV S/S,
 - b) Vemagiri - Narasaraopeta 400kV D/C Line – 85 km (extension of Vemagiri - Nunna 400kV Line from Nunna to Narasaraopeta 400kV Substation, by-passing Nunna),
 - c) 400/220kV Substation at Narasaraopeta – 2 x 315 MVA Transformer capacity,
 - d) 4 Nos. of 400 kV Bay extensions at Vemagiri 400/220kV Substation for LILO of Gajuwaka – Nunna 400kV D/C Line of PGCIL.
- The scheme includes the associated 220 kV System consisting of erection of 220/132kV Substations at Narasaraopeta & Parchur with a transformer capacity of 2 x 100 MVA each and 246 ckm of 220kV Lines;

- a) Narasaraopeta (400kV) - Narasaraopeta 220kV D/C Line with OPGW – 8 km,
 - b) Narasaraopeta (400kV) - Parchur 220kV D/C Line – 55 km,
 - c) Parchur - Podili 220kV D/C Line – 60 km,
 - d) 220/132 kV Substation at Narasaraopeta - 2 x 100 MVA,
 - e) 220/132 kV Substation at Parchur - 2 x 100 MVA,
 - f) 2 Nos. 220 kV Bay extensions at Podili 220/132kV Substation.
- The Administrative Approval for the Scheme was issued on 23-03-2005 with an estimated cost of Rs.324.37 Crore and an IDC of Rs.39.41 Crore. M/s.REC Limited has sanctioned a loan of Rs.252.74 Crore for the scheme vide Scheme Code 013237, dated 24-01-2006. The Commissions Reference Number assigned by APERC vide letter dated 04-01-2006 for the scheme is APT/TS/400/F-INVT-55/2006.
 - 2 Nos. 400kV Bay extensions at Vemagiri 400/220 kV Substation for LILO of Gajuwaka-Nunna 400kV D/C Line of POWERGRID are commissioned on 23-03-2008 and erection of remaining 2 bays is under progress.
 - The land acquisition for 400/220 kV Substation is under process and the associated scheme will be taken up after the land is acquired.
 - The scheme is proposed to be completed in FY 2011-12.

2. Vijayawada Power Transmission Scheme is taken up for evacuation of power from the Vijayawada Thermal Power Station Stage-IV.

- a) LILO from Nunna – Srisailam/Narasaraopeta 400 kV D/C Line to VTPS-IV: 2x5 km;
 - b) 400 kV D/C Line from VTPS Stage-IV to Malkaram : 268 km;
 - c) 2 Nos. 400 kV bay extensions at Malkaram 400 kV Substation;
- The revised Administrative Approval for the Scheme was issued on 17-06-2008 with an estimated cost of Rs.405.55 Crore and an IDC of Rs.22.50 Crore. The financial assistance is arranged from the Commercial Banks. The Commissions Reference Number assigned by APERC vide letter dated 22-05-2008 for the scheme is APT/TS/400/F-INVT-90/2008.

- LILO from Nunna – Srisailam 400 kV D/C Line to VTPS Stage-IV is under progress and proposed for commissioning during 2008-09 to match with the commissioning of the VTPS Stage-IV unit.
- Tendering is under progress for VTPS-IV – Malkaram 400kV D/C Line and proposed to be completed in FY 2011-12.

B) System improvement Schemes (On-going) :

1. Dichpally and Gajwel Transmission Scheme :

- The scheme consists of erection of 400/220kV Substation at Dichpally and 400/220/132 kV Substation at Gajwel along with the associated 400kV & 220 kV system;
- The revised Administrative Approval for the Scheme was issued on 19-02-2007 with an estimated cost of Rs.398.78 Crore and an IDC of Rs.33.30 Crore. The financial assistance of Rs.300.90 Crore was sanctioned by M/s.PFC Limited vide Loan No.31403063. The Commissions Reference Number assigned by APERC for the scheme is APT/TS/400 kV/F-INVT-47/2005.
 - 400/220kV Substation at Dichpally - Commissioned on 30.03.2008 and Commercial operation started from 05-04-2008,
 - 400kV DC/SC Line from Ramagundam to Dichpally (171.52 ckm) & 400kV bay extension at Ramagundam, NTPC Switchyard - Commissioned on 30.03.2008,
 - Dichpally (400kV) to Dichpally 220kV DC Line & 2 Nos. 220kV bay extensions at Dichpally 220/132 kV Substation - Commissioned on 05-01-2008,
 - 400/220/132kV Substation at Gajwel - Commissioned on 05-08-2008,
 - 400kV D/C Line for LILO from Ramagundam – Ghanapur 400kV S/C Line of Powergrid to Gajwel 400/220/132 kV Substation - Commissioned on 05-08-2008,
 - 220kV DC/SC Line from Gajwel (400kV) to Kamareddy (220kV),
 - LILO from Medchal–Minpur 220kV D/C Line to Gajwel 400kV S/S,
 - 220/132 kV Substation at Kamareddy with 2x100 MVA Power Transformers,

- The 220kV works under (f), (g) & (h) are under progress and are expected to be completed by July, 2009.

2. 400 kV Augmentation Scheme :

- The scheme consists of erection of 315 MVA, 400/220kV Power Transformers at Mamidipally (Hyderabad), Chittoor & Mahaboobnagar 400/220kV Substations;
 - a) Erection of 1 No. 315 MVA, 400/220 kV Power Transformer at Mamidipally (Hyderabad) 400/220 kV Substation,
 - b) Erection of 1 No. 315 MVA, 400/220 kV Power Transformer at Chittoor 400/220kV Substation,
 - c) Erection of 2 Nos. 315 MVA, 400/220 kV Power Transformers at Velloor, (Mahaboobnagar) 400/220 kV Substation,
- The Administrative Approval for the Scheme was issued on 29-04-2006 with an estimated cost of Rs.89.15 Crore. The financial assistance is arranged from the Commercial Banks. APERC has accorded investment approval for an amount of Rs.89.15 Crore and an IDC of Rs.2.88 Crore considering the revised line lengths as per the surveys and Commissions Reference Number assigned for the scheme is APT/TS/400/F-INVT-69/2007.
- 1 No. 315 MVA, 400/220kV Power Transformer along with bay extension works at Mamidipally 400/220kV Substation is completed and commissioned on 11-12-2007.
- The augmentation of power transformer capacities at Chittoor and Mahaboobnagar are under progress and programmed for completion during 2009-10.

3. 400 kV Ring main Transmission Scheme :

- The scheme consists of erection of 400/220kV Substations at Malkaram and Yeddumailaram along with the associated 400kV & 220 kV system;
 - a) 400/220 kV Substation at Malkaram – 2 x 315 MVA Transformer capacity,
 - b) 400 kV D/C Line for LILO of Ramagundam – Ghanapur 400 kV S/C Line of Powergrid to Malkaram 400 kV Substation - 27 km,

- c) 400/220 kV Substation at Yeddumailaram – 3 x 315 MVA Transformer capacity,
 - d) Hyderabad (Mamidipally) - Yeddumailaram 400 kV D/C Line - 108 km,
 - e) Yeddumailaram - Gajwel 400 kV D/C Line - 107 km,
 - f) 2 Nos. 400 kV bay extensions at Hyderabad (Mamidipally) 400kV Substation,
 - g) 2 Nos. 400 kV bay extensions at Gajwel 400 kV Substation,
 - h) Yeddumailaram (400 kV) - Yeddumailaram 220kV DC Line – 15 km,
 - i) 2 Nos. 220 kV bay extensions at Yeddumailaram 220/132 kV Substation.
- The Administrative Approval for the Scheme was issued on 22-10-2005 with an estimated cost of Rs.437.73 Crore and an IDC of Rs.35.46 Crore. The financial assistance of Rs.374.90 Crore was sanctioned by M/s.PFC Limited vide Loan No.31403083. APERC has accorded investment approval for an amount of Rs.455.71 Crore and an IDC of Rs.77.44 Crore considering the revised line lengths as per the surveys and Commissions Reference Number assigned for the scheme is APT/TS/400/F-INVT-66/2006.
 - Works of 400 kV D/C Line for LILO of Ramagundam – Ghanapur 400 kV S/C Line of Powergrid to Malkaram 400 kV Substation are under progress and programmed for completion by December, 2008. In case of Malkaram 400/220 kV Substation, LOI is issued on 31-07-2008 to M/S ECI, Hyderabad and the detailed Purchase order is being issued. The substation is proposed to be completed during 2009-10.
 - The land acquisition for Yeddumailaram 400kV Substation is under progress. The associated scheme will be taken up after the land is acquired and proposed to be completed during 2010-11 except the Yeddumailaram – Mamidipally 400kV D/C Line which is proposed to be completed during 2011-12.

C) Schemes proposed for evacuation of power (New Schemes) :

1. Bhoopalapally Power Transmission Scheme is taken up for evacuation of power from the Kakatiya Thermal Power Project (1x500 MW & 1x500+20% MW) :

- The scheme consists of the following transmission lines and associated bay extensions:
 - a) 400kV D/C Line from Bhoopalapally TPP to Warangal 400kV S/S of PGCIL – 44 km,
 - b) 400kV D/C Line from Bhoopalapally TPP to Gajwel 400/220/132kV S/S – 130 km,
 - c) 2 Nos. 400 kV Bay extensions at Warangal 400/220kV Substation of PGCIL,
 - d) 2 Nos. 400 kV Bay extensions at Gajwel 400kV Substation.
- The Administrative Approval for the Scheme was issued on 05-07-2008 with an estimated cost of Rs.234.27 Crore and an IDC of Rs.27.64 Crore. The financial assistance from the Commercial Banks is under process. The investment proposal is submitted to the Commission vide letter dated 31-07-2008 and approval is awaited.
- The works will be taken up after the investment proposal is approved by APERC.

2. Kothagudem Power Transmission Scheme is proposed for evacuation of power from the Kothagudem Thermal Power Station (Stage-VI) 1x500 MW :

- The scheme proposal is as follows :
 - a) 400kV D/C Line from Kothagudem TPP to Suryapet – 175 km,
 - b) LILO of VTPS – Malkaram 400kV D/C Line to Suryapet 400/220 kV S/S – 40 km,
 - c) 400/220 kV Substation at Suryapet,
 - d) 220kV D/C Line from Suryapet (400kV) to 220/132kV Suryapet Substation,
 - e) 2 Nos. 220 kV Bay extensions at Suryapet 220kV Substation.
- The transmission scheme is under formulation.
- The proposed completion of the scheme is during FY 2011-12.

3. Ramagundam Power Transmission Scheme is proposed for evacuation of power from the Ramagundam (BPL) Thermal Power Project (2x300 MW) :

- The scheme proposal is as follows :
 - a) 400kV D/C Line from Ramagundam TPP to Gajwel – 120 km,
 - b) 2 Nos. 400 kV Bay extensions at Gajwel 400/220/132 kV Substation.
- The transmission scheme is under formulation.
- The proposed completion of the scheme is during FY 2012-13.

4. Krishnapatnam Power Transmission Scheme is proposed for evacuation of power from the Krishnapatnam Thermal Power Project (2x800 MW) :

- The scheme proposal is as follows :
 - a) 400kV D/C Line from Krishnapatnam TPP to Nellore – 40 km,
 - b) 400kV D/C Line from Krishnapatnam TPP to Chittoor – 150 km,
 - c) 2 Nos. 400 kV Bay extensions at Nellore 400/220 kV Substation
 - d) 2 Nos. 400 kV Bay extensions at Chittoor 400/220 kV Substation.
- The transmission scheme is under formulation.
- The proposed completion of the scheme is during FY 2013-14.

5. Rayalaseema Power Transmission Scheme is proposed for evacuation of power from the Rayalaseema Thermal Power Project Stage-IV (500+20% MW) :

- The scheme proposal is as follows :
 - a) 400kV D/C Line from Rayalaseema TPP to Chinakampally – 55 km,
 - b) 400kV D/C Line from Rayalaseema TPP to Anantapur – 100 km,
 - c) 400/220 kV Substation at Ananthapur,
 - d) 2 Nos. 400 kV Bay extensions at Chinakampally 400 kV Substation,
- The transmission scheme is under formulation.
- The proposed completion of the scheme is during FY 2014-15.

D) Schemes proposed under System strengthening/ improvement (New Schemes) :

1. Installation of 63 MVAR Reactors is proposed as a part of improvement/control of voltage profiles in southern region as per the recommendations/ directions of Standing Committee on Power System Planning.

- The scheme consists of the following :
 - a) Installation of 63 MVAR Bus reactor at Vizag 400kV Substation – 1 No.
 - b) Installation of 63 MVAR Bus reactor at Kurnool 400kV Substation – 1 No.
 - c) Installation of 63 MVAR Line reactor at Mamidipally (Hyderabad) 400kV Substation – 1
- The Administrative Approval for the Scheme was issued on 21-08-2008 with an estimated cost of Rs.30.36 Crore. The financial assistance for the scheme from the Commercial Banks is under process. The investment proposal is submitted to the Commission vide letter dated 24-09-2008 and approval is awaited.
- The proposed completion of the scheme is during FY 2009-10.

2. 400kV Augmentation Scheme-II is proposed for augmentation of 315 MVA, 400/220kV transformation capacity in the existing Gajwel, Malkaram & Kurnool 400/220 kV Substations::

- The scheme proposal is as follows :
 - a) Erection of 1 No. 315 MVA, 400/220 kV Power Transformer at Gajwel 400/220/132 kV Substation,
 - b) Erection of 1 No. 315 MVA, 400/220 kV Power Transformer at Malkaram 400/220kV Substation,
 - c) Erection of 2 Nos. 315 MVA, 400/220 kV Power Transformers at Kurnool 400/220kV Substation,
- The transmission scheme is under formulation.
- The proposed completion of the scheme is during FY 2013-14.

3. System Improvement Scheme is proposed to meet additional load growth and improvement of voltage profiles with reliability in the districts of Khammam, Mahaboobnagar, Kurnool & Anantapur districts.

- The scheme proposal is as follows :
 - a) 400kV D/C Line from Kothagudem TPS to Kothagudem – 20 km,
 - b) 400/220 kV Substation at Kothagudem – 2x315 MVA,
 - c) 400kV D/C Line from Kothagudem to Khammam – 85 km,
 - d) LILO of Ghanapur- Kurnool 400kV S/C Line to Veltoor (Mahaboobnagar) – 20 km,
 - e) 400kV D/C Line from Gooty to Anantapur – 20 km,
 - f) 2 Nos. 400 kV Bay extensions each at Khammam, Mahaboobnagar, Gooty & Anantapur.
- The transmission scheme is under formulation.
- The proposed completion of the scheme is during FY 2014-15.

The details of addition of assets during the current year are indicated below.

Item Description	Actual till 31-03-08	FY 2008-09
400kV Lines (Ckm)	2,986	95
400kV Sub-Stations (Nos.)	8	1 No. (2x315)

The details of projected addition of assets during the years 2009-10 to 20013-14 are indicated below :

Item Description	2009-10	2010-11	2011-12	2012-13	2013-14	Total
400kV Lines (Ckm)	88	214	1,616	240	380	2,538
400kV Sub-Stations (Nos.)	1 (5x315)	1 (3x315)	2 (4x315)	0	0	4 (12 x 315)

(III) Plans For Capital Expenditure For Renovation And Modernization And Improvement Of Existing Transmission System

At present, most of the 220 KV and 132 KV EHT sub-stations & Transmission Lines are in service for the last 40 years. The full life of the equipment is already completed. Due to ageing of the system, the transmission network is facing frequent troubles and outages. The old equipment is beyond repairs and some of the companies do not exist for taking up repair works/supply of spares. Hence, it is essential to replace the aged equipment, obsolete equipment, to strengthen and to improve the system for satisfactory running of the EHT network. Therefore 132 KV & 220 KV sub-stations and Transmission lines which have served for more than 25 years and which are giving frequent troubles are included in the above scheme. The RMI scheme is prepared for five years for Rs.500 Crores for procurement of substation and lines materials for replacements of aged/obsolete equipment. In each year about 10 substations and about 500 KM to 600 KM lines are proposed for renovation. By strengthening the old transmission lines the sudden collapse of the network can be avoided. By replacing the aged equipment the failures and outages can be reduced which helps to enhance the transmission system reliability and stability. Due to which the availability factor and efficiency of the system will increase thereby increasing the revenue of the organization.

PLANS FOR CAPITAL EXPENDITURE for Improving the Communication System of APTRANSCO

The following schemes are proposed in the Second Control Period for modernization and updating the communication network for strengthening communication system in APTRANSCO.

1. OFC Network for ALDC Dedicated Channels.

It is proposed to replace the existing PLCC dedicated data and voice channels with OFC network to provide reliable and faster communication for efficient operations of Grid substations and ERP connectivity with an estimated cost of 153.10 Crs.

2. OFC Network for Protection Paths

It is proposed to provide alternate OFC channels for all important nodal substations in the grid to interconnect for efficient, reliable and uninterrupted communications with an estimated cost of Rs.95.12 Crs.

Performance Measures**NUMBER AND DURATION OF SUPPLY INTERRUPTIONS****1. Requirement in the Guidelines**

Number and duration of supply interruptions on transmission networks, separately for 440kV, 220 kV, 132 kV and 66 kV. Details of steps proposed to improve performance and monitoring. (Guidelines – 11a)

2. APTransco's Response:**Interruptions on EHT lines during 2003-04, 2004-05, 2005-06,2006-07 and 2007-08**

The statistics for the number of power interruptions on EHT lines are tabled below. Most of the interruptions were due to breakdowns and lasted over two hours per interruption. The mobilization of personnel and equipment, location of fault and its repair in various climatic conditions and inaccessible terrain takes time. Every effort is made to act as quickly as possible to move men and material and restore the line to normalcy in the shortest possible time. Hence year on year number of interruptions are gradually reduced.

Year	EHT line voltage	No. of interruptions	Total time of interruptions	Avg. Duration Per Interruption (hrs)
2007-08	400kV	3	68.38	Beyond 2 Hrs.
	220kV	86	1939.31	Beyond 2 Hrs.
	132kV	67	1835.05	Beyond 2 Hrs.
2006-07	400kV	0	0	Beyond 2 Hrs.
	220kV	70	1835.55	Beyond 2 Hrs.
	132kV	107	3031.03	Beyond 2 Hrs.
2005-06	400kV	7	787.04	Beyond 2 Hrs.
	220kV	129	3436.53	Beyond 2 Hrs.
	132kV	131	4522.25	Beyond 2 Hrs.
2004-05	400 kV	13	2148.53	Beyond 2 hrs.
	220 kV	139	3570.14	Beyond 2 hrs.
	132 kV	223	5626.58	Beyond 2 hrs.
2003-04	400 kV	24	1008	Beyond 2 hrs.
	220 kV	155	4613	Beyond 2 hrs.
	132 kV	233	4605	Beyond 2 hrs.

All transmission line breakdowns are logged and recorded. The data sheets maintain information such as circuit name and number, date and time of occurrence, date and time of restoration, any remedial measures taken for alternate supply, and a brief description of the cause. As the data is voluminous, and manually entered, all the log sheets have not been included in this filing. However, any data requested by the Commission can be made available as and when requested. Considering the vast extent of the transmission system and the number of transmission circuits, the average availability factor of EHT lines of APTransco for the year 2007-2008 works out at 99.88%. The details of the line availability for the years 2006-07, 2005-06, 2004-05, 2003-04, 2002-03, 2001-02, 2000-01 and 1999-2000 are shown in the tables below.

Availability of Transmission System (400 kV, 220 kV & 132 kV) during the year 2007-08.

Period	Cumulative total length of EHT lines in APTransco in Ckt..km.	Total availability of EHT lines (total length x 24 hrs x days in the month) in Ckt.km.-Hrs.	Total Ckm.-Hrs. in service of EHT lines (3) – (No. of Hrs. not in service due to B/D etc.(Length of the feeder in Kms.) in CKt.Km.Hrs	Availability factor (4) / (3) x100
1	2	3	4	5
1999-00	19927	174560520	168698125	96.641
2000-01	22291	195269160	194497301	99.604
2001-02	24046	210642960	209460989	99.438
2002-03	25757	225631320	225570718	99.973
2003-04	26164	228677791	227200532	99.354
2004-05	26820	232339656	231508767	99.392
2005-06	28795	21423309	21403793	99.909
2006-07	29455	21914669	21903318	99.948
Apr-07	29455	21207744	21194030	99.935
May-07	29567	21997625	21917504	99.636
Jun-07	29676	21366487	21318792	99.777
Jul-07	29778	22154817	22145319	99.957
Aug-07	29850	22208363	22197333	99.950
Sep-07	29950	21563698	21537879	99.880
Oct-07	29971	22298409	22259633	99.826
Nov-07	30012	21608626	21595339	99.939
Dec-07	30132	22418089	22409890	99.963
Jan-08	30217	22481150	22473247	99.965
Feb-08	30217	20305555	20292869	99.938
Mar-08	30459	22661347	22615486	99.798
Total		21855992	21829777	99.880

Steps implemented /proposed to improve performance and monitoring

The following steps have been implemented to improve the performance and monitoring:

- Replacement of existing aged conductors in a phased manner, since conductor snapping and jumper failures are found to be the major causes for interruptions.
- Replacement of old and failed insulators on existing lines.
- Reinforcement of the conductor of overloaded lines, periodical tree cutting work to prevent falling of branches with conductors, conducting quarterly inspection of lines and timely rectification of defects noticed.
- Breakdown staff attending supply interruptions is arranged round the clock by placing them in shift duties.
- Emergency vehicles are kept ready for breakdown staff round the clock to facilitate quick and timely deployment of staff and minimise the duration of interruptions.
- Safety appliances such as gloves, safety shoes, helmets, earthing rods and hotline apparatus are also provided to the breakdown staff.
- Providing walkie-talkie radio sets, CUG cell phones to operation staff for better communication and reduces the reaction time for staff deployment to a site where a fault has occurred.
- Providing of Rolling Stock of important equipments like CTs, PTs, Circuit breaker spares and Power Transformers to meet the emergencies and reduce the downtime.
- Use of Thermo vision cameras in EHT switchyard to detect hot spots and taking remedial actions.
- Use of off line fault locators for locating the fault on lines during breakdowns.

At present, some of the 220 KV and 132 KV EHT sub-stations & Transmission Lines are in service for the last 40 years. The full life of the equipment is already completed. Hence in addition to the above the following steps are proposed to improve the performance and monitoring:

- Renovation and Modernization Scheme is prepared for Rs.500Crores for procurement of Sub Station and line materials for replacement of aged/obsolete equipment.
- Under the Renovation, Modernization & Improvement Scheme in each year about 10 substations and about 500 KM to 600 KM lines are proposed for renovation.
- Is proposed to strengthen the Hot Lines wing by procuring the hotline cameras, wet washing kit, hot line tools, and vehicles etc for reducing the interruption time and for doing the preventive maintenance.

Major grid disturbances occurred during the year 2005-06,2006-07 and 2007-08

I) Major Grid Disturbances during 2005-2006

a) Grid breaker trippings at KTPS on 09.05.2005

Incident:

- At 16:39hrs on 09.05.2005, the 220KV KTPS-V Stage –Budidampadu feeders-1&2 tripped at both ends for a fault of tower collapse between locations 178 to 184.
- At the same time 220KV Miryalaguda –KTPS feeder tripped at both ends for a fault of tower collapse at loc. 200. The collapsed 220kV KTS-V –Budidampadu DC line fell on this feeder at lines crossing location.
- Heavy gale was reported in the region in and around Budidampadu at that time.
- Due to tripping of above feeders, the following lines tripped on Power swing/ over load.
 - 1) 220KV KTPS-Shapornagar at KTPS
 - 2) 220KV KTPS-Nunna at both ends.
 - 3) 220KV KTPS-Lower Sileru feeder-2 at KTPS
 - 4) 220KV Bommur –Lower Sileru at Bommur
 - 5) 220KV Upper Sileru –Pendurthy at Upper Sileru.
- The above trippings resulted in islanding of KTPS, KTPS V-Stage, Lower Sileru, Upper Sileru, Donkarai Power Houses with the loads of Sitharampatnam and Manugur Substations. The island experienced

very high frequency as the connected load is about 200MW against the generation of about 1100MW.

- Units-1 to 9 at KTPS tripped due to high frequency. Unit-10 at KTPS V-Stage survived with the loads of Sitharampatnam at Mangur Substations.
- There was a loss of about 850 MW Generation and the grid frequency dropped from 49.45Hz to 49.15Hz.
- There was no interruption to any of the loads during the above occurrence.

1.1 Remedial Action:-

The towers (collapsed) of 220kV KTS-V –Budidampadu DC line were subsequently re routed to avoid recurrence.

b) Grid breaker trippings at KTPS on 09.02.2006:

Incident:

- At 10:00hrs on 09.02.2006, the Unit-4 at KTPS tripped on operation of overall differential relay for a phase to phase fault due to bird fault on HV side of Generator Transformer.
- Due to delayed clearance of above fault (by overall differential relay) on Unit-4 at KTPS, all the 220kV feeders connected to KTPS and KTPS – Vth stage tripped at remote source ends in backup zones of distance protection relays.
- As a result all the Units at KTS [except Unit-2 which was under L/C] and KTPS-Vth Stage tripped due to loss of evacuation and there was a loss of generation of about 1000MW.
- There was interruption to all loads fed from 220kV Manuguru and Sitharampatnam Substations in the above incident.

Remedial Action:

The overall differential relays on unit-4 at KTS was subsequently tested and rectified.

c) **Grid breaker trippings at VTPS on 28.02.2006**

Incident:

- At 22:25hrs.on 28.02.2006, the R-Phase CT of Unit-2 generator transformer got blasted at VTPS, creating a 220KV bus fault on bus-2.
- The fault was cleared with the tripping of all 220kV feeders and units connected to bus-2 including bus coupler on operation of bus bar protection.
- There was a generation loss of about 600MW and system frequency fell from 48.7Hz. to 48.50Hz.
- There was no interruption to any of the loads in the above incident.

II) **Major Grid Disturbances during 2006-2007**

Grid breaker trippings at Nagarjunasagar Power House on 12.08.2006

Incident:

- At 15:01hrs on 12.08.2006, 220kV bus bar protection operated on Bus-II at Nagarjunasagar Hydel Station for a bus fault on the 220kV Bus-2.
- All the 4-units, Power Transformer-2 and 220kV Tallapally feeders-2&3 connected to 220kV Bus-2 including bus coupler tripped on bus bar protection.
- Subsequently, 220kV Nagarjunasagar - Srisailam and Nagarjunasagar - Tallapally feeder-I tripped on Power Swing. As a result, all other units tripped at Nagarjunasagar, due to loss of evacuation.
- There was a generation loss of about 700MW in the above incident.
- There was interruption to the loads of Macherla, Piduguralla, Halia, Kodandapur and K.M.Pally 132kV Substations.

III) **Major Grid Disturbances during 2007-2008**

a) **Grid breaker trippings at KTPS on 11.08.2007**

Incident:

- At 22:03hrs on 11.08.2007, jumper between bus isolator to breaker of 220kV Lower Sileru feeder-2 got cut, creating 220kV Bus fault at KTS.

220kV Bus bar protection did not operate at KTS and the fault got cleared by tripping of all 220kV feeders at remote source ends in backup zones of distance protection relays.

- All the units at KTS (except Unit-5 which was not in service), KTS –V stage and 3 units at Lower Sileru tripped due to loss of evacuation..
- There was a generation loss of about 1000MW.
- During the above incident, there was interruption to all the loads fed from 220kV Sitarampatnam and Manuguru Substations.

Remedial Action:

Subsequently the old 220kV bus bar protection scheme was replaced with new numerical busbar protection scheme at KTPS.

b) Grid breaker trippings at Nagarjunasagar Receiving Station on 26.09.2007

Incident:

- At 20:50hrs on 26.09.2007, the 220kV Tallapally - Nagarjunasagar Receiving Station feeder-3 tripped at 220kV Tallapally Substation for a suspected momentary fault.
- While clearing the above line fault, B-Phase breaker interrupting chamber got blasted at Nagarjunasagar end.
- As a result, the LBB operated and tripped all the 220kV feeders, 100MVA Power Transformer-2 and units connected to bus-2 including bus coupler.
- Simultaneously all other 220kV feeders, 100MVA Power Transformer-1 connected to bus-I also tripped due to problem in LBB control circuit.
- There was a generation loss of about 700MW.

Remedial Action:

The LBB control circuit at 220kV Nagarjunasagar Receiving Station was rectified.

PERIODS WHEN VOLTAGE AND FREQUENCY WAS BEYOND PRESCRIBED LIMITS

1. Requirement in the Guidelines

Periods when voltage and/or frequency was beyond the prescribed limits on transmission (400 kV, 220 kV, 132 kV and 66 kV) networks. Details of steps proposed to improve performance and monitoring. (Guidelines – 11b).

2. APTransco's Response:

Frequency

APTransco is one of the constituent members of the Southern Regional Grid and operates in synchronism with the power grids of the other southern states of Karnataka, Tamilnadu, Pondicherry, Kerala and a part of Goa. The system frequency is monitored by the Southern Regional Load Dispatch Center (SRLDC) located at Bangalore. As per the operating principles laid down by SRLDC, all constituent members are expected to maintain system frequency as near as possible to 50 Hz.

However, due to various reasons such as generating capacity shortages, high demand, grid indiscipline in maintaining load generation balance, inadequate load monitoring and management measures, the grid frequency variations are as wide as 48.33 Hz during peak load periods to 50.96 Hz during off-peak periods in 2006-07. The average system frequency maintained during 2006-07 was 49.50Hz.

During 2007-08, the grid frequency variations are as wide as 48.28 Hz during peak load periods to 51.03 Hz during off-peak periods and the average system frequency was 49.50 Hz.. The details of frequency duration, maximum and minimum frequency experienced during 2006-07 and 2007-08 are shown below.

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Frequency regime of AP System: From April 2006 to March 2007

Month	Percentage of time for which frequency is						Average frequency (Hz)	frequency Max. (Hz)	frequency Min. (Hz)
	<48.5	48.5 & <49.0	49.0 & <49.5	49.5 & <50.0	50.0 & <50.5	<50.5			
04/2006	0.00	23.70	59.00	15.58	1.62	0.10	49.21	50.96	48.51
05/2006	0.00	4.32	47.66	37.81	10.13	0.08	49.51	50.83	48.53
06/2006	0.00	1.20	36.17	43.69	18.88	0.06	49.67	50.79	48.58
07/2006	0.00	0.48	7.75	53.66	38.00	0.11	49.89	50.65	48.54
08/2006	0.00	0.37	6.56	27.89	64.77	0.41	50.01	50.74	48.58
09/2006	0.00	1.38	28.24	34.33	36.03	0.02	49.76	50.55	48.54
10/2006	0.08	10.45	41.67	36.10	11.69	0.01	49.48	50.57	48.33
11/2006	0.00	0.69	50.37	44.08	4.85	0.01	49.52	50.53	48.59
12/2006	0.00	10.40	78.06	11.42	0.12	0.00	49.24	50.08	48.53
01/2007	0.00	9.26	78.60	11.79	0.30	0.05	49.23	50.78	48.58
02/2007	0.00	2.92	80.62	15.29	1.10	0.07	49.26	50.91	48.56
03/2007	0.00	6.26	87.68	5.14	0.84	0.08	49.26	50.91	48.56

Frequency regime of AP System: From April 2007 to March 2008

Month	Percentage of time for which frequency is						Average frequency (Hz)	frequency Max. (Hz)	frequency Min. (Hz)
	<48.5	48.5 & <49.0	49.0 & <49.5	49.5 & <50.0	50.0 & <50.5	<50.5			
04/2007	0.00	12.44	75.97	10.59	0.95	0.05	49.14	50.91	48.56
05/2007	0.00	2.01	61.77	33.15	2.98	0.09	49.38	50.73	48.57
06/2007	0.00	3.79	38.15	42.71	14.27	1.08	49.55	51.03	48.57
07/2007	0.00	0.77	17.35	48.59	33.24	0.05	49.76	50.76	48.57
08/2007	0.00	0.47	9.10	40.12	49.28	1.03	49.90	50.62	48.57

09/2007	0.00	0.28	3.27	25.20	69.19	2.06	50.05	50.68	48.57
10/2007	0.0	7.79	41.50	28.13	22.30	0.28	49.52	50.52	48.56
11/2007	0.00	8.73	54.00	32.61	4.66	0.00	49.35	50.46	48.52
12/2007	0.00	0.82	67.45	30.86	0.87	0.00	49.37	50.24	48.59
01/2008	0.00	2.65	62.07	31.61	3.67	0.00	49.37	50.41	48.56
02/2008	0.01	6.21	74.33	18.84	0.60	0.01	49.26	50.72	48.28
03/2008	0.00	8.09	49.33	36.77	5.57	0.24	49.39	50.85	48.56

VOLTAGES OF AP SYSTEM FOR 2006-07

The voltage levels on a typical day at generating stations, major grid stations and some of the tail end stations is shown in the enclosed statement.

The Voltages recorded on 18-03-2007. the date on which the State demand attained peak during the year 2006-07, (8641 MW) at some of the major Grid Sub-stations are also enclosed. Voltages recorded at some of the Generating Stations, Grid sub-stations and Tail-end sub-stations are as tabled below:

Station Voltages at Generating Stations On 18-3-2007

SL. NO.	STATION NAME	00:00hrs	08:00hrs	19:00hrs	Max	Min
1	Upper Sileru	224	225	224	227	224
2	Lower Sileru	227	228	227	231	227
3	Kothagudem	226	225	227	231	224
4	Vijayawada	225	224	225	227	223
5	Rayalaseema	226	221	225	227	220
6	Srisailam	226	223	226	226	221
7	Nagarjuna Sagar	220	220	220	220	220
8	Ramagundam B	132	132	135	137	130
9	Vijjeswaram	228	226	228	232	225

Station Voltages at Generating Stations On 18-3-2007

400 kV Substations

SL. NO.	STATION NAME	00:00hrs	08:00hrs	19:00hrs	Max	Min
1	RAMAGUNDAM	404	401	406	405	399
2	GHANAPUR	402	398	402	403	395
3	GOOTY	423	412	418	426	408
4	NAGARJUNASAGAR	407	400	406	408	397
5	CUDDAPAH	414	400	409	417	400
6	NUNNA	420	414	422	423	413
7	GAJUWAKA	410	409	411	413	407
8	KHAMMAM	406	401	408	407	400
9	MAMMIDIPALLY	400	396	402	402	395
10	NARNOOR	403	396	403	405	392
11	KALPAKA	407	406	407	410	404
12	SIMHADRI	407	407	407	410	405
13	SRISAILAM	403	399	408	409	395
14	CHITTOOR	414	399	407	417	399
15	NELLORE	416	404	413	420	402
16	VEMAGIRI	416	413	417	426	411
17	MAHBOOBNAGAR	410	413	416	406	

220 Kv, 132 Kv Voltages at Major Grid Sub-Stations On 18/03/2007

SL. NO.	STATION NAME	00:00hrs	08:00hrs	19:00hrs	Max	Min
1.	GAJUWAKA	217/132	217/133	217/131	217/134	217/131
2.	CUDDAPAH	225/129	215/122	224/126	226/129	215/121
3.	CHITTOOR	229/134	213/132	226/134	231/136	213/130
4.	SULLURUPET	217/137	210/132	214/131	218/137	210/132
5.	ANANTAPUR	219/132	217/132	221/134	222/138	214/128
6.	HINDUPUR	218/133	216/133	219/133	220/136	213/131
7.	DICHPALLI	209/125	207/124	215/128	214/129	204/122
8.	BHIMGAL	212/125	210/123	218/125	220/126	206/120
9.	SIDDIPET	207/124	209/125	219/130	216/132	202/120
10.	YEDDUMYLARAM	220/132	220/132	220/132	220/132	220/132
11.	MAHABOOBNAGAR	219/127	214/123	218/126	218/127	210/120
12.	CHANDRAYANAGUTTA	219/130	216/129	218/128	220/131	214/127
13.	SHAPURNAGAR	215/134	213/133	214/129	216/135	210/129
14.	GACHIBOWLI	212/127	210/127	211/126	214/128	207/125
15.	MOULAALI	214/130	211/128	213/127	215/131	209/127
16.	GHANAPUR	217/131	215/130	217/129	219/132	213/129
17.	KALWAKURTHY	217/129	212/125	217/128	219/130	209/121
18.	MINPUR	204/125	198/122	209/130	208/129	200/124
19.	NARKETPALLY	210/122	209/123	214/127	214/130	207/122
20.	MEDCHAL	213/126	210/124	213/127	215/129	208/124
21.	APCARBIDES	223/131	221/131	225/133	226/134	218/129

22.	GOOTYSS	225/130	222/129	224/130	227/132	219/126
23.	KALIKIRI	227/135	208/131	223/132	227/136	207/129
24.	NANDYAL	220/131	217/130	221/133	223/134	215/129
25.	NELLORE	220/132	220/130	220/130	220/136	220/125
26.	ONGOLE	221/134	214/131	218/133	221/136	213/129
27.	RENIGUNTA	228/136	213/132	225/133	230/138	213/131
28.	YERRAGUNTLA	220/133	220/130	220/131	220/133	220/130
29.	BHIMDOLE	205/139	205/134	222/138	205/140	205/133
30.	BOMMUR	228/127	226/126	227/126	230/127	225/125
31.	GARIVIDI	223/131	224/133	220/129	225/133	222/131
32.	GUNADALA	220/132	220/132	220/132	220/132	220/132
33.	TADIKONDA	223/132	221/131	221/129	223/132	220/129
34.	KONDAPALLI	224/134	223/132	224/133	226/135	223/131
35.	NIDADAVOLU	228/132	225/129	226/129	229/133	224/128
36.	KAKINADA	220/132	220/132	220/132	220/132	220/132
37.	PENDURTY	220/132	220/132	220/129	220/134	220/132
38.	BHONGIR	218/129	216/128	219/130	220/132	215/127
39.	DURSHED	207/125	206/125	214/130	214/132	202/122
40.	KHAMMAM	224/131	223/131	226/132	229/131	222/131
41.	MALAYALAPALLY	215/132	215/131	220/135	222/136	212/130
42.	MANUGURU	222/133	222/134	226/135	229/137	220/132
43.	MIRIYALAGUDA	216/128	216/130	218/130	219/132	210/124
44.	NIRMAL	206/120	206/120	215/127	219/127	202/117
45.	SITARAMPATNAM	218/132	218/132	220/132	222/132	217/132
46.	WADDEKOTHAPALLY	219/128	217/127	222/132	222/133	216/126
47.	WARANGAL	218/128	217/128	223/132	221/135	214/126
48.	SOMAYAJULAPALLY	221	218	222	223	215
49.	MALKARAM	222	220	222	224	218

132 Kv & 33 Kv Voltages at Tail – End Sub-Stations On 18/03/2007

SL. NO.	STATION NAME	00:00hrs	08:00hrs	19:00hrs	Max	Min
1	CHILAKAPALEM	130/35	131/35	127/35	133/36	127/34
2	GUDURU	132/34	132/34	132/35	135/35	132/34
3	DHARMAVARAM	128/34	130/34	132/35	132/36	126/34
4	POCHAMPADU	123/33	123/33	133/34	135/34	121/33
5	ADILABAD	122/34	122/34	128/33	128/35	118/33
6	NIZAMABAD	128/33	128/33	134/33	134/34	126/33
7	BELLAMPALLY	134/34	134/33	135/35	135/35	132/33
8	GADWAL	126/34	125/33	130/34	135/35	123/33

VOLTAGE FOR 2007-08

The voltage levels on a typical day at generating stations, major grid stations and some of the tail end stations is shown in the enclosed statement.

The Voltages recorded on 20-03-2008. the date on which the State demand attained peak during the year 2007-08, (9161 MW) at some of the major Grid Sub-stations are also enclosed. Voltages recorded at some of the Generating Stations, Grid sub-stations and Tail-end sub-stations are as tabled below:

Station Voltages at Generating Stations On 20-03-2008

SL. NO.	STATION NAME	00:00hrs	08:00hrs	19:00hrs	Max	Min
1	Upper Sileru	231	226	230	231	226
2	Lower Sileru	216	218	220	223	215
3	Kothagudem	216	214	219	222	214
4	Vijayawada	223	220	221	224	220
5	Rayalaseema	232	227	230	232	226
6	Srisailam	224	219	221	224	218
7	Nagarjuna Sagar	220	220	220	220	220
8	Ramagundam B	132	130	133	134	129
9	Vijeswaram	230	227	228	231	226

Station Voltages at Generating Stations On 20/03/2008

400 kV Substations

SL. NO.	STATION NAME	00:00hrs	08:00hrs	19:00hrs	Max	Min
1	RAMAGUNDAM	406	401	406	407	400
2	GHANAPUR	403	393	398	402	392
3	GOOTY	412	402	408	414	401
4	NAGARJUNASAGAR	411	401	407	411	400
5	CUDDAPAH	415	401	407	415	399
6	NUNNA	422	414	422	423	410
7	GAJUWAKA	418	411	414	418	412
8	KHAMMAM	411	400	410	409	400
9	MAMMIDIPALLY	401	391	397	402	389
10	NARNOOR	412	402	410	416	399
11	KALPAKA	409	409	412	414	409
12	SIMHADRI	412	405	407	411	406
13	SRISAILAM	408	397	407	412	396
14	CHITTOOR	416	397	404	416	397
15	NELLORE	400	400	400	400	400
16	VEMAGIRI	421	421	421	421	421
17	MAHBOOBNAGAR	410	418	427	410	

220 Kv, 132 Kv Voltages at Major Grid Sub-Stations On 20/03/2008

SL. NO.	STATION NAME	00:00hrs	08:00hrs	19:00hrs	Max	Min
1.	GAJUWAKA	220/148	220/146	220/144	220/148	220/143
2.	CUDDAPAH	232/138	224/133	228/136	232/139	222/132
3.	CHITTOOR	229/138	217/134	224/132	230/139	216/131
4.	SULLURUPET	222/134	212/133	214/128	223/134	211/131
5.	ANANTAPUR	227/135	223/133	227/136	232/137	222/133
6.	HINDUPUR	225/136	222/136	225/136	227/138	221/132
7.	DICHPALLI	193/122	198/126	211/134	215/135	186/115
8.	BHIMGAL	197/115	201/118	214/124	215/126	188/110
9.	SIDDIPET	210/126	197/117	213/127	215/128	200/118
10.	YEDDUMYLARAM	220/132	220/132	220/132	220/132	220/132
11.	MAHABOORNAGAR	224/131	215/125	223/131	224/133	212/122
12.	CHANDRAYANAGUTTA	204/130	204/126	196/125	202/130	202/123
13.	SHAPURNAGAR	211/132	204/129	205/128	211/133	201/126
14.	GACHIBOWLI	209/133	202/128	202/126	209/133	199/124
15.	MOULAALI	214/132	214/132	214/132	214/132	214/132
16.	GHANAPUR	215/129	209/126	211/125	215/130	208/125
17.	KALWAKURTHY	213/126	205/120	211/126	214/129	204/119
18.	MINPUR	208/132	202/128	205/132	209/138	200/125
19.	NARKETPALLY	187/124	187/121	187/125	187/127	187/120
20.	MEDCHAL	209/129	203/125	205/126	209/130	200/123
21.	APCARBIDES	230/133	222/130	230/132	233/136	221/127
22.	GOOTYSS	234/133	229/129	232/131	235/133	227/128
23.	KALIKIRI	247/135	231/136	241/133	249/136	230/130
24.	NANDYAL	228/136	221/131	227/135	231/140	219/130
25.	NELLORE	220/135	220/132	220/130	220/137	220/127
26.	ONGOLE	223/134	216/129	218/130	223/133	215/129
27.	RENIGUNTA	230/134	217/137	224/131	231/137	216/129
28.	YERRAGUNTLA	229/133	225/131	227/132	229/133	224/130
29.	BHIMDOLE	226/141	221/137	222/139	226/142	220/136
30.	BOMMUR	230/135	225/132	226/132	229/134	225/132
31.	GARIVIDI	226/136	221/132	218/131	226/136	222/133
32.	GUNADALA	222/132	218/128	218/128	223/132	218/128
33.	TADIKONDA	218/133	214/131	215/129	219/133	213/128
34.	KONDAPALLI	223/133	220/131	220/129	224/133	219/128
35.	NIDADAVOLU	229/133	225/130	226/131	229/133	224/130
36.	KAKINADA	229/130	227/130	225/127	229/130	225/127
37.	PENDURTY	230/134	225/131	223/129	230/135	224/131
38.	BHONGIR	214/132	207/132	210/132	214/132	205/132
39.	DURSHED	205/124	198/120	208/126	209/127	199/120
40.	KHAMMAM	214/133	209/130	215/132	216/135	209/129
41.	MALAYALAPALLY	211/115	212/113	219/115	220/116	207/112
42.	MANUGURU	214/134	212/134	216/136	216/138	211/132
43.	MIRIYALAGUDA	211/127	205/122	212/128	215/131	204/121
44.	NIRMAL	200/117	199/117	204/120	201/121	196/115

45.	SITARAMPATNAM	210/130	207/129	211/131	215/132	203/127
46.	WADDEKOTHAPALLY	211/123	203/118	211/125	212/127	203/118
47.	WARANGAL	220/131	220/128	220/130	220/141	220/129
48.	SOMAYAJULAPALLY	228	221	227	230	219
49.	MALKARAM	218	212	214	218	210

132 Kv & 33 Kv Voltages at Tail – End Sub-Stations On 20/03/2008

SL. NO.	STATION NAME	00:00hrs	08:00hrs	19:00hrs	Max	Min
1	CHILAKAPALEM	131/35	130/35	127/34	132/35	127/34
2	GUDURU	132/35	130/34	128/33	135/35	128/33
3	DHARMAVARAM	133/34	132/34	136/36	138/36	131/34
4	POCHAMPADU	123/34	122/33	128/34	131/34	131/33
5	ADILABAD	114/33	115/33	117/34	119/35	114/33
6	NIZAMABAD	125/33	128/33	136/34	136/35	124/34
7	BELLAMPALLY	131/33	131/34	131/33	132/34	129/33
8	GADWAL	129/33	118/33	128/33	131/35	118/33

APTransco has taken up installation of Capacitor banks at major 220 kV and 132 kV sub-stations to improve the voltage profile. Already the system has a total capacity of 3310 MVAR of capacitor banks in service at 132 KV & 33 KV.

ACCIDENTS

1. Requirement in the Guidelines

Number of reported fatal and non-fatal accidents, differentiating between accidents involving humans and those involving animals. An analysis of steps to reduce such accidents must also be provided. (*Guidelines - 11c*)

2. APTransco's response

4 Nos Non-Fatal accidents and 2 Nos of Fatal accidents (Out of 2 nos Fatal accidents, 1 no pertains to animal and 1 no pertains to human) reported in the Transmission system during 2006-07. In 2007-08 7nos Non fatal and 4 nos fatal accidents are reported. APTransco constantly reviews the existing safety practices and procedures with an endeavor to minimize and achieve a zero accident record. The statistics for 2006-07 and 2007-08 are shown in the Table-1, II, III and reasons for causing the accidents are summarized in Table-IV.

Table – I

	2006-07	2007-08
FATAL		
Humans	1	4
Animals	1	Nil
NON FATAL		
Humans	4	6
Animals	Nil	Nil

Table – II

Details of accidents recorded on EHT system in various TL&SS Zones for the year 2006-07						
	Hyd	Wgl	Vja	Vizag	Kadapa	Total
Non Fatal						
Human	0	0		2	2	4
Animals	0	0	0	0	0	0
Fatal						
Human	0	0	1	0		1
Animals			1			1

Table – III

Details of accidents recorded on EHT system in various TL&SS Zones for the year 2007-08						
	Hyd	Wgl	Vja	Vizag	Kadapa	Total
Non Fatal						
Human	4	0	1		1	6
Animals	0	0	0	0	0	0
Fatal						
Human	2	0	0	0	2	4
Animals	0	0	0	0	0	0

Table - IV

Reasons for causing the above accidents are summarized below:

Information Regarding Accidents during 2006-07

Sl. No	Date	Place at which accident occurred	Type			Reasons
			Dept./ Non-Dept	Fatal / Non-Fatal	Human / Others	
Hyderabad zone						
2006-07 – Nil						
Vijayawada Zone						
2006-07						
1	14-4-2006	220 kV SS/ Nunna	Non-Dept.,	Fatal	Human	The person was engaged for connecting cable to lighting fixture. Meanwhile the cable fallen down on the 220 kV live portion and abnormal sounds occurred while breaking fault and the fire caught up in the surroundings. Due to abnormal sounds, the person has fallen on ground.
2	16-7-2006	132 kV Guntur – Bapatla feeder at Loc.No.252	Non-Dept.,	Fatal	2 Nos. she buffaloes	The accident occurred due to falling of conductor on the animals at the time of breakdown, which was due to 132 kV Guntur – Bapatla feeder cut and disc insulators at Loc. 252 flashed over and conductor fallen on the animals.
Kadapa Zone						
2006-07						
3	29-07-2006	220 kV Sub-Station, Anantapur	Non-Dept.,	Non-Fatal	Human	Earthing was properly done but the person was slipped slightly

Sl. No	Date	Place at which accident occurred	Type			Reasons
			Dept./ Non-Dept	Fatal / Non-Fatal	Human / Others	
						and is anxiety which strictly his hand for go up the binding wire is his hand got the induction.
4	21-12-2006	132 kV Sub-Station Gooty	Non-Dept.,	Non-Fatal	Human	Due to induction of 33 kV Tarmila Kallur feeder line while arranging crossing 132 kV Gooty – Anantapur line earth wire over 33 kV line during shutdown.
Vishakapatnam						
2006-07						
5	07-02-2007	132 kV Tekkali Substation	Dept.,	Non-Fatal	Human	AE/M/Tekkali while attending complaint on line isolator of 132 kV TKL – Ponduru feeder, he slipped from the isolator structure and came in contact with isolator and received minor head injuries due to induction of adjacent circuit
6	25-1-2007	132 kV Sub-Station Mallaiahpeta	Dept.,	Non-Fatal	Human	The accident was occurred while the Assistant Engineer, is noting down the name plate details of 132 kV Y-Phase lightning arrester of 132/33 kV CGL make Power Transformer at 132 kV Sub-Station Malaiahpeta while getting down, accidentally touched the live conductor of LA when power transformer in live and received electrical burns. He was immediately shifted to M/s Raju Emergency Multispecialty Neuro Hospital, Rajahmundry and treatment was started.

Information Regarding Accidents during 2007-08.

Sl. No	Date	Place at which accident occurred	Type			Reasons
Hyderabad zone						
2007-08						
1	18-10-2007	220 kV SS/Mahboobnagar	Non-Dept.,	Non-Fatal	Human Contract Labour	Fallen on the ground due to induction while replacing HG fuse sector of Station Transformer
2	4-3-2008	220 kV SS/Mahboobnagar	Non-Dept.,	Fatal	Human Contract Labour	While giving NBFC, the causality came in to contact with the live wire through earth rod and electrocuted
3	6-12-2007	132 kV SS/ Nalgonda	Non-Dept.,	Non-Fatal	Human Skilled worker	While carrying out maintenance work on 10-16 MVA PTR LV CT for arresting oil leakage, the worker fell down on the concrete cable trench.
4	23-1-2008	132 kV GIS/ Hussainsagar	Non-Dept.,	Not known	Human Unknown person	Unknown person trespassed into the substation and climbed the station T/F and got electrocuted
5	19-7-2007	132 kV SS/ Bandlagunda	Non-Dept.,	Non-Fatal	Human	CL of APCPDCL entered the SS switchyard with earth rod without knowledge and connected the earth rod to the live part of 33 kV bus isolator jumper
6	25-11-2007	132 kV SS/ Mahboobnagar	Non-Dept.,	Fatal	G. Sodhan	While carrying out painting work the worker came into contact with live wire.
Vijayawada Zone						
2007-08						
7	27-7-2007	132 kV SS Pamaru	Non-Dept.,	Non-Fatal	Human	The person was engaged for greasing of Bus AB switches on 33 kV partial bus. After completing the work, while getting down he slipped and fallen on 33 kV Bantumilli feeder line AB switch.
Kadapa Zone						
2007-08						
8	10-04-07 @ 15:45 Hrs	132 KV SS, Timmaiah Gari Palli	Non-Dept.,	Non Fatal at the time of accident but expired while taking treatment	Human Semiskilled labour	While painting colour coding for 33 kV T.G. Palli feeder which was under L/C, accidentally climbed the line 33 kV Chitvel feeder and fell down due to electric shock
9	05-03-2008	132 kV Sub-Station Dharmavaram in	Non-Dept.,	Fatal	Human	LC was taken on 05-03-2008 at 10:20 Hrs. on 33 kV

Sl. No	Date	Place at which accident occurred	Type			Reasons
						D.Cheriopalli feeder for enhancement of 200/ 1A to 400/ 1A C.T work. LC was returned at 14:15 Hrs after completion of work. After returning the LC, the earth rods were removed and bus side AB switch was closed at 14:20 Hrs. After returning the LC Sri A. Raghavendra, Semiskilled Contract labour who also attended for fixing work of base plates of C.Ts left the yard and came to control room, the other staff went to 33 kV Capacitor Bank – I & II where other work was going on. All of a sudden at 14:25 Hrs Sri A. Raghavendra rushed to 33 kV D.Cheriopalli feeder bay from control room to search for the missing tools. After hearing the huge sound at 14:25 Hrs. all the staff rushed to the yard and observed that Sri A. Raghavendra has found fallen on the middle phase C.T. Structure of 33 kV D.Cheriopalli feeder with burns.
Vishakapatnam						
2007-08						
10	22-6-07	132 kV Sub-Station Ramachandrapuram	Non Dept.,	Non-Fatal	Human	While arranging LC to the 33kV Gollapalem feeder, semi skilled worker connected the earth rod to the 33kV live Rayavaram feeder, which is just behind the Gollapalem feeder by over sight and got burns and fallen from the structure.

Main reasons for Accidents and Remedial action to reduce accidents:

The 4 No's Non-fatal accidents and 1 No's Fatal accidents for human being and 1 No Fatal accidents for animals are reported in 2006-07. Out of 4 Nos Non-Fatal accidents 2 Nos pertains to departmental accidents and remaining are Non departmental. The fatal and Non-fatal accidents occurred for human beings mainly due to the induction to the adjacent live parts and slipping from the structure while carrying out the maintenance works due to anxiety/ confusion and 1 no fatal accidents for animals occurred due to the falling of conductor on the 2 nos of buffaloes due to the break down of 132 kV Bapatla feeder.

The 7 no's Non-fatal and 4 no fatal accidents for human beings occurred in 2007-08. All Non-fatal and fatal accidents occurred in 2007-08 are Non-departmental. The fatal and Non-fatal accidents occurred for human beings mainly due to the induction to the adjacent live parts, and touching of live parts unknowingly and slipping from the structure while carrying out the maintenance works due to anxiety/ confusion. 1 No Non-fatal accidents occurred due to unknown persons touches the live parts by entering into the switch yard without knowledge of the concerned.

Remedial action to reduce accidents:

For any lapse, suitable prompt action is taken against the concerned public or staff to discourage their negligence or casual approach.

The concerned superior staff takes deterrent action against all the erring field staff who fails to take safety precautions while working on lines and also ensure that adequate quantity of safety appliances are made available to all the concerned staff members. Safety training courses are regularly conducted.

It is proposed to make schedule for preventive maintenance of all CTs and PTs in the EHT substations. Preventive maintenance schedules are also generated from the ERP system. It is also proposed to replace all aged CTs and PTs & PTRs sets with new sets through renovation and modernization schemes.

Classes are being conducted for the workmen on payday or any suitable working day to enlighten them on safety measures and to avoid electrical accidents by proper utilization of safety devices and precautions as per the safety rules.

Preventive steps:

- Standard construction practice is ensured whenever new lines are laid and energized.
- Clearances for O/H lines as specified in IE rules 77, 78, 79, 80 and 81 to be strictly maintained and verified at the time of statutory inspections of lines & sub-stations, before charging.
- Cradle Guards are provided under the O/H lines as required under IE Rules Nos. 66 and 91, regarding safety and protective devices, in order to render the lines electrically harmless in case it breaks.
- All metal supports of O/H lines and attached metallic fittings are permanently earthed as per I.E.Rule No.90.
- Danger Boards to be affixed wherever necessary in the local language.
- Anti-climbing devices to be provided to prevent people from scaling towers or poles.

DEFECTIVE METERS

1. Requirement in the Guidelines

Number of inadequate or defective meters. Programme and phasing of investment for replacement. (Guidelines – 11d)

2. APTransco's response

APTransco is the sole Transmission licensee in Andhra Pradesh and receives power from various generation sources such as APGENCO, Central generating stations, IPPs, and captive units, and the power is utilized by the Four Distribution companies and other OA users. Extensive metering facilities are already in existence at these interface points. The present status of interface meter points with breakup is listed below.

Present Status of 0.2/0.5 class interface metering points

Sr. No.	DISCOM	Metering Point Type	Sub category	No. of Metering Points			Category Total	DISCOM Total
				0.2 class	0.5 class	Total		
1	CPDCL	PTR LVs	132/11kV	1	13	14	237	348
2	CPDCL	PTR LVs	132/33kV	100	118	218		
3	CPDCL	PTR LVs	220/33kV	2	2	4		
4	CPDCL	PTR LVs	132/66kV	1	0	1		
5	CPDCL	EHT Consumers	220kV Industrial	2	1	3	44	
6	CPDCL	EHT Consumers	132kV Industrial	20	13	33		
7	CPDCL	EHT Consumers	132kV Rly. Traction	8	0	8		
8	CPDCL	G-D	--	7	2	9	9	
9	CPDCL	D-D	--	0	6	6	6	
10	CPDCL	PDs (33kV, 11kV)	--	49	3	52	52	
11	EPDCL	PTR LVs	132/11kV	1	5	6	102	183
12	EPDCL	PTR LVs	132/33kV	43	52	95		
13	EPDCL	PTR LVs	220/33kV	1	0	1		
14	EPDCL	PTR LVs	132/66kV	0	0	0		
15	EPDCL	EHT Consumers	220/400kV Industrial	2	0	2	51	
16	EPDCL	EHT Consumers	132kV Industrial	15	19	34		
17	EPDCL	EHT Consumers	132kV Rly. Traction	7	8	15		

18	EPDCL	G-D	--	1	1	2	2	204
19	EPDCL	D-D	--	0	7	7	7	
20	EPDCL	PDs (33kV, 11kV)	--	21	0	21	21	
21	NPDCL	PTR LVs	132/11kV	13	2	15	148	
22	NPDCL	PTR LVs	132/33kV	64	68	132		
23	NPDCL	PTR LVs	220/33kV 220/11kV	1	0	1		
24	NPDCL	PTR LVs	132/66kV	0	0	0		
25	NPDCL	EHT Consumers	220kV Industrial	2	0	2	30	
26	NPDCL	EHT Consumers	132kV Industrial	4	11	15		
27	NPDCL	EHT Consumers	132kV Rly. Traction	3	10	13		
28	NPDCL	G-D	--	11	3	14	14	
29	NPDCL	D-D	--	3	1	4	4	
30	NPDCL	PDs (33kV, 11kV)	--	8	0	8	8	
31	SPDCL	PTR LVs	132/11kV	6	10	16	186	
32	SPDCL	PTR LVs	132/33kV	61	103	164		
33	SPDCL	PTR LVs	220/33kV	0	6	6		
34	SPDCL	PTR LVs	132/66kV	0	0	0		
35	SPDCL	EHT Consumers	220kV Industrial	0	0	0	37	
36	SPDCL	EHT Consumers	132kV Industrial	7	5	12		
37	SPDCL	EHT Consumers	132/220kV Rly. Traction	9	16	25		
38	SPDCL	G-D	--	0	1	1		1
39	SPDCL	D-D	--	1	10	11	11	
40	SPDCL	PDs (33kV, 11kV)	--	60	0	60	60	
T-D SUB-TOTAL:				534	496	1030	1030	1030

G - T					
Sr. No.	Metering Point Type	No. of Metering Points			Category Total
		0.2 class	0.5 class	Total	
1	APGENCO - APTRANSCO	88	0	88	178
2	PGCIL/CGS	41	0	41	
3	NTPC	4	0	4	
4	INTER-STATE	7	0	7	
5	IPPs	15	0	15	
6	CPPs	5	0	5	
7	APGPCL	6	0	6	
8	132kV EHT PDs	12	0	12	
G-T SUB-TOTAL:		178	0	178	178

OVERALL SUMMARY				
Sr. No.	Metering Point Type	No. of Metering Points		
		0.2 class	0.5 class	Total
1	T – D	534	496	1030
2	G – T	178	0	178
GRAND TOTAL:		712	496	1208

At present the metering facilities are fully operational and there are no defective meters. Presently all interface meters installed between APTRANSCO and Generators are 0.2 class accuracy. Other than Genco interface points, Generator – Transco interface points meters are provided with ABT and trivector features.

It was decided by APTRANSCO that all existing interface meters to be replaced with 0.2 class accuracy having ABT features.

Annexure 3: Response to Commission Directives

LIST OF DIRECTIVES, WHICH ARE CARRIED FORWARD AND REQUIRING CONTINUING COMPLIANCE

Annexure - A

Dir. No.	Description of Directive	Status
	Energy Audit	
1	APTRANSCO shall conduct regular and thorough energy audit to ensure accountability. A copy of the Energy Audit Reports of each DISCOM to be filed with the Commission on a quarterly basis. (T.O.2004-05, para 419)	The directive is complied with
2	The Commission directs that the Licensee shall henceforth reconcile the energy accounting figures annually and file reconciliation statements along with the audited Annual Accounts every year.	The directive is complied with
	Capital Investments	
3	Considering the importance of capitalization of works, the Commission lays down the following requirements to be fulfilled before accepting inclusion of the value of a capitalized work in the OCFA: a) On completion of a capital work, a physical completion certificate (PCC) to the effect that the work in question has been fully executed, physically, and the assets created are put to use, to be issued by the concerned engineer not below the rank of Superintendent Engineer. b) The PCC shall be accompanied or followed by a financial completion certificate (FCC) to the effect that the assets created have been duly entered in the Fixed Assets Register by transfer from the CWIP register to OCFA. The FCC shall have to be issued by the concerned finance officer not below the rank of Senior Accounts Officer. c) The above-mentioned certificates have to be submitted to the Commission within 60 days of completion of work, at the latest. The Commission may also inspect or arrange to inspect, at random, a few of the capitalized works included in the OCFA to confirm that the assets created are actually being used and are useful for the business. (Para 390 & 391, T.O.2005-06)	The directive is complied with

ANNEXURE – B
LIST OF DIRECTIVES – FY 2006-07

Dir. No.	Description of Directive	Status
	Contracted Capacity Vs Allocated Capacity	
1	<p>APTRANSCO shall bring to the notice of the distribution licensees the requirement of theirs entering into agreements with it in terms of clause 20.2 of the Commission's Transmission Tariff Regulation mentioning therein, inter-alia, their contracted capacity before 30th September, 2006.</p> <p style="text-align: right;">(Paragraph 56)</p>	The directive is complied with
	Contingencies Reserve	
2	<p>The contributions towards Contingencies Reserve must be invested in securities authorized under the Indian Trusts Act, 1882, within a period of six months from the close of the year of account in which the appropriation is made. Should the licensee, however, desire to invest the accumulations in the Reserve in securities / investments other than those authorized under the Indian Trusts Act, it must seek prior approval of the Commission indicating inter-alia the securities/instruments in which they propose to invest the funds and the investment ratings of those securities / investments from at least two reputed rating agencies.</p> <p>Any drawal from the Reserve can be made only to meet the emergent expenditure required to restore the system damaged by natural calamities, fire accidents, etc. Such drawals should be reported to the Commission within 15 days with details of the damage to the system.</p> <p style="text-align: right;">(Paragraph 64)</p>	The directive is complied with
	Availability of copies of ARR /Tariff Filings	
3	<p>The Licensees shall henceforth make available copies of their ARR/Tariff filings available at all the district headquarters.</p> <p style="text-align: right;">(Paragraph 78)</p>	The directive is complied with
	Timely Completion of projects / Schemes	
4.	<p>The licensee shall take all possible measures to ensure that the projects / schemes taken up are completed on schedule. In this regard, the Commission clarifies that it will not allow any interest during construction for delays exceeding one month and three months in respect of completion of projects / schemes with the completion schedules of up to one year and more than one year, respectively, unless the Commission's approval for extension in the completion schedules is obtained in advance.</p> <p style="text-align: right;">(Paragraph 84)</p>	The directive is complied with

	Variations in revenue requirements	
5.	<p>APTRANSCO shall file the figures of actual costs and revenues for each quarter within three weeks of the close of the quarter to facilitate a review of the variations in the revenue requirements. For this purpose, the Commission will issue an appropriate format for filing of information relating to each item of the ARR.</p> <p style="text-align: right;">(Paragraph 87)</p>	The directive is complied with

2 Annexure 3: Regulatory Forms