

**REPORT  
ON  
REPLACEMENT  
OF  
OLD & INEFFICIENT SUB CRITICAL UNITS  
BY  
SUPER CRITICAL UNITS/  
RETIREMENT /RENOVATION**

**Prepared by TPP&D Division, CEA**

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## **EXECUTIVE SUMMARY**

In order to conserve scarce natural resources like land, water and coal, Ministry of Power advised CEA in August 2015 to prepare a report on “Replacement of old and inefficient units with supercritical units” and explore possibility of replacing the old & inefficient thermal generating units by installing supercritical units. The issue was earlier highlighted during a Meeting taken by Secretary, Power on 20.4.2015 wherein CEA was requested to identify retired power plant which can be replaced with Ultra Mega Power Projects (UMPP’s). CEA vide letter No.149/UMPP/Gen/TPI/CEA/2015 dated 30.4.2015 & dated 15.5.2015 had submitted a brief note on replacement of old and inefficient units with UMPP’s. Subsequently, a meeting was taken by JS (Thermal), MoP in the month of June 2015 wherein the concerned State Govt. highlighted the constraints for acquisition of additional land in the nearby vicinity. This was mainly due to rapid urbanization in the vicinity of existing thermal stations. It was, therefore, decided to explore the possibility of replacement of old and inefficient units with supercritical units.

In order to assess the quantum of proposed replacement of old, inefficient & subcritical units by supercritical units/retirement/renovation, units having life span of 25 years or more have been considered. The design life of 25 years is generally considered for coal fired units but this does not imply that units should not be operated beyond 25 years. Even some of the old plants are performing well. As per data available in CEA as on 31.3.2015 around 32830 MW capacity in State / Central sector and 1450 MW in Private sector is more than 25 years old. At present 27 nos. units with gross capacity of 2658 MW are under shut down for more than 3 years as such the same are contributing to the ineffective capacity. Out of this 4 units having capacity of 604 MW are under Renovation.

To ascertain the status of the old plants, three meetings were taken by Chairperson CEA/ Member (Th) CEA with the concerned State Utilities on 18th August, 16th September and 23rd September, 2015 , wherein each and every project was discussed threadbare.

As per the report, out of total capacity of 32,830 MW (above 25 years old) in State & Central Sector:

- i) 22170 MW capacity can be operated for considerable time and has either undergone renovation & modernization / life extension or are programmed for the same.

- ii) 5860 MW capacity can be retired in due course of time in a phased manner and some of the units can be replaced with super critical units.
- iii) 4800 MW capacity can be decided based on their viability of R&M in near future. In case these units are not considered feasible for R&M, a review can be taken to either retire or replace with supercritical units.
- iv) 10180 MW capacity supercritical units can be installed in place of retired/ proposed for retirement of total capacity of 5228 MW.

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## **Report on “Replacement of old & inefficient sub-critical units by super critical units / Retirement / Renovation”**

Ministry of Power, in August 2015, requested CEA to prepare a report on “Replacement of old and inefficient units by supercritical units” for optimum utilization of scarce natural resources like land, water & coal. Even though CEA had earlier given some suggestions on replacement of old and inefficient unit with Ultra Mega Power Projects but none of the proposal was accepted by the State Government, largely due to requirement of additional land and water for UMPP. Since these old units are having 25 years or more life span, therefore, the nearby area of the plant has been developed and it is not possible now to acquire any additional land in the vicinity. It may be mentioned that deterioration in efficiency of thermal power plant can be restored back by proper maintenance / R&M. In order to assess the quantum of proposed replacement of old, inefficient & subcritical units by supercritical units/retirement/renovation units having life span of 25 years or more have been considered. CEA maintains the data of such projects.

### **An Overview**

As on 31.3.2015 the total coal fired capacity having more than 25 years old is around 34,280 MW of which, about 20,000 MW lies in the state sector and 12,830 MW in the central sector and 1450 MW in private sector. A list of such units is given in Annexure –I.

The design life of 25 years is generally considered for coal fired units but this does not imply that units should not be operated beyond 25 years or such operation would lead to performance deterioration. Residual life studies conducted on several units have shown considerable residual life remains as can also be seen that large nos. of very old units working satisfactorily.

A study on performance of thermal units more than 25 years old (as on 31-3-2014) was carried out by CEA in January 2015. The study found that out of the total coal fired capacity of about 30,000 MW covered in the study, over 10,000 MW was operating at PLF of 80 % or higher and about 5000 MW was operating at PLF between 65-80 %. Several units achieved PLF over 95 % and some even achieved PLF of over 100%.

The data shows that large number of units had PLF over 90 % in the year 2014-15 and consistently over the last 3 years. These include several 110 MW units which are 31 years of age. Amongst the 200/210 and 500 MW capacity group, the

average PLF for 2014-15 was 68 % and about 6000 MW capacity had PLF of over 85 % . The average PLF for 500MW group has been 82 %.

Similar trends are seen in the operating heat rate. While operating heat rate for all the individual units are not available, the data available with CEA for some of the units shows that there is no correlation between the age and operating heat rate of the units and stations like Singrauli and Korba, Anpara “A”, Dr. N. Tata Rao, where all the units are very old, showed low operating heat rate vis-à-vis their design heat rate as compared to several other stations which had considerable newer capacity. Incidentally all of the above stations appear in the list of units more than 25 years old. Even where performance both in terms of low PLF as well as high operating heat rate, the reasons are not attributable to any inherent technology constraints but are rather operational. It will not be possible to evolve any transparent and rational criteria for retirement of units based on age. Except for small non reheat units, all other units considered are based on contemporary technology employed in over 70 % of the worldwide capacity.

The efficiency gains with technology substitution to Supercritical are not significant. Rather much higher potential of efficiency improvement exists through better operational practices in large number of stations – both old and new. The operating practices are the single most important factor responsible for the performance achieved and considerable improvements in performance are possible with good operating practices.

In view of the above it may be concluded that retirement on the basis of age of the unit may be considered only for non-reheat units. Retirement of reheat units should not be based on age but should be based on performance parameters. The units which are subjected to good operating practices, better maintenance can certainly be operated beyond the design life of 25 years. However, there are many such units which are not maintained properly have deteriorated much earlier than the designed life and operation of these units have become uneconomical and unsafe. The states may be sensitized about in efficient operation of their stations and could be incentivized to improve performance (PAT is one such measure already taken). The decision to take improvement measures or replacement would depend on techno economics and may be considered on case to case basis by concerned power utilities.

## **R&M Polices**

### **National Electricity Policy on R&M:**

The provisions in the above policy documents read as under:

Para- 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 needs to be pursued vigorously and all existing generation capacity should be brought to minimum acceptable standards. The Government of India is providing financial support for this purpose.

Para - 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.

Integrated Energy Policy (December 2008)

The provisions in the above policy document under the heading 'Increasing Efficiency of Coal-Based Power Plants' read as:

"Rehabilitation of existing thermal stations could raise capacity at least cost in the short run. Similarly rehabilitation of hydro stations could yield much needed peak capacity at negligible cost. Both the steps should be taken up urgently."

**Renovation and Modernisation (R&M) and Life Extension Programme (LEP) from 7th Plan onwards till 11th Plan.**

R&M Programme in a structured manner was initiated in 1984 as a centrally sponsored programme during 7th Plan and the programme continued during the two Annual Plans 1990-91 & 1991-92. The momentum for undertaking R&M works continued during the 8th & 9th Plan. However, the same could not be sustained during 10th Plan. The Plan wise R&M details are given below:-

Five Year Plan	Year	No. of TPS / No. of Units	Capacity (MW)	Additional Generation Achieved MU/ Annum*	Equivalent MW**
7th Plan & 2 Annual Plans	85-86 to 89-90 & 90-91, 91-92	34 / 163	13570	10000	2000
8th Plan	92-93	44 / 198	20869		

(R&M) (LEP)	To 96-97	43/(194) 1/(4)	(20569) (300)	5085	763
9th Plan (R&M) (LEP)	97-98 to 2001-02	37 / 152 29/ (127) 8/ (25)	18991 (17306) (1685)	14500	2200
10th Plan (R&M) (LEP)	2002-03 to 2006-07	9/25 5/(14) 4/(11)	3445 (2460) (985)	2000	300
11th Plan (R&M) (LEP)	2007-08 to 2011-12	21/72 15/(59) 6/(13)	16146 (14855) (1291)	5400	820

\*Tentative figure.

\*\* Equivalent MW has been worked out assuming PLF prevailing during that period.

#### R&M Activities in 12th Plan :

Renovation & Modernization (R&M) is seen as a cost-effective option for additional generation from the existing thermal power stations and better asset management due to its low cost and short gestation period. Besides generation improvement and improvement in availability, other benefits achieved from R&M / LE include life extension, improved safety, reliability and environmental conditions.

Many of the thermal power plants are not operating to their full potential and large numbers of thermal units including 200/210 MW units are old and outlived their normal economical design life. The 66 LMZ units of 200/210 MW Capacity are best potential candidates for Energy Efficiency R&M (EE R&M).

For the 12th plan period (2012-1017) total 135 units with aggregate capacity of 29367 MW have been identified for implementation of R&M/LE works. Out of which, 70 units with aggregate capacity of 12066 MW identified under Life Extension works while 65 units having total capacity of 17301 MW categories under R&M works. The R&M/ LE Programme to be implemented during the 12th Plan is given below.

S.No.	Particulars	LE/R&M works identified during 12th Plan No. of units & capacity (MW)	Total (State Sector + Central Sector)
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		State Sector	Central Sector	
1.	LE	38 (6820)	32 (5246)	70 (12066)
2.	R&M	20 (4150)	45 (13151)	65 (17301)
Total		58 (10970)	77 (18397)	135 (29367)

Achievement of R&M/ LE Programme during 12th Plan (2012 - 17)

Activity	Programme (MW)	Achievement (MW) ( as on 21-09-2015 )
Life Extension Programme (LEP)	12066 (70 units)	2131.76 ( 18 Units )
R&M Programme	17301 (65 units)	1060.5 ( 09 units )
Total	29367 (135 units)	3192.26 ( 27 units )

Out of 135 units identified potential capacity earmarked for 12th plan period, total 27 units with aggregate capacity of 3192.26 MW have been achieved under R&M/LE programme so far. This comprises 18 units with total capacity of 2131.76 MW under Life Extension and 09 units with total capacity of 1060.5 MW against R&M category works.

List of few coal based Thermal units where large scale R&M works taken up during the last three years in state sector

S.No.	Name of the TPS	Unit No.	Capacity MW	Date of Shut down	Date of Synchronization
1	Bathinda	3	110	14.1.2010	05.08.2012



2	Bathinda	4	110	5.11. 2011	05.8.2012
3	Obra	7	100	04.12.2009	Expected by Dec-15
4	Obra	10-11	2 x 200	22.3.2012	Expected by Dec-15
5	Harduaganj	7	110	5.3. 2011	Synchronized in May 2015
6	Muzaffarpur	1	110	15.4.2010	05.07.2013
7	Muzaffarpur	2	110	29.3. 2012	30.09.2015
8	Barauni	6	110	17.3. 2012	Expected 31.03.2016
9	Barauni	7	110	23.8. 2006	Expected by 25.10.2015
10	Patratu	9	110	5.8.2006	Expected by Mar 2016
11	Patratu	10	110	5.8.2006	24.05.2012
12	Bandel	5	210	24.11. 2013	21.09.2015

From the above list it is observed that there is exorbitant time over run in completing the R&M works, thus defeating the very purpose of R&M. In order to make R&M more meaningful the utilities should re-look on their future R&M programme.

### **Coal Linkage Policies**

#### **Coal Linkage Transfer Policy in case of scrapping of old Units by replacing them with new plants :**

Min of Coal vide letter dated 17.09.2014 has issued detailed recommendations of SLC(LT) regarding automatic transfer of coal linkage in case of scrapping of old Units by replacing them with new plants as under:

LOA/linkage granted to the old plant shall be automatically transferred to the new plant of nearest supercritical capacity.

If the capacity of the new supercritical plant is higher than the old plant, additional coal may be accorded priority subject to the availability of coal on the best effort basis from CIL.

The retired old plant(s) capacity has to be at least 50 % of capacity of new supercritical plant. Old plants can be clubbed together to achieve this minimum benchmark of 50% of proposed-supercritical capacity.

- i) This policy shall be applicable to pre-NCDP plants in public sector only, which have already been granted long term Linkages/LOAs.
- ii) Automatic transfer of LOA as explained above shall be permissible only when the new plant is set up within the State in which the old plant was located and the old plant is actually scrapped. The old plant shall continue to operate till the CoD of new plant.

MoP has recommended to MoE to remove the condition of retirement of at least 50% of capacity of new supercritical plants.

**State wise assessment of potential / viability of replacing old & inefficient units by super critical units:**

In order to facilitate the optimal utilization of natural resources i.e. land, water and coal, replacement of old & inefficient units with Super Critical units is envisaged in National interests. Min. of Coal vide letter dated 17.09.2014 had formulated a policy on automatic transfer of linkage in case of scrapping of old units by replacing them with new Super Critical plants. The major benefits of Super Critical units are as under:-

- i) Operating Station Heat Rate (SHR) of the old & inefficient units (reheat type) ranges from 2500-3500 Kcal/Kwh against their Design SHR of 2275-2370 Kcal/KWh while Super Critical units have Design SHR around 2150 Kcal/KWh resulting in more generation of electricity per tonne of coal. It also reduces emissions (CO<sub>2</sub>, SO<sub>2</sub>, Mercury and NO<sub>x</sub>) per unit of generation and save environment.
- ii) Bigger size units optimize land and water requirement.

Thus, in view of multi-fold benefits of Super Critical units and as advised by MoP meetings were held in CEA with various State / Central Utilities on 18.08.2015, 16.09.2015 & 23.9.2015 to assess the potential / viability of replacing old & inefficient units by super critical units.

Based on discussions with various State/ Central Utilities, status of replacement of old and inefficient units by Super critical Units of various states/ central utilities is summarized as below:

- i) **MAHARASHTRA**

**Nasik TPS** :Unit 1&2 (2x140 MW Units) have been scrapped in the month of June, 2011. MAHAGENCO has proposed to replace these units with 1x660 MW Supercritical Units. Present status of the proposed unit is given below:

**MSPGCL Board approval**

Administrative approval for implementation of (1x660 MW) supercritical coal based thermal power project at Nasik TPS given by MSPGCL Board of Directors on 21.08.2010 and the same was approved by Government of Maharashtra on 29.12.2011.

**Land:** Land for setting up the project is being made available by suitable readjustment of land in possession of MAHAGENCO in Nasik TPS premises.

**Water** : Water Resources Department, Government of Maharashtra vide letter dated 12.01.2011 approved additional rejuvenation of 6.5 MMQ of water from Godavari river and balance water requirement of 10.5 MMQ shall be met from already sanctioned water of 34 MMQ for Nashik TPS unit I to V.

**Coal:** Government of India vide letter dated 06.09.2013 has allocated Mahjanwadi coal block for this project.

**Environment Clearance** :TOR has been accorded by MOEF&CC on 15.06.2011. Online application for environment clearance has been submitted to MOEF&CC on 26.03.2015.

**Aviation Clearance:** Regarding Aviation clearance for constructing chimney of required height Principal Secretary (Energy) vide letter dated 06.05.2015 requested officer incharge defense authority, Colaba for review of the case and grant NOC.

MERC accorded approval for inclusion of 1x660 MW Nasik unit in PPA between MHANGENCO and MAHAVITARAN.

ii) **Punjab State Power Corporation Limited.**

**GND TP Bathinda:** Unit 1 to 4 (4x110 MW) are having high heat rate and low PLF even after life extension works. Life Extension works in GND TPS Bhatinda stage – I (unit – 1&2) was carried out in 2006-07 and that of stage –II (units 3 & 4) was done in 2012 - 2014. PSPCL would like to operate these units at least till 2021-22. More over these units are unlikely to be replaced with super critical units being situated at Bhatinda city.

**Ropar TPP:** The total installed capacity of Ropar TPP is 1260 MW (6x210 MW). Units (1 to 4) (4x210 MW) is having low PLF & is proposed for need based R&M. It was suggested that Punjab Government should go for only small scale R&M, Ropar TPP may be considered as a potential site for replacement by new supercritical units in future. Presently, Punjab has planned to go ahead with Hajipur TPS (2x660 MW) to be commissioned by 2021-22. According to PSPCL replacement proposal of (6 x 210 MW) units at Ropar TPS with supercritical units shall be reviewed in 2020-21 depending upon demand / supply gap, if required.

PSPCL have furnished land and water availability at GGSSTP Ropar Coal based Thermal Plant of capacity 1260 MW (6x210 MW) as under:

Land - 2274 acres

Water - 750 Cusecs

Average consumptive water requirement - 100 Cusecs.

### iii) Gujarat

**Ukai TPS:** Unit – 1 and 2 (2x120 MW) have undergone life extension, however, there was no significant improvement in performance even after that. GSECL have intimated that they propose to replace unit 1 & 2 by supercritical units. GSECL have submitted details regarding availability of land and water for Ukai TPS as under :

Land: for units 1, 2, 3, 4 and 5 (2x120 MW+2x200 MW+1x210 MW) = 614.354 Acres

Water: Total for units 1, 2, 3, 4, 5 and 6 (1350 MW) – 4.0 MLD

### iv) Tamil Nadu

**Ennore TPS :** TANGEDCO proposed to replace unit 1 to 5 of Ennore TPS by 1x660 MW supercritical unit, details regarding availability of land and water is given as below:

Land (after dismantling exiting 5 units (450 MW) ) : 91 acres.

Water: 13000 m<sup>3</sup>/hour

Terms of Reference (ToR) for conducting environmental & other studies have been issued by MOEF&CC for the proposed 660 MW supercritical replacement unit.

v) **Madhya Pradesh:**

**Satpura TPS :** Satpura TPS unit 1 to 5 (5 x 62.5 MW) have already been retired. Unit 6 to 9 are having high heat rate. It is decided that MPPGCL will not undertake comprehensive R&M on these units. Proposal for Joint Venture with NTPC is under active consideration. Till the matter reaches to a decisive end, the decision for retirement of these units is kept on hold.

**Amarkantak TPP:** Units 1 & 2 are already de-commissioned and Amarkantak extension TPP 2x120 MW is proposed to be retired in 2016-17. It is proposed to set up a super critical unit in its place. Required Land & Water is available. Proposal is yet to be firmed up by MPPGCL.

vi) **Chhattisgarh**

**Korba East TPS-II:** In spite of being very old, the 4x50 MW units are performing well with PLF around 60%. However, heat rate of these units are very high. These units were installed in the year 1966-68 and are non-reheat units. CSPGCL has planned to retire these units from June 2016 onwards in phased manner.

**Korba East TPS-III:** The 2x120 MW units are performing well in terms of PLF, these units have under gone R&M in 2002-05. These are re-heat type units and are not to be phased out. Setting up of replacement unit is not feasible at this site due to land constraints.

vii) **Telangana**

**Kothagudam TPS:** Units 1 to 4 (4x60 MW) are more than 48 years old whereas units 5 to 8 are more than 37 years old. These units have been identified for retirement. The heat rate of these units are also very high. Environment Clearance of Kothagudem Stage VII, (1x800 MW) has been granted on 16.7.2015 with the condition that all the units of Kothagudem Stage I to IV i.e. units 1 to 8 have to be retired by the end of 2019. TSGENCO has intimated that after the commissioning of 1x800 MW TPS at Kothagudam, old Units 1 to 8 of KTPS shall be retired.

**Ramagundam B (62.5 MW):** The unit is more than 45 years old and having high heat rate. This unit shall be retired along with Kothagudam units 1-8.

viii) **Andhra Pradesh**

**Dr. N. Tata Rao TPS:** Renovation and Modernisation works have been carried out on units 1 and 2 at Dr. N. Tata Rao TPS. APGENCO proposed to run these

units, as the performance parameters like SPM levels, Specific oil consumption, Specific coal consumption, Heat rate are comparable with new units. It is not viable to shut down these units. APGENCO proposed to set up one 800 MW unit at Dr. N. Tata Rao TPS. It was informed that BTG order shall be placed on BHEL shortly. Environmental clearance for this unit was accorded by MOEF&CC with the condition that the units 1 and 2 shall be shut down after commissioning of 800 MW unit keeping in view pollution burden in Vijaywada city, the proposed new capital of AP. APGENCO have intimated that R&M works have already been completed and it may not be viable to shut down these units. APGENCO was advised to take up the issue with MOEF&CC for waving the condition of shutting down units 1 and 2 on commissioning of (1x800 MW) supercritical unit at Dr. N. Tata Rao TPS and get the amendment issued for the Environmental Clearance of the project.

**ix) Jharkhand**

**Patratu TPS:** It was informed that this plant is to be taken over by JV Co. of NTPC & JUVNL. JV Co. is yet to be formed. MOU has been signed by NTPC with JUVNL. Units 1,2,3, 5&8 of Patratu TPS are proposed to be retired. Proposal has been submitted by Jharkhand Urja Vikas Nigam Limited to Govt. of Jharkhand to retire these units.

**x) Uttar Pradesh:**

**Panki TPS :** Panki unit 3& 4 are non re-heat type units and no R&M works is proposed for these units. While getting environmental clearance of a 660 MW super critical Panki Extn. unit, UPRVUNL have intimated that units 3&4 would be phased out after achieving COD of the new unit. The proposed 660 MW unit at Panki shall utilize land available at retired Panki 2x32 MW units, old staff colony, Ash Dyke land and land provided by UPPTCL.

**Harduaganj TPS:** Harduaganj Unit 1,2,3,4 & 6 have already been retired. R&M works in Unit-7 was taken up in March 2011 and has been synchronized in May 2015. Unit No.5 is a non reheat unit and is planned to be phased out after stabilization of Unit 7.

Harduaganj Extn. stage- II (1x660 MW) Project has obtained MOEF&CC clearance and order has been placed. Harduaganj (3x30 unit), old colony and other available land will be utilized for this Extn. project.

**Obra TPS:** Obra TPS Unit 1 & 2 (2x50 MW) are planned to be phased out after COD of Units 6 and 7 of Anpara D (2x500 MW) which is likely to be achieved during the current financial year.

Obra Unit 3, 4, 5&6 (3x50+94 MW) have been retired. Unit 7 (94 MW) is under R&M by M/s BHEL since July 2010 and is expected on load by December, 2015.

Obra Unit 8 (94 MW) is not in operation since 2005-06 and proposed to be retired. The proposal has been submitted for approval of UP Government and once approval is obtained, the retirement of the unit shall be taken up with CEA.

### **Parichha TPP**

R&M work of Parichha TPP Unit 2 (110 MW) was completed in 2013. But due to fire incident in cable gallery, the unit is under forced shut down w.e.f. 07.03.2014. Restoration work is expected to be completed by October, 2015. In unit - 1 (110 MW) R&M work has been approved. This unit will be closed for R&M after delivery of material by BHEL. R&M work is expected to start in the year 2016-17. UPRVUNL has been advised to ensure that environment norms laid down by MOEF&CC are complied with. There is no proposal for setting up supercritical unit at Parichha.

### **Anpara TPS**

Unit 1 to 3 : Need based R&M was carried out on these units between 2008-13. As such there is no proposal from UPRVUNL to retire any of the unit at Anpara TPS. The PLF of these units is above 75% and heat rate is also good.

### **xi) DPL**

DPL has informed that its Board of Directors in its meeting held on 18.03.2013 has accorded in principal approval for installation of one supercritical unit replacing unit no. 1 to 4. On evaluation of Pre Feasibility Report, Board of Directors recommended for obtaining clearance from Government of West Bengal to proceed for preparation of detailed project report and statutory action.

The Durgapur Projects Ltd. unit – 1 & 2 were de-commissioned on 31.03.2010 and 31.3.2011 respectively subsequently unit no. 3, 4 and 5 were also declared as retired w.e.f. 1.04.2014.

### **xii) West Bengal**

Bandel TPS: Large scale R&M works on Bandel TPS Unit 5 (210 MW) is nearing completion. The Unit has been synchronized on oil on 25.8.2015. COD is expected in October, 2015. Unit 1 to 4 are about 50 years old. These units are reheat type which have been de-rated from 84.5 MW to 60 MW and present heat rate is very high. Setting up of a new coal based supercritical unit in place of these old four units of BTPS is not possible as the dismantling of these units will

only release an area of 6 acres which may not be sufficient for any new supercritical unit.

WBPDCCL has given few reasons to continue with the 4x60 MW units as follows:

- i) Bandel TPS is a load centre generating station supplying power to industries through very short distance 132 kV & 33 kV line (12 nos.).
- ii) The station plays an important role in VAR (Reactive Power) control of the associated transmission network catering industrial load.
- iii) Apart from this the station has a lone unit 5 (210 MW). During outage or overhauling of this unit, the station generation will be zero causing voltage dip in the surrounding substations.

In view of above, WBPDCCL has decided to continue with these units and has identified refurbishment works to achieve sustained generation with better heat rate to the tune of 2800 kcal/kWh.

Santaldih TPS: Unit 1 to 4 of (4x110 MW) has been decommissioned and dismantling work has been started. However, the same need to be deleted from list of installed capacity of CEA.

Kolaghat TPS (KTPS) unit 2 & 3: These two units are presently running at less than optimum levels. A study is being undertaken for evaluating their life expectancy and further repair and maintenance work if necessary.

**xiii) Assam**

**Chandrapur TPS :** This is an existing power plant (2x30 MW) based on liquid fuel and is under shut down since June, 99 due to exorbitant cost of fuel. It is proposed by APGCL to revive the plant by replacing the existing boiler by fluidized bed combustion boiler based on coal firing using existing turbines through joint venture mode. The decision on revival depends upon Tariff adoption by Regulator.

**xiv) DVC**

**Durgapur TPS :** DVC has decided to retire unit 3(140 MW). A 660 MW supercritical unit at DTPS is planned. Land and water is available. DVC has carried out preliminary studies.

**ChandrapuraTPS :** Unit 4 to 6 (3x130 MW) have already been retired. According to their Plan, two nos. 660 MW capacity units at Chandrapura can be set up after retirement of unit 1 to 3. Land and water is available. DVC has carried out preliminary studies.



**BokaroTPS:** Unit 1 & 2 (2x 210 MW) which are more than 25 years old are having low PLF and higher Heat Rate. DVC was advised to take appropriate action either to retire these units or improve their performance at the earliest.

**Conclusion:-**

The following old and inefficient thermal units are proposed for replacement by super critical units:

**State Sector**

<b>State</b>	<b>Plant Capacity Retired / proposed for Retirement (MW)</b>	<b>Proposed replacement Cap. (MW)</b>	<b>Present status</b>
Haryana	Panipat TPS (440)	800	TOR obtained
U.P.	Harduaganj TPS (290)	660	Order placed
U.P.	Panki TPS (210)	660	NIT floated
U.P.	Obra TPS (438)	2x660	Proposal stage
M.P.	Amarkantak TPS (280)	660	Proposal stage
M.P.	Satpura TPS (312.5)	660	Proposal stage
Maharashtra	Nasik TPP (250)	660	Land available, Water & Fuel tied up, PPA agreement is available. Process for aviation and MoEF clearance is in progress.
Maharashtra	Bhusawal Unit 2 (62.5) Paras Unit 2 (62.5)	660	Bhusawsal Unit 6 (660 MW):The ICB tender on EPC basis was invited and the Bid evaluation report is submitted to Competent Authority for approval.
Gujarat	Ukai TPS (240 )	660	Proposal stage

Telangana	Kothagudem TPS & Ramagundem' B (782.5)	800	EC obtained
Tamilnadu	Ennore TPS (450)	660	TOR obtained
West Bengal	DPL TPS (280)	660	Proposal stage
<b>Total</b>		<b>8200</b>	

### Central Sector

State	Plant Capacity Retired / proposed for Retirement (MW)	Proposed replacement Cap. (MW)
West Bengal	DVC Durgapur (350 )	660
Jharkhand	DVC Chandrapura (780 )	2x660
<b>Total</b>		<b>1980</b>

**TOTAL STATE + CENTRAL SECTOR REPLACEMENT CAPACITY :**  
**10180 MW**

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## ANNEXURE-I

### STATE SECTOR

S.No	STATION	UNIT	CAP (MW)	UTILITY	Remarks
1	RAJGHAT TPS	1	67.5	IPGPCL	Decision to be taken
2	PANIPAT TPS	1	110	HPGCL	To be retired
3	PANIPAT TPS	2	110	HPGCL	To be retired
4	PANIPAT TPS	3	110	HPGCL	To be retired
5	PANIPAT TPS	4	110	HPGCL	To be retired
6	PANIPAT TPS	5	210	HPGCL	R&M/operational
7	GND TPS(BHATINDA)	1	110	PSPCL	R&M/operational
8	GND TPS(BHATINDA)	2	110	PSPCL	R&M/operational
9	GND TPS(BHATINDA)	3	110	PSPCL	R&M/operational
10	GND TPS(BHATINDA)	4	110	PSPCL	R&M/operational
11	ROPAR TPS	1	210	PSPCL	R&M/operational
12	ROPAR TPS	2	210	PSPCL	R&M/operational
13	ROPAR TPS	3	210	PSPCL	R&M/operational
14	ROPAR TPS	4	210	PSPCL	R&M/operational
15	KOTA TPS	1	110	RRVUNL	R&M/operational
16	KOTA TPS	2	110	RRVUNL	R&M/operational
17	KOTA TPS	3	210	RRVUNL	R&M/operational
18	KOTA TPS	4	210	RRVUNL	R&M/operational
19	OBRA TPS	1	40	UPRVUNL	To be retired
20	OBRA TPS	2	50	UPRVUNL	To be retired
21	OBRA TPS	7	94	UPRVUNL	R&M/operational
22	OBRA TPS	8	94	UPRVUNL	To be retired
23	OBRA TPS	9	200	UPRVUNL	R&M/operational
24	OBRA TPS	10	200	UPRVUNL	R&M/operational
25	OBRA TPS	11	200	UPRVUNL	R&M/operational
26	OBRA TPS	12	200	UPRVUNL	R&M/operational
27	OBRA TPS	13	200	UPRVUNL	R&M/operational
28	PANKI TPS	3	105	UPRVUNL	To be retired
29	PANKI TPS	4	105	UPRVUNL	To be retired
30	HARDUAGANJ TPS	5	60	UPRVUNL	To be retired
31	HARDUAGANJ TPS	7	105	UPRVUNL	R&M/operational
32	PARICHHA TPS	1	110	UPRVUNL	R&M/operational

33	PARICHHA TPS	2	110	UPRVUNL	R&M/operational
34	ANPARA TPS	1	210	UPRVUNL	R&M/operational
35	ANPARA TPS	2	210	UPRVUNL	R&M/operational
36	ANPARA TPS	3	210	UPRVUNL	R&M/operational
37	UKAI TPS	1	120	GSECL	To be retired
38	UKAI TPS	2	120	GSECL	To be retired
39	UKAI TPS	3	200	GSECL	R&M/operational
40	UKAI TPS	4	200	GSECL	R&M/operational
41	UKAI TPS	5	210	GSECL	R&M/operational
42	GANDHI NAGAR TPS	1	120	GSECL	Decision to be taken
43	GANDHI NAGAR TPS	2	120	GSECL	Decision to be taken
44	WANAKBORI TPS	1	210	GSECL	R&M/operational
45	WANAKBORI TPS	2	210	GSECL	R&M/operational
46	WANAKBORI TPS	3	210	GSECL	R&M/operational
47	WANAKBORI TPS	4	210	GSECL	R&M/operational
48	WANAKBORI TPS	5	210	GSECL	R&M/operational
49	WANAKBORI TPS	6	210	GSECL	R&M/operational
50	SIKKA REP. TPS	1	120	GSECL	Decision to be taken
51	SATPURA TPS	6	200	MPPGCL	Decision to be taken
52	SATPURA TPS	7	210	MPPGCL	Decision to be taken
53	SATPURA TPS	8	210	MPPGCL	Decision to be taken
54	SATPURA TPS	9	210	MPPGCL	Decision to be taken
55	AMARKANTAK EXT TPS	1	120	MPPGCL	To be retired
56	AMARKANTAK EXT TPS	2	120	MPPGCL	To be retired
57	DSPM TPS Korba	1	50	CSPGCL	To be retired
58	DSPM TPS Korba	2	50	CSPGCL	To be retired
59	DSPM TPS Korba	3	50	CSPGCL	To be retired
60	DSPM TPS Korba	4	50	CSPGCL	To be retired
61	DSPM TPS Korba	1	120	CSPGCL	R&M/operational
62	DSPM TPS Korba	2	120	CSPGCL	R&M/operational
63	KORBA-WEST TPS	1	210	CSPGCL	R&M/operational
64	KORBA-WEST TPS	2	210	CSPGCL	R&M/operational
65	KORBA-WEST TPS	3	210	CSPGCL	R&M/operational
66	KORBA-WEST TPS	4	210	CSPGCL	R&M/operational
67	KHAPARKHEDA TPS	1	210	MAHAGENCO	R&M/operational
68	NASIK TPS	3	210	MAHAGENCO	Decision to be taken
69	NASIK TPS	4	210	MAHAGENCO	Decision to be taken
70	NASIK TPS	5	210	MAHAGENCO	Decision to be taken
71	KORADI TPS	1	105	MAHAGENCO	To be retired
72	KORADI TPS	2	105	MAHAGENCO	To be retired
73	KORADI TPS	3	105	MAHAGENCO	To be retired

74	KORADI TPS	4	105	MAHAGENCO	To be retired
75	KORADI TPS	5	200	MAHAGENCO	Decision to be taken
76	KORADI TPS	6	210	MAHAGENCO	R&M/operational
77	KORADI TPS	7	210	MAHAGENCO	Decision to be taken
78	BHUSAWAL TPS	2	210	MAHAGENCO	Decision to be taken
79	BHUSAWAL TPS	3	210	MAHAGENCO	Decision to be taken
80	PARLI TPS	3	210	MAHAGENCO	Decision to be taken
81	PARLI TPS	4	210	MAHAGENCO	Decision to be taken
82	PARLI TPS	5	210	MAHAGENCO	Decision to be taken
83	CHANDRAPUR(MAH. )	1	210	MAHAGENCO	Decision to be taken
84	CHANDRAPUR(MAH. )	2	210	MAHAGENCO	Decision to be taken
85	CHANDRAPUR(MAH. )	3	210	MAHAGENCO	Decision to be taken
86	CHANDRAPUR(MAH. )	4	210	MAHAGENCO	Decision to be taken
87	Dr. N.TATA RAO TPS	1	210	APGENCO	R&M/operational
88	Dr. N.TATA RAO TPS	2	210	APGENCO	R&M/operational
89	Dr. N.TATA RAO TPS	3	210	APGENCO	R&M/operational
90	KOTHAGUDEM TPS	1	60	TSGENCO	To be retired
91	KOTHAGUDEM TPS	2	60	TSGENCO	To be retired
92	KOTHAGUDEM TPS	3	60	TSGENCO	To be retired
93	KOTHAGUDEM TPS	4	60	TSGENCO	To be retired
94	KOTHAGUDEM TPS	5	120	TSGENCO	To be retired
95	KOTHAGUDEM TPS	6	120	TSGENCO	To be retired
96	KOTHAGUDEM TPS	7	120	TSGENCO	To be retired
97	KOTHAGUDEM TPS	8	120	TSGENCO	To be retired
98	RAMAGUNDEM - B TPS	1	62.5	TSGENCO	To be retired
99	RAICHUR TPS	1	210	KPCL	R&M/operational
100	RAICHUR TPS	2	210	KPCL	R&M/operational
101	ENNORE TPS	1	60	TNGDCL	To be retired
102	ENNORE TPS	2	60	TNGDCL	To be retired
103	ENNORE TPS	3	110	TNGDCL	To be retired
104	ENNORE TPS	4	110	TNGDCL	To be retired
105	ENNORE TPS	5	110	TNGDCL	To be retired
106	TUTICORIN TPS	1	210	TNGDCL	R&M/operational
107	TUTICORIN TPS	2	210	TNGDCL	R&M/operational
108	TUTICORIN TPS	3	210	TNGDCL	R&M/operational
109	METTUR TPS	1	210	TNGDCL	R&M/operational
110	METTUR TPS	2	210	TNGDCL	R&M/operational
111	METTUR TPS	3	210	TNGDCL	R&M/operational
112	PATRATU TPS	1	40	JSEB	To be retired
113	PATRATU TPS	2	40	JSEB	To be retired
114	PATRATU TPS	3	40	JSEB	To be retired
115	PATRATU TPS	4	40	JSEB	Decision to be taken

116	PATRATU TPS	5	90	JSEB	To be retired
117	PATRATU TPS	6	90	JSEB	Decision to be taken
118	PATRATU TPS	7	105	JSEB	Decision to be taken
119	PATRATU TPS	8	105	JSEB	To be retired
120	PATRATU TPS	9	110	JSEB	R&M/operational
121	PATRATU TPS	10	110	JSEB	R&M/operational
122	BARAUNI TPS	6	105	BSEB	R&M/operational
123	BARAUNI TPS	7	105	BSEB	R&M/operational
124	BANDEL TPS	1	60	WBPDC	R&M/operational
125	BANDEL TPS	2	60	WBPDC	R&M/operational
126	BANDEL TPS	3	60	WBPDC	R&M/operational
127	BANDEL TPS	4	60	WBPDC	R&M/operational
128	BANDEL TPS	5	210	WBPDC	R&M/operational
129	SANTALDIH TPS	1	120	WBPDC	To be retired
130	SANTALDIH TPS	2	120	WBPDC	To be retired
131	SANTALDIH TPS	3	120	WBPDC	To be retired
132	SANTALDIH TPS	4	120	WBPDC	To be retired
133	KOLAGHAT TPS	2	210	WBPDC	R&M/operational
134	KOLAGHAT TPS	3	210	WBPDC	R&M/operational
135	D.P.L. TPS	3	70	DPL	To be retired
136	D.P.L. TPS	4	75	DPL	To be retired
137	D.P.L. TPS	5	75	DPL	To be retired
138	D.P.L. TPS	6	110	DPL	Decision to be taken
139	CHANDRAPUR(ASSAM)	1	30	APGPCL	Decision to be taken
140	CHANDRAPUR(ASSAM)	2	30	APGPCL	Decision to be taken
	<b>SUBTOTAL STATE SECTOR</b>	<b>140</b>	<b>19993</b>		

### CENTRAL SECTOR

1	BADARPUR TPS	1	95	NTPC Ltd.	To be retired
2	BADARPUR TPS	2	95	NTPC Ltd.	To be retired
3	BADARPUR TPS	3	95	NTPC Ltd.	To be retired
4	BADARPUR TPS	4	210	NTPC Ltd.	R&M/operational
5	BADARPUR TPS	5	210	NTPC Ltd.	R&M/operational
6	SINGRAULI STPS	1	200	NTPC Ltd.	R&M/operational
7	SINGRAULI STPS	2	200	NTPC Ltd.	R&M/operational
8	SINGRAULI STPS	3	200	NTPC Ltd.	R&M/operational
9	SINGRAULI STPS	4	200	NTPC Ltd.	R&M/operational
10	SINGRAULI STPS	5	200	NTPC Ltd.	R&M/operational
11	SINGRAULI STPS	6	500	NTPC Ltd.	R&M/operational
12	SINGRAULI STPS	7	500	NTPC Ltd.	R&M/operational
13	RIHAND STPS	1	500	NTPC Ltd.	R&M/operational

14	RIHAND STPS	2	500	NTPC Ltd.	R&M/operational
15	UNCHAHAR TPS	1	210	NTPC Ltd.	R&M/operational
16	UNCHAHAR TPS	2	210	NTPC Ltd.	R&M/operational
17	TANDA TPS	1	110	NTPC Ltd.	R&M/operational
18	TANDA TPS	2	110	NTPC Ltd.	R&M/operational
19	KORBA STPS	1	200	NTPC Ltd.	R&M/operational
20	KORBA STPS	2	200	NTPC Ltd.	R&M/operational
21	KORBA STPS	3	200	NTPC Ltd.	R&M/operational
22	KORBA STPS	4	500	NTPC Ltd.	R&M/operational
23	KORBA STPS	5	500	NTPC Ltd.	R&M/operational
24	KORBA STPS	6	500	NTPC Ltd.	R&M/operational
25	VINDHYACHAL STPS	1	210	NTPC Ltd.	R&M/operational
26	VINDHYACHAL STPS	2	210	NTPC Ltd.	R&M/operational
27	VINDHYACHAL STPS	3	210	NTPC Ltd.	R&M/operational
28	VINDHYACHAL STPS	4	210	NTPC Ltd.	R&M/operational
29	RAMAGUNDEM STPS	1	200	NTPC Ltd.	R&M/operational
30	RAMAGUNDEM STPS	2	200	NTPC Ltd.	R&M/operational
31	RAMAGUNDEM STPS	3	200	NTPC Ltd.	R&M/operational
32	RAMAGUNDEM STPS	4	500	NTPC Ltd.	R&M/operational
33	RAMAGUNDEM STPS	5	500	NTPC Ltd.	R&M/operational
34	RAMAGUNDEM STPS	5	500	NTPC Ltd.	R&M/operational
35	TALCHER (OLD) TPS	1	60	NTPC Ltd.	R&M/operational
36	TALCHER (OLD) TPS	2	60	NTPC Ltd.	R&M/operational
37	TALCHER (OLD) TPS	3	60	NTPC Ltd.	R&M/operational
38	TALCHER (OLD) TPS	4	60	NTPC Ltd.	R&M/operational
39	TALCHER (OLD) TPS	5	110	NTPC Ltd.	R&M/operational
40	TALCHER (OLD) TPS	6	110	NTPC Ltd.	R&M/operational
41	FARAKKA STPS	1	200	NTPC Ltd.	R&M/operational
42	FARAKKA STPS	2	200	NTPC Ltd.	R&M/operational
43	FARAKKA STPS	3	200	NTPC Ltd.	R&M/operational
44	MUZAFFARPUR TPS	1	110	K.B.U.N.L	R&M/operational
45	MUZAFFARPUR TPS	2	110	K.B.U.N.L	R&M/operational
	<b><i>SUB TOTAL NTPC</i></b>	<b><i>45</i></b>	<b><i>10665</i></b>		
46	CHANDRAPURA(DVC) TPS	1	130	DVC	To be retired
47	CHANDRAPURA(DVC) TPS	2	130	DVC	To be retired
48	CHANDRAPURA(DVC) TPS	3	130	DVC	To be retired
49	DURGAPUR TPS	3	130	DVC	To be retired
50	DURGAPUR TPS	4	210	DVC	To be retired
51	BOKARO `B` TPS	1	210	DVC	Decision to be taken

	<b><i>SUB TOTAL DVC</i></b>	<b>6</b>	<b>940</b>		
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52	NEYVELI TPS- I	1	50	NLC	To be retired
53	NEYVELI TPS- I	2	50	NLC	To be retired
54	NEYVELI TPS- I	3	50	NLC	To be retired
55	NEYVELI TPS- I	4	50	NLC	To be retired
56	NEYVELI TPS- I	5	50	NLC	To be retired
57	NEYVELI TPS- I	6	50	NLC	To be retired
58	NEYVELI TPS- I	7	100	NLC	To be retired
59	NEYVELI TPS- I	8	100	NLC	To be retired
60	NEYVELI TPS- I	9	100	NLC	To be retired
61	NEYVELI TPS-II	1	210	NLC	R&M/operational
62	NEYVELI TPS-II	2	210	NLC	R&M/operational
63	NEYVELI TPS-II	3	210	NLC	R&M/operational
	<b><i>SUB TOTAL NLC</i></b>	<b>12</b>	<b>1230</b>		
	<b>SUB TOTAL CENTRAL SECTOR</b>	<b>63</b>	<b>12835</b>		

### PRIVATE SECTOR

1	TROMBAY TPS	4	150	TATA PCL
2	TROMBAY TPS	5	500	TATA PCL
3	SABARMATI (C STATION)	15	30	TOR. POW. (AECO)
4	SABARMATI (C STATION)	16	30	TOR. POW. (AECO)
5	SABARMATI (D-F STATIONS)	1	120	TOR. POW. (AECO)
6	SABARMATI (D-F STATIONS)	2	110	TOR. POW. (AECO)
7	SABARMATI (D-F STATIONS)	3	110	TOR. POW. (AECO)
8	NEW COSSIPORE TPS	1	30	CESC
9	NEW COSSIPORE TPS	2	30	CESC
10	NEW COSSIPORE TPS	3	50	CESC
11	NEW COSSIPORE TPS	4	50	CESC
12	TITAGARH TPS	1	60	CESC
13	TITAGARH TPS	2	60	CESC
14	TITAGARH TPS	3	60	CESC
15	TITAGARH TPS	4	60	CESC
	<b>SUB TOTAL PVT.</b>	<b>15</b>	<b>1450</b>	

<b>TOTAL ( STATE + CENTRAL + PVT.)</b>	<b>218</b>	<b>34278</b>
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