

Work shop programme

Rehabilitation of coal fired power plants

Status, Needs and challenges for R&M programme in India

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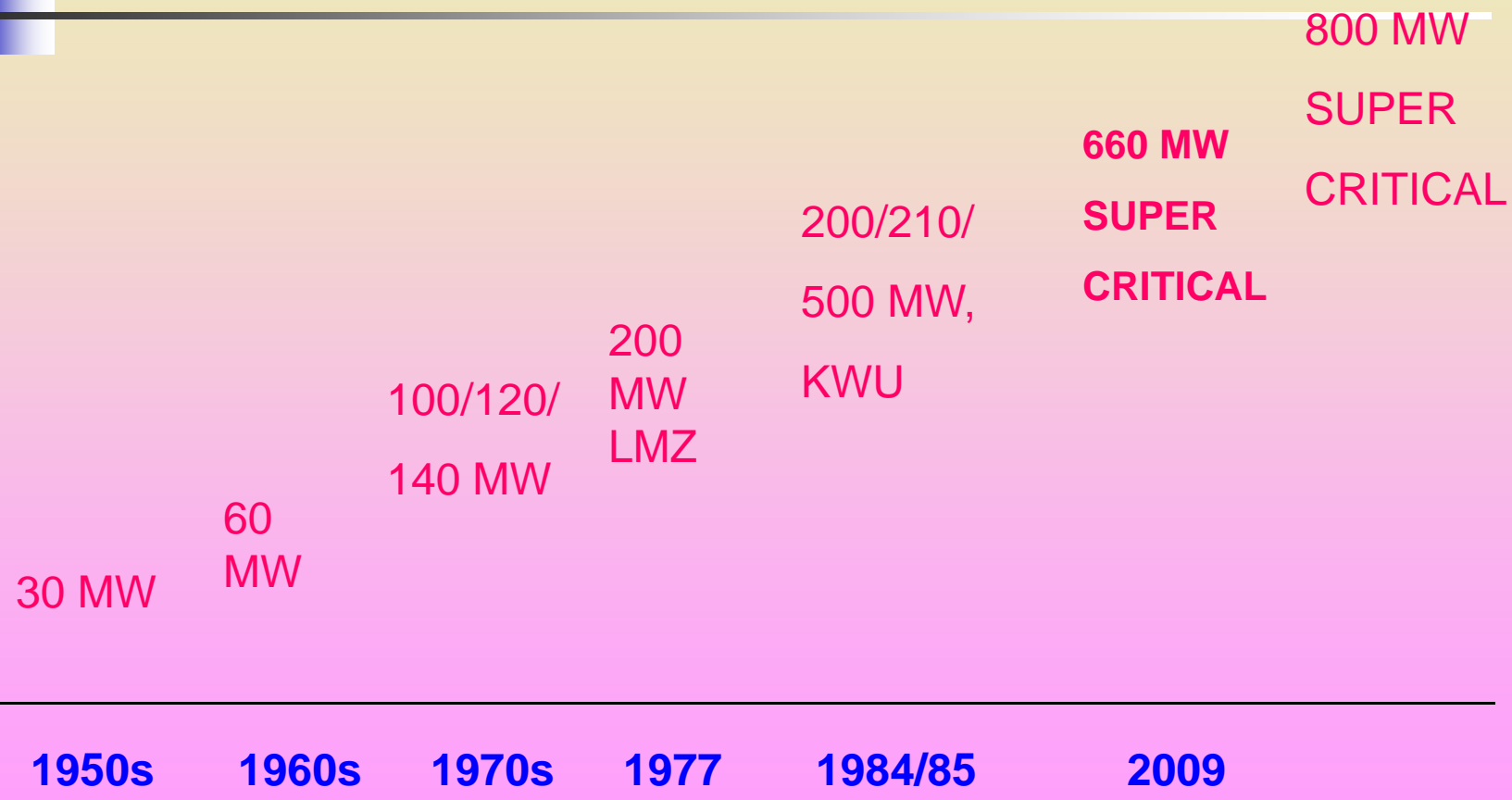
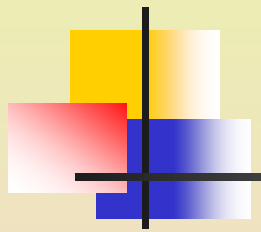
Phillipines, Manilla

Present Power scenario in India

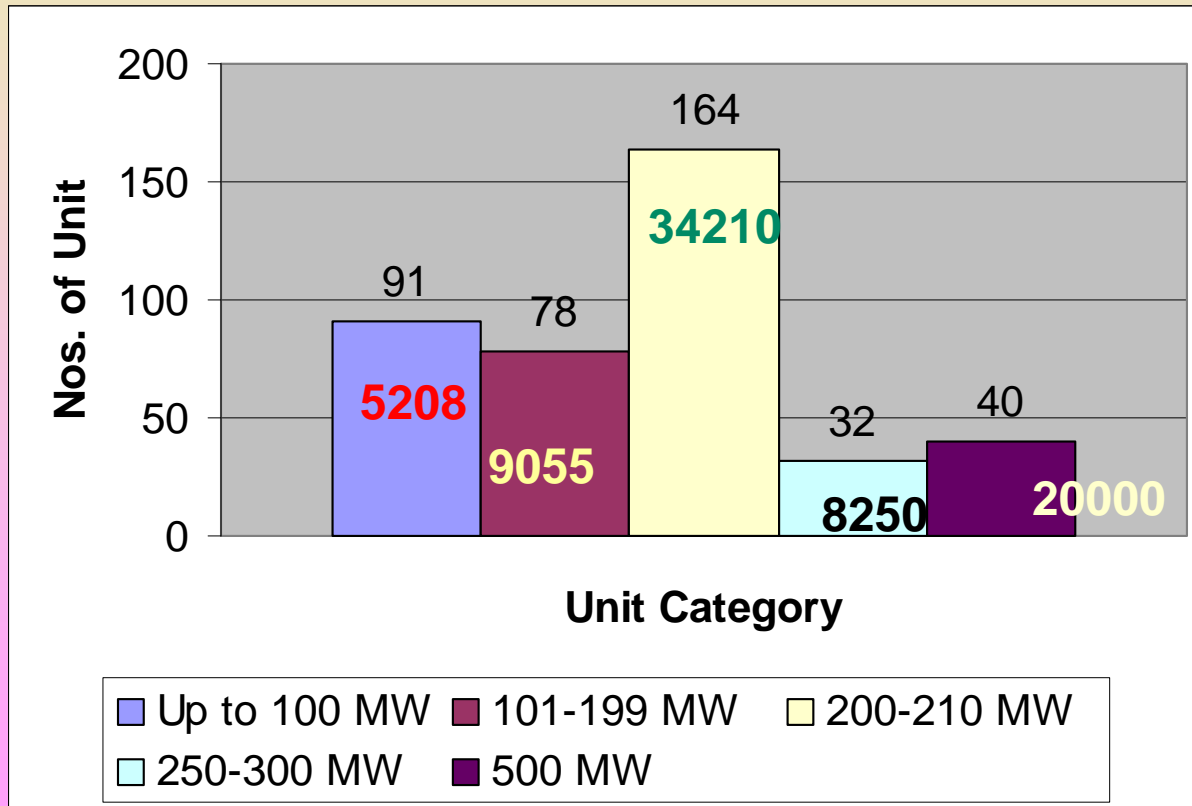
- Total Installed Capacity as on 31.03.09:
 - 147965.41 MW
 - Thermal – 93725.24 MW
 - Coal - 77648.88 MW
 - Gas - 14876.61 MW
 - Diesel - 1199.75 MW
 - Nuclear - 4120.00 MW
 - Hydro - 36877.76 MW
 - RES (MNRE)- 13242.41 MW

Coal 52.5% of installed capacity
(>75 % of Generation)

Growth of Unit Size in India (Thermal plants)



Distribution of Thermal Unit Sizes



Performance of thermal units

2007-08



Unit size	No. of units reviewed	Capacity MW	PLF (%)
500 MW	33	16500	84.91
250 MW	13	3250	93.75
200/210 MW	160	33355	82.43
140/150 MW	11	1480	53.52
120 MW	21	2520	46.84
110 MW	40	4440	55.82
100 MW	11	1100	51.07
60 MW	25	1500	47.86
57.5- 50 MW	24	1200	41.41
40-25 MW	13	390	46.04

Age Profile of Large Size Thermal Units

As on March 2009

Capacity range (in MW)	> 15 years but <20 years	>20 years but < 30 years	> 30 years
< 200	8 (1)	27 (9)	108 (46)
200/210	38 (3)	74 (8)	10 (3)
250/300	-	-	-
500	9	6	NIL

Fig. in bracket indicates units where LE works carried out/under implementation.

Thus large portion of existing capacity (10,000 to 12,000 MW) can be considered for efficiency enhanced R&M on priority basis. Investment requirement would be of the order of US\$ 5 billion.

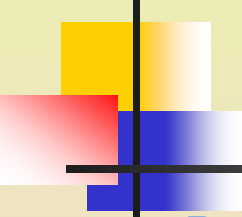
Heat Rate Deterioration

As on March 2009

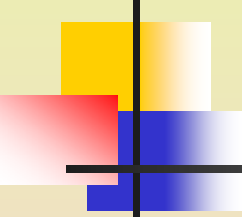
Capacity range (in MW)	H.R. deterioration from design value	Actual heat rate
< 200	20- 25 %	3000 kcal/kWh
200/210 (LMZ)	12-14 %	2700 kcal/kWh
200/210 (KWU)	10-12 %	2600 kcal/kWh

These are averaged indicative values for comparison only.

Reasons for poor performance

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- Design deficiencies, manufacturing and generic defects.
 - Inefficient Operation and Maintenance (O&M) causing prolonged and repetitive forced outages.
 - Cumulative / delayed and avoided maintenance.
 - Inadequate and non timely availability of spare parts especially for imported equipment.
 - Lack of resources. Not able to take up the Renovation & Modernisation programmes to the extent required.
 - Quality of coal being supplied gets deteriorated. Wide variation in coal quality, presence of extraneous non-coaly matter.
 - Inadequately trained manpower for the O&M of the plant.

NEED FOR R&M / LE

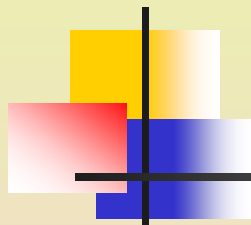
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- A low cost and short gestation period option for enhanced generation.
 - Improvement in performance parameters – PLF, Availability, heat rate/ efficiency, auxiliary power consumption, partial loading & forced outage.
 - Restore derated capacity and/or extension of economic life.
 - To overcome technological obsolescence & non availability of spares (eg. C&I)
 - Environmental issues, safety and other statutory requirements.
 - Thus R&M is a technical necessity -Extent of R&M could depend on cost -benefit options.

Activities in the Past

1. Conception of systematic R&M Programme – 1982
2. Commencement of Implementation - 1984
3. Details of R&M Programme covered under various 5-Yr Plans

5-Yr. Plan	No. of Units/ (MW)	Total cost (Rs. in crores)	Adl. gen. MU/ Annum (Eqv. MW)
7th Plan	163 (13570 MW)	1066	10000 (2000)
8th Plan	198 (20869 MW)	862	5085 (763)
9th Plan R&M	127 (17306 MW)	850	Generation sustenance
LEP	25 (1685 MW)	1560	5100 (770)
10th Plan R&M	14 (2460 MW)	214	Generation sustenance
LEP	11 (985 MW)	948	2146 (322)

R&M Programme upto year 2017 - Tentative



Programme	11 th Plan (Yr. 2007-12)	12 th Plan (Yr. 2012-2017)
Life Extension Programme (LEP)	7318 MW (53 units)	20472 MW (86 units)
R&M Programme (for generation sustenance)	18965 MW (76 units)	4680 MW (14 units)

DRIVERS FOR EFFICIENCY INTEGRATED R&M

- Increased emphasis on Environment for clean technology.
- Reduction in cost of generation as power market is set to be more competitive in future.
- Fuel, Land & Water availability becoming more and more difficult.
- Efficiency enhancement feasible in existing plants.
- CDM opportunities arising out of global warming concerns.
- Accrued benefit in a typical 200/210 MW unit include
 - increased output by about 10%
 - Improved heat rate by 5 - 8%
 - Extended plant life by 10 years or more

CHALLENGES IN R&M OF TPSs



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1. PROJECT FORMULATION STAGE
 2. CONTRACT FINALISATION PHASE
 3. IMPLEMENTATION PHASE
 4. REGULATORY ASPECTS
 5. FINANCIAL MODELLING
 6. O&M PRACTICES

CHALLENGES – PROJECT FORMULATION STAGE

- R&M not considered a priority area as compared to new generation projects – delays in take off.
- Long time taken in report preparation.
- Efficiency enhancement options also to be evaluated for techno-economical considerations.
- Need to well define performance objectives : level of restoration with/without efficiency improvement, upgradation in output etc.
- Limited experienced consultants to undertake the feasibility studies.

CHALLENGES- CONTRACT FINALISATION PHASE

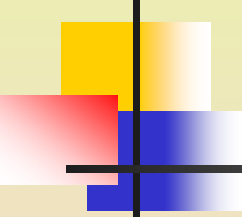


- Scope identification - bidder selection on competitive bidding.
- Comprehensive health assessment.
- Need to reduce high cost of R&M.
- Guarantees to be well defined.
- Strategy to handle surprises.
- Feasibility for standardising bid document/procedure.

CHALLENGES – IMPLEMENTATION PHASE

- Reluctance to take long shut downs – only limited number units can be taken out simultaneously. Non-availability and /or high cost of alternative energy procurement.
- Lack of initiatives by the equipment suppliers – perceived business risks in terms of time frame/cost. & perception about long term business opportunities.
- Greater participation from equipment suppliers for better competition – bulk ordering for implementation in a phased manner.
- Lack of support by utilities in terms of providing dedicated teams for supervision/monitoring.

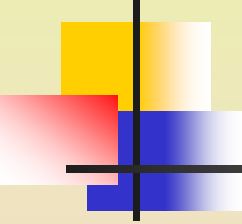
CHALLENGES – REGULATORY ASPECTS

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- Bench marking of capital expenditure to be passed into tariff.
 - Methodology of cost benefit sharing between the generating company and the consumer.
 - Whether rehabilitation to be made mandatory after certain period of operation to ensure continued high level of performance & life extension.
 - Lack of accountability for delayed or non-implementation of R&M.
 - Uncertainty over treatment on cost escalation, delays, period of shutdown etc.

CHALLENGES – FINANCIAL MODELLING

- Huge Fund Requirement.
- Incentivising private sector participation. No success in the past. Suitable model to be developed, e.g. Invest, Rehabilitate, Operate and Transfer.
- Type of hand holding (Lease, JV etc.), Investment share, Terms of agreement, Use of additional generation.
- Need to delineate deferred O&M cost from the rehabilitation cost to firm up techno-economics.
- GENCOs to improve their financial strength for greater acceptability by financial institutions including external funding agencies.

NEED FOR BEST O&M PRACTICES

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- Need to have strong O&M base for sustained good performance during post R&M.
 - Deployment of adequate and experienced O&M personnel.
 - Extensive training of O&M personnel.
 - Development of suitable systems for overhaul planning, planned maintenance, performance feedback etc.



Thank You