

# International Conference on Energy Management Beyond 2000

Lucknow, October 19-21, 2000

## RECOMMENDATIONS

Sponsored by several public sectors and R & D organizations, the above conference provided an opportunity for exchange of views and mutual experience between engineers, academicians, scientists, researchers and planners. The deliberations have given a thrust to the challenges and challenges of Energy Management at the threshold of millennium. About 66 State of the Art technical papers and case studies were presented during the Congress and the following recommendations emerged :

1. Energy in any form plays a vital role in the development since inception of mankind and now for the survival of world. In the Present era of industrial revolution and in the process of development of energy sources, depletion of resources, disposal of waste specially from thermal and nuclear power stations degradation of environment, fossil fuel burning etc. has to be given more concern in the present millennium for the sustainable development of civilization. We have to look for efficient energy generation and utilization specially in view of limited resources of harnessable energy.
2. In order to survive and thrive to enable the commercial transaction increase efficiencies and lower costs, Energy sector needs to redraw its corporate strategies. Organizational design, management systems, managerial processes and leadership style.
3. The challenges of new millennium in the energy sector is to improve the political management of energy policy rather than ensure energy security through increased investment alone. Because of unsettling uncertainties; changes in the work environment, policies, structure, systems and procedures, during initial years of power sector reforms, operational and financial performances of the emerging entities are likely to be deteriorated. Involvement of financial institutions and sustained implementation of reform programme will help improve perception and held entities raise larger volume of financing for better consumer services with reliable power supply.
4. To accomplish the results of power sector reforms, the emerging entities need good corporate governance with minimum political interference to ensure reduction in transmission and distribution losses and improve revenue collection.
5. In India about 75% of population live in rural areas and major segment of rural population is too poor to buy commercial energy. Integrated rural energy programme (IREP) need to be intensified for meeting the basic needs of cooking, heating and lighting for weaker section of society as well as for economic development in rural India.
6. Technical education curricula covers energy management in a touch and go way. The thrust in this direction is far less than actually needed. The need of the time is to introduce energy management in curricula of Technical Institutions for new generation.
7. RLA based plant performance improvement programme, a scientific approach for Renovation and Modernization of Thermal Power Plant, could be effectively implemented, which would not only result in increased output, but also ensure long term trouble free and economic operation of the plant Priority funding from O & M Budget of utility is to be ensured.
8. An eco-friendly action plan based on the effective utilization of fly ash in bulk quantities is to be emerged to avoid land encroachment and pollution.
9. Beneficiation (Dry & Wet) of coal at pitheads resulting in low transportation costs, decrease in

auxiliary consumption, improvement in PLF and ESP efficiency, etc. must be encouraged.

10. The retrofitting in existing thermal plants for performance and life extension needs to be given due importance. Modern CFD enables the three dimensional nature of the steam flow to be modeled. Blade profile in H.P. and L.P. turbines can now be specified to reduce the sources of loss by application of appropriate levels of taper, twist lean and secondary flow correction.
11. Computer aided design of coal bunker is required for effective utilization of coal and reduced flow problems. Software can be effectively implemented in the design of coal bunkers and Silos for reliable flow in the thermal power and mining industry.
12. To improve hydro-thermal mix (ideal 40:60), private sector participation in Hydro generation coupled with further improvement in Government Policies and expeditious implementation are very much needed. There is also a need for development of environment friendly small hydro power projects for moving towards sustainable development, because adverse impacts are almost negligible.
13. There is need to conduct survey and investigations on advanced scientific basis and prepare bankable detailed hydro project report, effectively counter lobbies who spread incorrect information and rumour about hydro projects, educate public to create awareness in them. Government of India and State Government must work hand in glove and encourage and cooperate with developers in land acquisition, rehabilitation and resettlement, catchment area treatment problems etc.
14. There is an urgent need to review the tariff structure to ensure that utilities are able to generate reasonable return on the incremental investment incurred on the R. M & U of hydro power plants. Tariffs based on the lowest marginal cost concepts could be possible solution. Hydro power plants substantially serve the peaking power and hence Time of Day (ToD) tariff should be introduced. This would encourage the hydro power development and would give a boost to speedy exploitation of India's hydro potential.
15. More thrust needs to be given to increase Nuclear Power generation. It is desirable to review model of France where more than 70% generation is through Atomic Energy. Implementation of latest predictive techniques in a systematic manner including using latest instrumentation to further improve PLF in existing Nuclear Power Plants has been appreciated.
16. Energy audit is the most powerful tool in pursuing a comprehensive energy management programme in minimizing energy losses and avoiding wastage of electricity in industries and power plants. Top management of an organization must take an active role in planning, organizing, staffing, directing and controlling the entire conservation programme.
17. In agriculture sector, efficiencies of agricultural pumps commonly being used are very low due to design and manufacturing deficiencies and improper motor-pumps combinations. There is scope of saving of 50% of total energy consumption by pumping sets without effecting the output by employing efficient pumps conforming to IS:10804-1986, using motors of proper ratings in conjunction with shunt capacitors (for improving low power factor), using PVC pipes for suction, delivery, etc. There are potential alternatives to diesel fuels such as bio-gas, solar energy, etc.
18. The minimizing of energy losses and avoiding wastage of electricity are in true sense the backbones of energy conservation. This will be achieved only by root level awareness and persistent R & D efforts by power system engineers. At mass level the people should be educated about energy conservation programme collectively by the Government Institutions and power sector utilities which will bring participation of every individual with proper understanding. The benefits of various policies and recent techniques such as concessional tariff during off-peak hours, use of energy efficient

equipments and methods etc. will go to each and every consumer through the mass campaign. Thus Energy conservation can emerge as a Super Power Generator for new millennium through constant awareness and untiring R & D efforts.

19. Railway Electrification programme has not been related to National energy policies dictated by energy efficiency, energy conservation and oil substitution. The largest potential for reducing dependence on oil is by substituting electricity for end uses that now employ oil and rail transport is one such area. In the National interest, Railways must be electrified on all its trunk routes and dependence on oil should be minimized.
20. To strengthen Transmission and Distribution system, high phase order transmission system, corporate planning for electricity distribution entities and implementation of availability based tariff are needs of the hour to help reduce the energy crisis.
21. Remote energy metering system must be employed to solve revenue collection problem of power sector. New innovative technologies viz. Artificial Neural Network based motor diagnosis system to detect machine fault on line, microprocessor based acquisition system with communication connector to facilitate heavy earthmoving machine operator to reduce equipment downtime for improved mineral productivity, development of strain gauges for performance monitoring to ensure safety and reliability of complex structures such as coal feed bunkers, electrostatic precipitators etc. are recommended.
22. It is possible to reduce the demand for power supply at peak hour by suitable Demand Management techniques which could reduce the additional capacity requirement.
23. In way of Energy Demand Management beyond 2000 what country needs to keep is the power available for major activity of economic growth by following activities.
  - Reducing T & D losses
  - Conservation of electric energy
  - Arrest pilferage / Theft of electricity
  - Compulsory HT / LT metering, prepaid metering of domestic, commercial consumer.
  - Energy Auditing and accounting of each and every unit of electricity produced, no areas of manipulations.
  - Introduction of Time of the Day (ToD) or time based energy meters to be hastened to enable differential tariff for peak and non-peak hours.
  - Utilities to be professionalised and run as commercial.
24. Artificial neural network can be used for minimum emission dispatch problem with transmission loss. A principal advantage of the use of ANN lies in its flexibility.
25. Digital based intelligent field devices and multi parameter digital communications continue making their presence into the process industries. Investing in the intelligent field devices / digital communication, open and scalable process systems, is the right step towards setting up a Smart Plant. The performance and success of such a smart plant is paralysed if its foundation is still based on the conventional automation architecture, which is designed around the DCS.
26. Industrial sector, particularly metallurgical sector in India consumes substantial amount of energy. Energy conservation opportunity should be identified for each unit and actions have to be initiated in an organized manner to implement appropriate measures, monitor the benefits and further improvements may be made. The Government may come out with legislation for making the energy audit compulsory and set energy consumption targets for each industry.

27. In years to come, use of more non-conventional energy sources viz. solar, bio-mass, wind etc., must be encouraged through Government Policies and bigger private sector participation.
28. Rice husk contains 60-70% total volatile matter. Rice husk can be converted into energy through the use of different technologies viz., burning in excess of air, burning in a controlled atmosphere, destructive (dry) distillation, pyrolysis, gasification producer gas, chemical processes. Modern rice mills can meet all their energy demand by utilizing rice husk energy alone. However, the use of rice husk should not remain confined to rice mills only, but its extensive use as an energy source needs to be persuaded vigorously. This should be considered as an available raw material in the same manner as any other raw fuel source.
29. Efforts must also be made to develop suitable indigenous technologies for circulating fluidized bed gasifiers to handle particularly the powdery biomass efficiently and effectively. These gasifiers can have higher throughput capabilities and greater flexibility than fixed bed gasifiers which can be utilized to run gas turbines for generating power.
30. There is significant potential for use of non-conventional energy sources as follows, which if properly harnessed will reduce the dependence on conventional sources and meet the energy shortages.

■ Bio-gas plant	12 million numbers
■ Biomass / bio-energy	17,000 MW
■ Mini / Micro hydel	10,000 MW
■ Wind Power	20,000 MW
■ Ocean Thermal Power	50,000 MW
■ Tidal Power	02,000 MW
■ Sea Wave	02,000 MW
■ Total Solar input over Indian land	$5 \times 10^{15}$ KWh/yr