



POWER AND POLLUTION: AN ANALYTICAL STUDY

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ABSTRACT

In these times when the sweep of modernity is altering every facet of life on the Earth, electricity has acted and continues to act as the catalyst which has made these changes possible. So, it is only commendable and a valuable asset for the state when Chhattisgarh has not only managed to generate enough electricity to fulfill its own needs, but also has produced in excess year after year. CSEB (Chhattisgarh state electricity board) is in a strong position to meet the electricity requirement of the state and boasts of a good financial health.

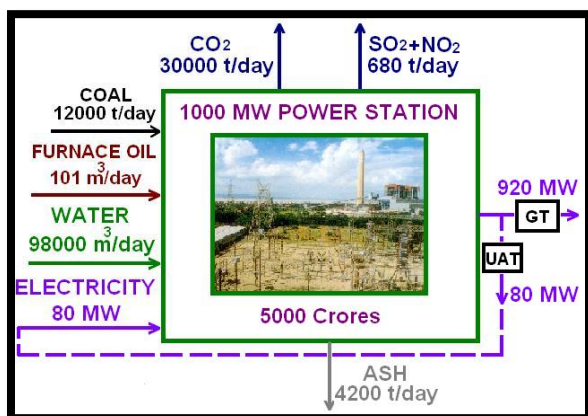
But on the other side of the coin, such a massive production of electricity has also resulted in air pollution which is proving to be a huge threat to health of the denizens of the state.

INTRODUCTION

Chhattisgarh is one of the few states of India where the power sector is effectively developed. Based on the current production of surplus electricity, the position of the state is comfortable and profitable. The Chhattisgarh State Electricity Board (CSEB) is in a strong position to meet the electricity requirement of the new state and boasts of a good financial health. It provides electricity to several other states because of surplus production with Korba and Bilaspur being its power hubs.

Currently there are 128 captive power plants in the state with a total capacity of 11000 MW. Moreover in 12th five year plan government has planned to achieve production of 20000 MW power.

According to a report of the Central Electricity Authority (CEA), Chhattisgarh had 26012 million units of power available during 2015-16 against the anticipated requirement of 24980 million units. The state had 1032 millions units of surplus power generated during 2015-16 and the peak



requirement is anticipated at 3825 MW as against the anticipated availability of 3857 MW – A surplus of 32 MW.

This was the positive side of the state being a power hub. However, there is negative side too. Many coal based thermal power plants like the National Thermal Power Corporation and CSEB located in Korba have caused widespread pollution.

According to a study conducted by the Central Pollution Control Board in 2009, Korba ranks fifth in the “Critically Polluted Area” category among 88 industrial clusters. More than one lakh metric tons of fly ash is generated annually by the eight thermal power plants in Korba which produce 6090 Mega Watts of electricity.

When coal is burnt for generating electricity, many pollutants like carbon dioxide (CO₂), sulphur dioxide, suspended particulate matter (SPM) etc are produced. These pollutants are responsible for many diseases like Asthma, bronchitis etc.

A recently released report of the World Bank and the institute for health metrics and evaluation has come out with some startling facts. India has lost 1.4 million lives to air pollution.

As per IHME report, presently air pollution is estimated to be the fourth leading fatal health risk in terms of attributable deaths and pre mature mortalities after metabolic risks, dietary risks and tobacco.

By damaging health of people and causing fatal diseases, air pollution can have a lasting effect on a person’s economic productivity.

‘Fly-ash’ refers to fine particles of ash sent up by the burning of solid fuel-like coal. Typically, this is the residue of ash generated by thermal power plant. Due to its toxic nature, the government has mandated that fly-ash must be dumped in ash ponds, which are specially made on vacant lands.



However this mandate is not strictly observed and casual dumping has resulted in the poisoning of air, water and land in areas close to the power plants. This has also had a negative impact on the health of people living in those areas. Korba, located in the northern half of Chhattisgarh, is one such affected area.

HYPOTHESIS

Chhattisgarh is one of the few states in India which has an efficient power sector. The state not only produces enough power to fulfill the needs of its citizens, but also considerably in excess. However, much dependence on thermal power plants to produce electricity and an inefficient Pollution Control Board has resulted in air pollution. The pollutants such as fly ash, SPM etc are wreaking havoc on health of the denizens of the state.

OBJECTIVES

Along with Growth, Electricity and Power, a healthy, green and unpolluted environment is essential for living beings.

METHODOLOGY

The methodological aspects of the research study include objectives field of study and research design. Basically survey method was used.

AIR POLLUTION IN KORBA

More than 1 lakh metric tons of fly-ash is generated annually by the eight thermal power plants in korba, which produce 6090 megawatts of electricity. The current average fly-ash utilization by the eight thermal power companies put together is less than 50%.

The end result of this is that the fly-ash generated has affected the water in the Hasdeo River in addition to polluting the overall environment. The water of the Hasdeo is only fit for bathing now and the Central Pollution Control Board has declared korba a 'Critically Polluted Zone'.



A thermal power plant on an average generates about 300 kg of fly ash and minimum 3 to 5 kg of Suspended Particulate Matter (SPM) per mega watt hour of generation. In Chhattisgarh total nine power plants generate approximately 21 million tones of fly ash and 0.2 million tones of SPM every year. These have badly affected the ecosystem.

The Pollution Control Board of Chhattisgarh is an understated and weak organization which has further exacerbated the condition. The government should endeavor to fill all the vacant posts with efficient manpower. Regular inspection and controlling of pollution is the need of the hour to prevent further damage to both men and ecosystem.

EFFECTS OF THERMAL POLLUTION

POLLUTION LOAD FROM COAL BASED THERMAL POWER PLANT	
Pollutants	Emissions (in tones/day)
CO ₂	424650
Particulate Matter	4374
SO ₂	3311
NO _x	4966

1. **Reduction in dissolved oxygen:** Concentration of Dissolved Oxygen (DO) decreases with increase in temperature.
2. **Increase in toxicity:** The rising temperature increases the toxicity of the poison present in water. A 10C increase in temperature of water doubles the toxicity effect of potassium cyanide, while 80C rise in temperature triples the toxic effects of o-xylene causing massive death of fishes.
3. **Interference in biological activity:** Temperature is considered to be of vital significance to physiology, metabolism and biochemical processes that control respiratory rates, digestion, excretion, and overall development of aquatic organisms. Temperature changes cause total disruption to the entire ecosystem.



4. **Interference in reproduction:** In fishes, several activities like nest building, spawning, hatching, migration and reproduction depends on optimum temperature.
5. **Direct mortality:** Thermal pollution is directly responsible for mortality of aquatic organisms. Increase in temperature of water leads to exhaustion of microorganisms thereby shortening the life span of fish. Above a certain temperature, fishes die due to failure of respiratory system and nervous system.
6. **Food storage for fish:** An abrupt change in temperature alters the seasonal variation in the type and abundance of lower organisms leading to shortage of right food for fishes at the right time.

CONTROL MEASURES FOR THERMAL POLLUTION

the following methods can be adapted to control high temperature caused by thermal discharges:

1. **Cooling towers:** Use of water from water systems for cooling systems for cooling purposes, with subsequent return to the water way after passage through a condenser, is called cooling process. Cooling towers transfer heat from hot water to the atmosphere by evaporation. Cooling towers are mainly categorized or classified into two major types:
 - (i) **Wet cooling tower:** Hot water coming out from the condenser (reactor) is allowed to spray over baffles. Cool air, with high velocity, is passed from sides, which takes away the heat and cools the water.
 - (ii) **Dry cooling tower:** Here, hot water is allowed to flow in long spiral pipes. Cool air with the help of a fan is passed over these hot pipes, which cools down hot water. This cool water can be recycled.



2. **Cooling ponds:** Cooling ponds are the best way to cool thermal discharges. Heated effluents on the surface of the water in cooling ponds maximize dissipation of heat to the atmosphere and minimize the water area and volume. The warm water acts like a cooling pond.
3. **Spray ponds:** The water coming out from condensers is allowed to pass into the ponds through sprayers. Here water is sprayed through nozzles as fine droplets. Heat from the droplets gets dissipated to the atmosphere.
4. **Artificial lakes:** Artificial lakes are man made water bodies that offer once-through cooling. The heated effluents can be discharged into the lake at one end and water for cooling purposes may be withdrawn from the other end. The heat is eventually dissipated through evaporation.

SUGGESTIONS

Pollution control board is currently not so active. This is high time that the board should take proper actions to prevent thermal pollution and make sure that above mentioned measures are strictly followed by thermal power plants.

Other suggestions to control Thermal pollution are listed below:-

1. A fossil fuel plant is the major contributor of CO_2 thus for solving this problem we need to use natural resources which causes less pollution.
2. Improvement in the efficiency of power plant.
3. Switch over from fossil based energy sources to renewable sources like wind, solar or hydro power or nuclear power.

LIMITATIONS

The study has been conducted only for the district of Korba in Chhattisgarh.

CONCLUSION

The study has indicated the urgent needs of establishment of infrastructure and enactment and stringent implementation of rules and regulations to check the production of pollutants. For



achievement of such an objective, it is imperative that a body be constituted for efficiently and effectively working towards reduction of air pollution in the state. It is high time to realize the importance of use of renewable sources of energy such as solar power, wind power etc for production electricity to keep a check on air pollution and its resulting repercussions.

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