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THERMAL POWER PLANTS POLLUTION (A COMPARATIVE STUDY OF THERMAL POWER PROJECTS IN COMBINED ANDHRA PRADESH, INDIA

Srinivasa Rao Chintala[1]

[1]Department of Economics, Acharya Nagarjuna University, Guntur-522 510, A.P., India.

Prof.M.Koteswara Rao[2]

[2]Department of Economics, Acharya Nagarjuna University, Guntur-522 510, A.P., India.

ABSTRACT

The present study was conducted to investigate the impact of Thermal Power Plants Pollution – A Comparative Study of Thermal Power Projects in combined Andhra Pradesh", India. In this study the main objective is to isolate the health impact of the emissions from coal fired power plants, and to explore the energy destruction and the pollutant emissions characteristics of the plant, a schematic coal fired power plant is carried out. The system modules contain boiler, turbine and corresponding auxiliary equipments, as well as flu gas desulphurization (FGD) unit. Thermodynamic analysis show details of energy destruction distribution of different components, the results also demonstrate that So_2 volume concentration of flue gas in FGD unit out let is relevant with the plant output work and the sulfur fraction of coal, and the latter factor performed the main role to emission concentration.

KEYWORDS: *Thermal Power, plant, pollution controls, air, water, energy,*

INTRODUCTION

Indian economy is the fourth largest consumer of electricity in the world. The demand for electricity from a growing economy of this scale is huge – peak demand was approximately 122 gig watts (GW) of power in 2011. Peak supply (at 110 GW) could barely keep up with peak demand in 2011. The gap between the supply and demand for electricity is crucial to understand the power sector in India.

In this study, I draw attention towards addressing the 'A socio – economic analysis of Thermal Power plants pollution, assess the air, water and ash pollution related health impacts of emissions from coal fired power plants.

COAL FIRED POWER PLANTS

India has the fifth largest electricity generation sector in the world at 210 GW in 2012. In twelfth and thirteenth five year plans, additional capacity of 76 GW and 93 GW are planned of the total electricity generated, thermal power plants (Gas and Coal) account for 66 per cent, hydro electricity for 19 per cent and remaining 15 per cent from other sources including natural gas and nuclear energy.

Approximately 70 per cent of the operational units in the country are of the size less than or equal to 210 MW and these units lend to have the worst net efficiency and plant load factor. The newer plants are the mostly 500 MW or higher with the best net efficiency of more than 33 per cent. Particulate matter is the only

pollutant for which any pollution controls are widely used in India. A schematic of a coal fired power plants that shows flue gas from the boilers at high temperature and velocity passing through heat exchanged to recycle the residual energy. This then enters the particulate control equipment. (electro–static precipitators (ESP's), and cyclone bag filters for removal of entrained ash. ESP's are installed in all coal fired power plants. As removal efficiency at ESP's are higher for coarse particles, most of the PM dispersing from the top of the stack is in the size range of respirable PM (10mm or less) the PM in the flue gas also contains high concentration of heavy metals such as arsenic, lead, cadmium, mercury, copper and zinc, which not only contributes to potential health hazard than the bottom ash, but also increases the resistivity and reduces the ESP's collection efficiency to as low as 98 per cent.

Besides flue gas PM emissions, fugitive dust from the coal handling plants and ash ponds is a problem. According to CEA, after the combustion and application of control equipment, ash collections at the power plants ranged 70 per cent – 80 per cent of the total ash in the coal. It is assumed that the reaming ash is dispersed from stacks.

Poverty is the chief cause of environmental problems in many under development countries in Asia and Africa. The production of energy has to be increased to alleviate poverty, as it is involved in every aspect of life. In the present situation, we cannot do away with coal fired power plants, in spite of knowing their hazardous effects. Moreover, the pollution will increase simply because more coal fired power plants will be constructed to meet the future energy demand. In this scenario, our analysis regarding the responses of households from Narla Tata Rao Thermal Power Station (NTTPS) Rayala seema Thermal Power Project (RTPP) and Kothagudem Thermal Power Station (KTPS), will bring to light many serious environmental problems faced by them.

Coal is a major source of energy and its consumption is increasing day by day. When coal is burnt in Thermal Power Plants, fly ash is produced as a bye product. Bottom ash is stored in ash ponds, which creates pollution problem. Fly ash is one of the residues generated in combustion and comprises the fine particles that rise with the flue gases. Fly ash is used for making concrete and its control the environmental pollution. The different samples of coal, air and water analysis have been collected and analyzed for SPM, So_2 No_x and fluoride content.

Indian coal is of very bad quality with 30-45 per cent of ash content and less calorific value. So_2 and H_2So_4 are both Capable of irritating the respiratory systems of animals and humans. A low concentration of H_2So_4 causes head ache, nausea, lassitude, collapse, coma and death. Heart from any source may make atmospheric nitrogen and oxygen to react in to nitrogen oxide leading to burning or stinging of eyes, cough, tired feeling etc. Many people are affected by fly ash, as sub – micron respirable particles pass through precipitators into the atmosphere. Pollution could be causing genetic mutations that may not be apparent for decades or generations.

The health impacts of air pollution from these coal fired power plants include numerous premature deaths and frequent asthma attacks. In the future, the amount of power generated from coal will remain high, at least through 2030, and unless we find a better way to manage these power plants, the environmental effects of growing air pollution, green house gas emissions and cost to human health will all be high.

Economic development mainly depends on energy. The economically developed countries always do have a high rate of per capita consumption of energy. Thus, energy and economic development go together. Continuous increase in population, on the other hand, increases the demand for more energy incidentally leads to the grater emission of pollutants from the atmosphere.

The whole study is limited to socio – economic effects of Thermal power plants. Therefore, no scientific explanation is attempted. To get information from households a questionnaire was prepared.

For the purpose, 180 questionnaires were printed with a view to distribute 60 of them at each plant. The distribution is based on the distance from the plant. The stack height determines the dispersal of fly ash, which is the main culprit in affecting in the health of the people. The bottom ash in huge quantities is daily carried over to ash pond and is creating many environmental problems. Basing on this factor, questionnaire were give distance wise The distance is divided into three segments as less than or equal to 2 km, between 2kms to 5 km and 5kms to 10 km. The households are taken on random basis.In total there are 60 questions out of which 16 are related to pollution perception, 14 questions to health problems, 8 questions to social problems and 3 questions related to the expenditure pattern. Another 12 are related to the opinion of people about plant and remaining question are about the personal detains like name, place, age, sex, religion, caste, and family details. All the questions are closed ended except the only related to suggestions.

When we went to the households with the questionnaires many people in and around the plant came forward and gave their opinions enthusiastically. At KTPS, one colony itself is name as ash colony, and the plants Chimneys and spewing forth gusts of fly ash, which is quits visible. Electro-precipitators are not working properly at KTPS when we went to KTPS, within hours we were coated with ash. At NTTPS, and RTPP in spite of its sophisticated machinery, our vehicle parked with the premises of the plant for a couple of hours was totally covered with black dust. Such is the condition in and around these Thermal power plants many feel that there is a scarcity of oxygen resulting in suffocation. They recount many cases of deaths of employees due to heart attack and many of them are suffering from fatigue, tiredness and heart related problems.

Respondents who have been living for more than 5 years are complaining more about the problems related to pollution, than those who have been living for up to 5 years.

The Results of Study Summarized as Follows:-

- Although coal has low quality and calorific value, it has been a vital source in the production of Thermal energy in India. Since the country has a lack of coal reserves. Coal will continue to be limitedly used according to projection of the Ministry of Energy and Natural Resources.
- The main criterion in the selection of the power plant location has been proximity to coal reserves. However, the thermal Power Plants are constructed in the places very close to residential areas. In KTPS power plants are very close to the forest areas that are under preservation.
- Both the private sector and the external investors were encouraged to invent in the energy sector by the loss that were passed in 1994 and 1996. However, there has not been effective enforcement of regulations determining new power plant types, selecting their locations more carefully, deciding the technology to be used and to the fuel source to be used in the new power plants.
- Some opined the plant should use modern equipment so that the out dated equipment will be abandoned out dated equipment usually do not work well.
- Some suggested proper maintenance of equipments. If the plant management is improved definitely it controls the pollution.
- Some households suggested to increase the stack height, use of high quality coal, control of ash production, raising the ash pond bunds, control pollution, use of modern pollution equipment, tree plantation, imparting environmental education to responds, conducting environmental movements so that respondents well come to know the importance of controlling pollution and effects of pollution.

RECOMMENDATIONS

- ✓ The use of fuel sources with low emission but higher efficiency should be encouraged.
- ✓ The use of emission – minimizing technologies has to be mandatory.
- ✓ Power plants should be taxed according to the level of their emissions.
- ✓ The future Thermal Power Plants should be required to adopt new firing technologies. Research and development in the area of minimizing the pollutant emissions from the Thermal Power Plants should be supported and funded by the government.
- ✓ The 8th five year development plan stressed that 'in sustainable development approach, an energy production and consumption plan that will support economic and social development and have minimum environmental pollution with minimum energy and cost use should be targeted'.
- ✓ Local government should be given more authority in decisions about whether or not power plant should be located in their region.
- ✓ Check the quality of effluents generated from the nearby industries by Pollution Control Board authorities before it is discharged to the Estuary
- ✓ A serious effort should be made to tap the renewable, non- conventional and less polluting energy sources like bio energy, tidal energy, Geo-energy and wind energy.
- ✓ Stack height has to be increased suitably to disperse the emissions to longer distances in greater area.
- ✓ New ESP's should be installed in the plants and they should be maintained properly. Bag filters and bag houses should be increased.
- ✓ Residential area should be at least 5 km, away from the plant as most of the complaints are received from within 5 km.

- ✓ Instead of leaving fly ash into the air it has to be collected and put to good uses like making bricks and laying roads.
- ✓ The bunds of ash ponds should be laid sufficiently high so that the water will not over flow and periodic check for any leaks should conducted.
- ✓ Treatment of water in ash pond should be undertaken to thoroughly clean it of toxic metals.
- ✓ The temperature of water being left into the cooling canal at NTTPS has to be strictly monitored, as the fish are affected adversely at that confluence of this canal and Krishna River.
- ✓ Agriculturists should be warned not to use water from ash pond for crops and to be made aware of the fact that toxic metals would leach into the soil making it infertile and barren over a period of time.
- ✓ Coal mill workers should be provided with safety equipment.
- ✓ Every employee of the plant should be given periodical free medical checkup.
- ✓ Many employees complained that their services or not regularized and they are paid daily wages at a very low rate.
- ✓ Working conditions of the employees of the plant has to be improved and more recreation facilities may be provided to make their life less miserable.
- ✓ A majority of the respondents have complained about very poor medical facilities.
- ✓ The medical and health department of the Government of Andhra Pradesh should rise the up to the situation and start more hospitals and super specialty hospitals also have to started to take care of the serious health problems faced by the people living near these plants.

CONCLUSION

Apparently, energy producing process creates pollution and ironically for cleaning the environment again we need more and more energy. So we can not totally do away with energy. Energy problems and environmental problems are international. They need individual, as well as collective efforts to find a solution without impairing the pace of economic development.

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