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POLLUTION IMPACT ASSESSMENT OF ORGANIC WASTE BLENDED QUALITY COAL USE IN COAL FIRED POWER PLANT

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Abstract- Thermal power stations, though a key option for generating power in India, have significant environmental impacts that have implications for the impacts on local ecology and public health as well as for global warming damages associated with power plant emissions and fly ash. Changed pattern of electricity use is creating waste as another challenge. Management of emission and waste; though seems two different issues but are the concealed outcome of increased energy consumption level. In this paper a simple and single approach is dealt to address emission reduction and waste management challenges.
Keywords- emission, global warming, municipal solid waste, GCV, pH.

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Introduction

Industrial growth become an accepted measure of national economy growth, has been established and accomplished worldwide. For the same sufficient power supply has been customary in national planning. Sustainable development, energy in particular while overall in specific is still in debate as well as in practices and vice-versa. India occupying 2% of the world land mass, presently generating about 2% of the global electricity for that Low grade coal is used, that is about 5% of the world reserves. Per capita energy consumption by world standard is very low. Although India is targeting an economic growth rate of 9-10% needs ample electricity in turn generating emissions as well as huge wastes. Indian electricity sector supplies the world's 5th largest energy consumer i.e. 4.0% of global energy consumption by more than 17% of global population [1].

65.34% of the electricity is generated by thermal power plants, 21.53% by hydroelectric power plants, and 2.70% by nuclear power plants 10.42% by Renewable Energy Sources. The installed power generation capacity of India stood at 181.558 GW, August '11 with per capita energy consumption 704 kWh. Country is expected to add up to 113 GW of installed capacity by 2017. A rapidly growing economy with increasing household incomes while limited domestic reserves of fossil fuels in turn the adverse impact on the environment everywhere[2].

Management of emission and waste; though seems two different issues but are the concealed outcome of the process of this changed pattern of electricity consumption. Indian emissions grew at the rate of 4 per cent per annum [3] during 1990 and 2000 period while the per capita waste generation is increasing by 13% per annum [4].

Reduction in emissions from environment friendly disposal of waste for prevention of methane emissions is one of the remedial steps waiting for our initiatives [5].

This paper suggests a simple and single approach to address both the problem cropping up all around us.

Environmental Implications of Power Plant

Subsequent to the industrial revolution, through fossil fuel combustion, changing agricultural practices and deforestation the natural composition of gases in the atmosphere is getting affected and climate environment began to alter significantly. Global temperature risen by about 0.6 0c over the 20th century [6]. Climate models predict that the global temperature will rise by about 6 0c by the year 2100. The key GHG causing global warming is carbon

dioxide. Approximately 80 % global warming is due to carbon dioxide emission currently coming from fossil fuel consumption. Higher energy consumption increases carbon dioxide emission.

India is the world's fourth largest economy and has a fast growing energy market. India's current power capacity is 30% short of demand. The present annual growth rate of energy consumption in India is 4%. Utilities burn mostly coal with approximately 10 - 30% excess air. The total carbon obtained from analysis is converted to CO after the reaction (combustion) is complete. Total CO emissions for 1997 from all the power plants in India are estimated at 1.1 Teragrams (Tg) per day or 397 Tg per year. Average CO emission per unit of electricity is 1.04 Gig grams (Gg).

Most power plants in India are running at an efficiency rate of 20-30%, which is lower than the efficiency rates of 35-40% in the US. Thermal power stations, though a key option for generating power in India, have significant environmental impacts that have implications for the local ecology and public health as well as for global warming. Associated major issues are: impacts of mining, particularly pronounced in densely populated areas, local impacts of emissions from power plants, global warming damages associated with power plant emissions and fly ash (it is the well known property of Indian coal). Various pollutants in emissions from thermal power plants are: Particulate matter, Sulphur dioxide, Oxides of nitrogen, Carbon monoxide (though it is typically not a major pollutant in Indian thermal power plants). People living around power plants are likely to be affected by exposure to emissions - SOX, CO, NOX, hydrocarbons, fly ash, polycyclic organic matter, trace metals, and radionuclide.

Suggested Method

A sample of coal (with a hypothesis that is fed to the plant) with 40 % Carbon(C), 2.5 % Sulphur (S), 15.6 % ash and 30,000 KJ/Kg heat content emits each day 400 MT CO2, 200 MT of Sulphur dioxide (SO2), 70 tons of nitrogen oxide (N2O) and 500 tons of fly ash, if no controls are present.

Municipal Solid Waste (MSW) Management is one challenge parallel emission issue, before city administrators. Electricity or Biogas Generation through MSW is one programme based project of MEDA, Pune and MPCB but are still in search of the much needed momentum. Finance and management issues may be constraints but still the pace is not satisfactory in general [4].

Organic material especially rotten tomatoes or fruits mixed with coal shall change the overall combustion outcomes. That will help to enhance the Gross Calorific Value (GCV) of coal as well as lower down Sulpher Content. Proper mix and selection of organic material also decrease or increase the ash content. In this demonstration coal (wash & raw) is mixed with organic material in 1: 0.2 by weight. It is observed that the performance gets improved. Orange comes under moderately alkaline while tomatoes (less sweet) with slightly alkaline category. The amount of combined acids in fruit juice be uniform in nature; indicates that the free-acid concentration is the chief variable. Organic acids in various fruit juice with a pH value approximately 7.90, while 4 is the pH value of tomatoes [7]. With a decrease in the ratio: total free acid / total free and combined acids, a corresponding rise in pH occurs [8].

Result & Conclusion:

The mix was analyzed at Central Institute of Mining & Fuel Research, Nagpur and the results are tabulated below. In the first phase of the study impact of mix of orange is studied on air dry basis. It is clear that by addition of 20% organic waste, moisture content remains almost same but ash content reduces drastically. From the analysis report of raw, wash coal and blended coal, it is evident that volatile matter increase remarkably and fixed carbon and total sulphur content reduces to some extent.

Further work is in progress in order to give concrete interpretations of the results with a comparative study i.e. the performance enhancement impacts of blended coal respectively with orange and tomatoes.

References

[1] Bhattacharya Subhes C., et. al. (2006) *Energy Policy*, 34, 3387-3397.
[2] Sharma Subodh et. al. (2006) *Current Science*, 90-93.
[3] IEA, *http://www.iea.org/*.
[4] Dutt Subroto et. al. (2011) *National Conference & Workshop on Direct Use of Renewable Energy & Energy Saving System in Industries & Homes,* 19-22.
[5] Hambad Abhisek, *green power telecom towers*.
[6] ESMAP Report, available on: *http://www.esmap.org*.
[7] http://*www.extension.umn.edu*.
[8] Sinclair Walton B., et.al., *http://www.ncbi.nlm.nih.gov.*

Table1 - Analysis Report of Coal Sample

Sr. No.	Particular of Coal Sample	Sample weight in gm.	on Air Dry basis				
			Moist. %	Ash. %	V.M. %	F.C. %	Total Sulphur
1	Wash Coal	230	8.4	28.1	27.3	36.2	0.6
2	Wash Coal + 20% O.M.	170	8.3	23.3	35	33.4	0.5
3	Raw Coal	210	5.5	46.9	21.7	25.9	0.7
4	Raw Coal + 20% O.M.	200	5.8	40.6	29.3	24.3	0.6

O.M. - Organic Material