

AMBIENT AIR SHED QUALITY MANAGEMENT WITH NEW COAL POWER PLANT INSTALLATION

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University of Moratuwa, Sri Lanka.
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Department of Civil Engineering

University of Moratuwa
Sri Lanka

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University of Moratuwa
Sri Lanka

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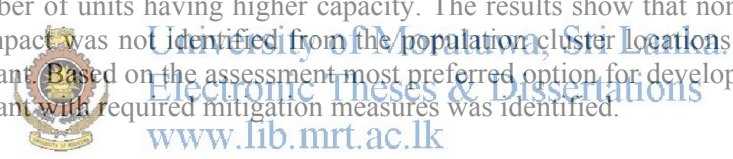
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ABSTRACT

Average growth rate of electricity demand over last 15 years in Sri Lanka is about 6.5 % per annum. Energy demand in the country was mainly met by hydropower up to the year 1999, and with time thermal generation has become prominent. According to generation expansion planning study – Base case (2013 – 2032), coal is expected to dominate the thermal power sector consumption (75.7 % share) for the next decades in Sri Lanka. During the planning stage of a coal power plant, proper offset provisions should be implemented in order to minimize air shed degradation by achieving relevant emission standards stipulated in regulations. Different factors that influence on ambient air quality degradation should be investigated before the power plant comes fully on stream. Since coal is not considered as a cleaner fuel, health risk is always linked with its hazardous emissions.

This assessment was carried out in order to investigate the impacts from three criteria pollutants, (SO₂, NO_x and PM) emitted from proposed 1200MW coal power plant in Sampoor. Three different scenarios were considered for the development of proposed power plant and four case studies to investigate different conditions under each scenario. Air Dispersion Modeling (AERMOD) was used to predict the ground level concentration within 20 km radius of the emission source. The results from the modeling assessment were used to identify the exposure assessment and then acute health risk impact was identified through dose response measures.

The study shows that high efficient coal power plant can be satisfactorily employed in a place where degraded air quality is already prevailed and also when considering ground level ambient air quality concentrations, it is more favorable to install the coal power plants with less number of units having higher capacity. The results show that non carcinogenic human health impact was not identified from the population cluster location in the vicinity to the power plant. Based on the assessment most preferred option for development of the proposed power plant with required mitigation measures was identified.



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List of Abbreviations

| | |
|-----------------|-----------------------------------------------|
| AAQ | Ambient Air Quality |
| ADM | Air Dispersion Modeling |
| CEA | Central Environmental Authority |
| CEB | Ceylon Electricity Board |
| ESP | Electro static Precipitator |
| FBC | Fluidized Bed Combustion |
| FF | Fabric Filter |
| FGD | Flue Gas Desulphuration |
| GDP | Gross Domestic Product |
| GLC | Ground Level Concentration |
| HAPs | Hazardous Air Pollutants |
| HQ | Hazard Quotient |
| NH ₃ | Ammonia |
| NO _x | Nitrogen Oxides |
| NOAEL | No Observed Adverse effect Level |
| PC | Pulverized Coal |
| PM | Particulate Matter |
| PP | Power Plant |
| REL | Reference Exposure Level |
| SC | Super Critical |
| SCR | Selective Catalytic Reduction |
| SNCR | Selective Non catalytic Reduction |
| SO ₂ | Sulphur Dioxide |
| TPCL | Trincomalee Power Company Limited |
| US EPA | United States Environmental Protection Agency |



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