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Greenhouse Gas Emission from Colombo to Galle due to Southern Expressway in Sri Lanka: A Variance Study.

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Abstract

The climate change is a major global problem, due to releasing the greenhouse gases (GHG) to the atmosphere at an alarming rate. The main constituent of GHGs is carbon dioxide (CO₂) and impact of all other gases is measured in relation to CO₂. Hence, GHG emissions are referred to as carbon dioxide equivalent or carbon emissions or carbon footprint (CFP). Transport is a major human activity which contributes to the emission of GHGs. In Sri Lanka there are no previous studies done to evaluate the carbon emissions from any road project. Unless mitigation measures are implemented, Sri Lanka's GHG emissions will reach dangerous level.

The objective in this study is to estimate the carbon footprint on Southern expressway (SEW) from Colombo to Galle due to vehicle movement under the operational stage. This study is mainly descriptive, based on secondary data. Vehicle fleet data was collected from RDA, November 2011 to June 2014. The DEFRA carbon factors were used to calculate the emissions from each category of vehicles, according to the fuel types. This study was conducted using distance based method using DEFRA guidelines. Distance between each interchange was considered according to the data gathered from RDA. ISO guide lines were used to develop the methodology and DEFRA guide lines for emission factors.

Total Carbon Foot Print = Total Distance Travelled (km) x Emission Factor (kgCO_{2e} / km)

The total CFP for the expressway is 130,793.01 t CO_{2e} for the period 2011 to 2014 and category one vehicles are the highest contributors of carbon emission (91%) in the SEW. The average GHG emission per day has increased by 47% from 2011 to 2014 and if continued so, carbon emissions on the SEW will increase to 221.2 tCO_{2e} per day, leading to an increase of 135.77% from the base year (2011). The study showed that the emission per km between Kahathuduwa-Gelanigama interchanges, is highest among interchanges.

The annual increase of the emission by 2014 indicates that the SEW has become popular. The yearly increase of traffic can drastically reduce these advantages unless steps are taken either to reduce this trend of increasing the vehicle emission or to widen the expressway. Since emissions between Kahathuduwa to Gelanigama is higher than others, it is evident that the usage of the expressway around this area is high and authorities to consider development of road infrastructure external to the SEW in this area.

Keywords: Carbon footprint, Climate change, Southern expressway, Green house gases, Carbon dioxide