

VEHICLE EMISSION INVENTORY FOR SRI LANKA

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Abstract

Estimates available to date in Sri Lanka shows that the transport sector is responsible for majority share of the most of the gaseous emissions to the environment with compared to any other sector such as industry, agriculture, fisheries etc. This pattern is applicable for most of the countries all over the world. Many countries have taken steps towards controlling vehicle emissions as they have realised the cost to the society. Sri Lanka too has adopted emission standards for all vehicles, but those standards are yet to be effectively enforced. Further, there is no mechanism to evaluate the benefits due to emission control strategies as no reliable emission inventory is available, specially to estimate local concentration levels.

To estimate the environment cost due to degradation of the air quality and to have an effective control and monitoring system it is necessary to identify different emissions and the significance of their effects to the environment and health. As the effects and the significance could change from place to place and also depend on different concentration levels, it is very important to estimate the vehicle emission to the environment at different localities. Thus, a meaningful emission management plan to be implemented it is necessary to have a reasonably accurate emission estimate, especially the geographic distribution of the emission load. An emission inventory based on geographic distribution of vehicle operation would be very useful in this regard.

Number of different techniques has been used for the emission estimates. Very approximate methods such as fuel sales to very sophisticated technique such as remote sensing measurements and

simulation models. Emission estimation methods adopted in Sri Lanka have considered either the total number of vehicles registered in Sri Lanka or the total annual vehicle kilo-meters estimated based on the assumed fuel economy and total fuel sales. The total vehicles registered do not account for the vehicles that may have taken out of operation. No attempt has been done to incorporate the differences in vehicle flows and speeds experiencing in different road sections (locations).

This paper discusses the development of a vehicle emission inventory that could be used for estimating vehicle emission with respect to special distribution. This inventory has developed with provision to accommodate improved vehicle emission factors for different vehicle types and traffic conditions in the future. This inventory is capable of estimating emission load due to traffic on any road link categorized as a National road. Provision is available to estimate the hourly emission load distributions and inventory out puts can be presented in a GIS platform.

Transportation Engineering Division (TED) of the Department of Civil Engineering, University of Moratuwa maintains a road inventory and socio economic database covering the entire country except certain parts in the North & the East. Transport planning model “Transplan” has been developed to estimate the daily vehicle volumes and average operating speeds of vehicles on all main roads in the Colombo Metropolitan Area (CMR) and all national roads (A & B Class) in the other provinces except certain parts in North & East.

Transplan model was extended to estimate the vehicle emission load for a given set of vehicle emission factors for different vehicle types and operating conditions (average speed). The following relationship is used for the estimation.

*Mass of Emission (g) = Emission Factor (g/km) * Vehicle kilometres travelled (km)*

Manual classified count carried out at select locations in the island was used to estimate the vehicle types and their distribution over the time at each of the road link. Vehicle registration information available was used to arrive at the diesel & petrol vehicle distribution. At present the hourly vehicle emission load along each road link is estimated based on approximate vehicle emission factors. The model is capable of accommodating accurate vehicle emission factors for different vehicle types and traffic conditions when available.