

# A new modelling approach for road traffic emissions: VERSIT+

Robin Smit<sup>a,\*</sup>, Richard Smokers<sup>a,b</sup>, Elke Rabé<sup>a</sup>

<sup>a</sup> *TNO Science and Technology, Business Unit Monitoring Systems, Environmental Studies and Testing,*

*P.O. Box 155, 2600 AD, Delft, The Netherlands*

<sup>b</sup> *CE, Oude Delft 180, 2611 HH, Delft, The Netherlands*

---

## Abstract

The objective of VERSIT+ LD is to predict traffic stream emissions for light-duty vehicles in any particular traffic situation. With respect to hot running emissions, VERSIT+ LD consists of a set of statistical models for detailed vehicle categories that have been constructed using multiple linear regression analysis. The aim is to find empirical relationships between mean emission factors, including confidence intervals, and a limited number of speed–time profile and vehicle related variables. VERSIT+ is a versatile model that has already been used in different projects at different geographical levels. Compared to COPERT IV, the VERSIT+ average speed algorithms provide increased accuracy with respect to the prediction of emissions in specific traffic situations.

© 2007 Elsevier Ltd. All rights reserved.

*Keywords:* Traffic emissions; VERSIT+ LD; Light vehicle pollution

---

## 1. Introduction

Despite lower exhaust emissions from cars over the past decades, road transport activities still contribute significantly to environmental problems at different geographical levels. Issues of concern include local exposure to air pollutants in areas with heavy traffic, photochemical smog formation, national emission levels of primary air pollutants and global warming. Generally, the air quality problems, as well as the effectiveness of potential solutions, are assessed on the basis of models rather than measurements. Emission models are becoming increasingly important for the evaluation of road investment projects, transport network and national emission levels regulations, and for the design and evaluation of local emission control policies – e.g. local traffic management schemes.

To predict traffic emissions, the Netherlands Organisation for Applied Scientific Research (TNO) has developed from 1987 VERSIT. The model originally predicted vehicle emissions as a function of propulsion energy

---

\* Corresponding author.

*E-mail address:* [robin.smit@tno.nl](mailto:robin.smit@tno.nl) (R. Smit).