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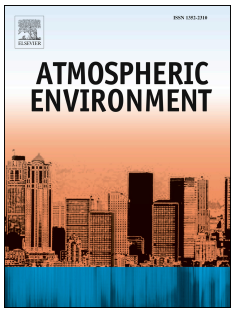

Cost effectiveness of introducing a new European Evaporative Emissions Test Procedure for petrol vehicles

Gary Haq , Giorgio Martini , Giorgos Mellios

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Cost effectiveness of introducing a new European Evaporative Emissions Test Procedure for petrol vehicles

Gary Haq [a,*], Giorgio Martini [a], Giorgos Mellios [b]

[a] European Commission, Joint Research Centre, Sustainable Transport Unit, Institute for Energy and Transport, via Enrico Fermi 2749, Ispra 21027, Italy

[b] Emisia SA, Antoni Tritsi 21, 57001 Thessaloniki, Greece

* Corresponding author. European Commission, Joint Research Centre, Sustainable Transport Unit, Institute for Energy and Transport, via Enrico Fermi 2749, Ispra 21027, Italy

email: gary.haq@york.ac.uk

Abstract

Evaporative emissions of non-methane volatile organic compounds (NMVOCs) arise from the vehicle's fuel system due to changes in ambient and vehicle temperatures, and contribute to urban smog. This paper presents an economic analysis of the societal costs and benefits of implementing a revised European evaporative emission test procedure for petrol vehicles under four scenarios for the period 2015-2040. The paper concludes that the most cost-effective option is the implementation of an aggressive purging strategy over 48 hours and improved canister durability (scenario 2+). The average net benefit of implementing this scenario is €146,709,441 at a 6% discount rate. Per vehicle benefits range from €6-9 but when fuel savings benefits are added, total benefits range from €13-18. This is compared to average additional cost per vehicle of €9.

Key words: petrol vehicles, non-methane volatile organic compounds, test procedure, cost effectiveness

1. Introduction

Non-methane volatile organic compounds (NMVOCs) from petrol fuelled vehicles contribute to the formation of ground-level ozone and photochemical oxidants associated with urban smog (Parrish *et al*., 2009; von Schneidemesser *al.*, 2010) and pose a threat to human health (Smith *et al*., 2009; Geiss *et al*., 2011). Emissions of NMVOCs in the European Union (EU) are decreasing, and fell by 55 per cent in the period 1990-2009. This has been due to the success of European air quality policies limiting air pollutant emissions from road transport (EEA, 2010). However, as much as 17 per cent of the EU urban population still live in areas where the European ozone target value for protecting human health is exceeded (EEA, 2012).

NMVOCs emissions originate from fuel escaping from the combustion process during the operation of the vehicle (exhaust emissions). In addition, evaporative losses from the fuel system (i.e. storage tank, carburettor, injection system and fuel pipes) occur immediately after the vehicle is switched off (known as 'hot soaks') and during parking due to changes in diurnal ambient temperatures, and during refuelling (Huang *et al.*, 2011)