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A decade of measuring on-road vehicle emissions with remote sensing in Australia

R. Smit^{a,b,*}, S. Bainbridge^c, D. Kennedy^d, P. Kingston^a^a Department of Environment and Science, GPO Box 2454, Brisbane QLD, 4001, Australia^b University of Technology Sydney, Faculty of Engineering and Information Technology, Sydney, Australia^c Strategic Policy, Department of Water and Environmental Regulation (DWER), Locked Bag 10, Joondalup DC, WA, 6919, Australia^d Science and Engineering Faculty, Queensland University of Technology (QUT), Brisbane, Australia

HIGHLIGHTS

- NO_x emission issues with diesel vehicles in Europe are similarly observed in Australia.
- A consistent reduction in smoke emissions with Euro standard is not observed for diesel LDVs.
- The proportion of Euro 5 diesel vehicles with malfunctioning or removed DPFs is increasing with age.
- Malfunctioning, removed or lack of DPFs is a larger issue in Australia than in the UK.
- Australian LCVs and SUVs show 1–4% DPF failure for 1 year old vehicles up to 20% for 5 year old vehicles.

GRAPHICAL ABSTRACT



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ABSTRACT

A remote sensing device (RSD) has been used at 23 locations across in Western Australia (20) and Queensland (3) in the period 2009–2019, generating more than 100,000 valid emission samples over more than a decade. After a statistical assessment of similarity and bias correction, the data were combined for this study to assess the performance of the light-duty vehicle (LDV) on-road fleet, i.e. cars, sport utility vehicles (SUVs) and light-commercial vehicles (LCVs). The percentage of excessive emitters is estimated to be about 2%. Diesel LDVs generally show stabilising or even increasing NO_x-to-CO₂ ratios with respect to progressive Euro classes. The RSD data confirm that the NO_x emission issues with diesel vehicles in Europe are similarly observed in vehicles sampled in Western Australia and Queensland.

There is insufficient empirical evidence for a consistent reduction in real-world PM ('soot') emissions over progressive emission standards for diesel LDVs, after adjusting for the effect of vehicle age. Further analysis of Euro 5 diesel LDVs shows substantial differences between vehicle types. The diesel LCV and SUV mean smoke factors (Euro 5) are 141% and 64% higher than diesel passenger cars.

On average, across 1–5 years of vehicle age, 4% of the measured Euro 5 diesel cars have smoke factor values that suggest diesel particulate filters (DPFs) are malfunctioning, potentially modified or are not present. The percentages are higher for SUVs and LCVs, i.e. 7% and 12%, respectively. Pooled data for the two most recent years of manufacture (2017–2018) suggest that 1% of one-two year old diesel SUVs and 2% of one-two year old

* Corresponding author. Department of Environment and Science, GPO Box 2454, Brisbane QLD, 4001, Australia.

E-mail addresses: robin.smit@des.qld.gov.au, mr.robin.smit@gmail.com (R. Smit).

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