Commentary
South Africa needs to accelerate the adoption of stricter vehicle emission standards

Kristy Langerman[1*], Bianca Wernecke[2], Lingzhi Jin[3], Boitemogelo Kwakwa[2], Meinrad Signer[4] and Nickey Janse van Rensburg[2]

[1]Department of Geography, Environmental Management and Energy Studies, University of Johannesburg, South Africa.
[2]University of Johannesburg Process, Energy and Environmental Technology Station, University of Johannesburg, South Africa
[3]International Council for Clean Transportation, Washington, DC 20005, United States of America
[4]Independent consultant to the International Council for Clean Transportation
*Corresponding author: klangerman@uj.ac.za

https://doi.org/10.17159/caj/2025/35/1.22338

Introduction

South Africa is lagging behind other countries in the Global South in the adoption of more stringent vehicle emission standards. This is due to a delay in the phase-in of low-sulphur fuels and the fact that vehicle emissions are self-regulated by the vehicle manufacturing industry. Here we discuss why lowering vehicle emissions should be a priority in South Africa, what Euro-type emission standards entail, and how vehicle emissions are regulated in South Africa. The move to Euro 6/VI-equivalent standards in South Africa, particularly for heavy-duty vehicles, needs to be prioritised as a complementary initiative to phasing in electric vehicles.

Vehicles are major emitters of toxic air pollutants like nitrogen oxides (NO_x, a precursor to ozone and secondary fine particulate matter (PM)), carbon monoxide (CO) and primary fine particulate matter. Older heavy-duty vehicles, in particular, are outsized emitters of black carbon, which is both a particularly toxic component of particulate matter and exacerbates global warming locally. It has been estimated in a global study that in 2015, there were around 1400 $PM_{2.5-}$ and ozone-attributable premature deaths in South Africa attributable to emissions from transportation (Anenberg et al., 2019). Given the growth in the number of registered vehicles in South Africa in the last 10 years (CEICDATA.COM, 2025; Cowling, 2025), premature mortalities have likely increased since then. Children, the elderly and socially vulnerable people are disproportionately affected by exposure to transport-related air pollution (Brusselaers et al., 2023).

Regulation of vehicle emissions

Vehicle emission standards are commonly referred to in terms of the Euro emission standard equivalents[1]. Euro-type emission standards specify allowed emission levels for new vehicles sold. Euro 1/I came into effect in the European Union in 1992, and only addressed NO_x and PM emissions. The standards have been progressively tightened over time. The latest standard is Euro 6/VI which controls NO_x, PM, CO and hydrocarbon (HC) emissions. Euro 7 will start being phased in from the end of 2026 in the European Union.

Compliance with increasingly stringent vehicle emission standards requires the use of more advanced emission control technologies. Compliance with Euro II standards only requires fuel injection delay for NO_x emission control, for example, whereas compliance with Euro VI standards requires exhaust gas recirculation and zeolite-based selective catalytic reduction to reduce NO_x emissions, a diesel oxidation catalyst to control CO and HC emissions, a diesel particle filter to remove PM, and advanced combustion and engine calibration. Euro emission standards regulate new vehicle type approvals and production, not the existing fleet. Most European countries mandate periodic emission testing for in-use vehicles, which verifies that emission control systems remain functional and have not been tampered with throughout the vehicle's useful life.

Many countries in the Global South have made significant progress in adopting stringent vehicle emission standards. For example, Brazil, China, India and Mexico have already adopted Euro IV-equivalent standards for new vehicle sales and registrations. In contrast to the progress made internationally, the vehicle emission regulations in South Africa have remained static at the Euro II level for nearly two decades.

A major reason for South Africa's delay in adopting more stringent vehicle emission standards is the delay in the introduction of ultra-low-sulphur (10 ppm) fuel, which is required for compliance with Euro V and stricter standards. The fuel delay is due to the significant capital investment requirements for refinery upgrades and the lack of an agreed-upon cost recovery

[1]Arabic numerals denote emission standards for light duty vehicles (e.g. Euro 5) and Roman numerals denote emission standards for heavy duty vehicles (e.g. Euro V). Since emissions from diesel-powered heavy-duty vehicles have a higher health impact and were the focus of the project on which this commentary is based, Euro emission standards for heavy-duty vehicles will be referred to here.

mechanism between the government and the refineries. Ultra-low sulphur diesel should be the norm from July 2027 when the update to the *Petroleum Product Act (120/1977): Regulations regarding Petroleum Products Specifications and Standards for Implementation* (commonly called *Cleaner Fuels II*) comes into effect.

Emission limits for new vehicles are stipulated in the *Compulsory Specification Regulations for Motor Vehicles*, which are drafted by the National Regulator for Compulsory Specifications (NRCS) under the auspices of the Department of Trade, Industry and Competition (DTIC). The *Compulsory Specifications* currently stipulate compliance with Euro II-equivalent standards, but are in the process of being upgraded to Euro V-equivalent standards. There is no commitment to or timeline for the adoption of Euro VI emission standards for new vehicles in South Africa.

Although vehicle emissions have historically been regulated by the vehicle manufacturing industry in South Africa, vehicle emissions fall within the mandate of the Minister of Forestry, Fisheries and the Environment in terms of the *National Environmental Management: Air Quality Act* (Act No. 39 of 2004). The DFFE may encourage the fast-tracking of more stringent vehicle emission standards through diplomatic channels, or declare new motor vehicle engines as controlled emitters and stipulate more stringent emission standards in terms of the *Air Quality Act* sections 23 and 24.

Justification for moving to Euro VI standards

To mitigate the risk to human health, South Africa needs to move to Euro VI emission standards as soon as possible. Euro VI standards achieve a substantial reduction in emissions relative to Euro V standards, particularly in real-world driving conditions. Furthermore, Euro VI provides proper anti-tampering control and emission control at altitude, which is especially important in South Africa, where more than 40% of the vehicle fleet is based on the Highveld.

There is resistance to moving beyond Euro V emission standards due to the additional cost of vehicles (estimated to be USD 1 120-1 260 (around ZAR 22 000) more for a Euro VI-compliant medium or heavy commercial vehicle than for a Euro-V-compliant vehicle), the logistics of needing an AdBlue (the diesel exhaust fluid used for the SCR system) distribution network wherever South Africa's vehicle fleet travels, and the disruptions to vehicle sales when more stringent emission standards come into effect. Nevertheless, a cost-benefit study conducted by the International Council on Clean Transportation (ICCT) shows that the societal health benefits of adopting Euro VI emission standards outweigh the costs of the transition (Xie et al., 2022).

While the transition to electric vehicles is critical for achieving zero tailpipe emissions and meeting climate goals by mid-century, the move has been extremely slow in South Africa. Battery electric vehicles and plug-in hybrid electric vehicles accounted for only 0.4% of new vehicle sales in South Africa in 2024 (Adams, 2025). It is estimated that even with ambitious EV targets, diesel vehicles will dominate the South African heavy-duty fleet through the 2030s. It is thus essential to proceed with adopting stringent emission standards for petrol- and diesel-fueled vehicles. Continuing to externalise the health impact costs of higher-emitting internal combustion engine vehicles will only slow the transition to electric vehicles.

Adopting Euro VI emission standards also presents an opportunity to stimulate the growth of local green and clean technology markets in South Africa. The transition could potentially level the playing field for the adoption of clean technologies, supporting a just transition within the heavy-duty vehicle sector. Apart from the health benefits, the adoption of Euro VI emission standard will drive demand for advanced emission control systems, AdBlue production, and vehicle retrofitting services, opening new avenues for local manufacturing and service-based enterprises. This shift will also create skilled employment opportunities across the clean transport value chain, including vehicle servicing, emissions monitoring, and the development and maintenance of supporting infrastructure. Furthermore, it can catalyse the growth of SMMEs involved in supplying, distributing, and maintaining green transport technologies, thereby strengthening local economies and contributing to a more equitable and sustainable industrial ecosystem.

Conclusion and recommendations

While vehicle manufacturers and owners are concerned about the financial impacts of leapfrogging to Euro VI emission standards, these need to be weighed against the health costs that are incurred as a result of the delayed implementation of Euro VI vehicle emission standards and disproportionately borne by the very young, old and socially vulnerable (who are not usually vehicle owners). Implementing more stringent emission standards for higher-emitting heavy-duty vehicles should be the first step. The Department of Forestry, Fisheries and the Environment is encouraged to assume a leadership role in pushing for the adoption of Euro VI emission standards. Stakeholder engagements, particularly with vehicle manufacturers, importers, retailers and fleet operators, need to be intensified to prepare and support the vehicle industry for the transition. Finally, an ambitious date needs to be set for Euro VI emission standards to come into effect in South Africa.

Acknowledgements

This commentary arose from a project funded by the Climate and Clean Air Coalition (CCAC) to support the Department of Transport in identifying the requirements and developing the technical background for updating the current heavy-duty vehicle emission standards in South Africa. The project was conducted by the University of Johannesburg and the International Council for Clean Transportation. Thato Kgasago and Siyabonga Simelane are acknowledged for their contribution to the project.

References

Adams, R., 2025. A gear shift in electric vehicles? Allan Gray. https://www.allangray.co.za/latest-insights/companies/a-gear-shift-in-electric-vehicles/ (accessed 5.14.25).

Anenberg, S.C., Miller, J., Henze, D.K., Minjares, R., Achakulwisut, P., 2019. The global burden of transportation tailpipe emissions on air pollution-related mortality in 2010 and 2015. Environ. Res. Lett. 14, 094012. https://doi.org/10.1088/1748-9326/ab35fc

Brusselaers, N., Macharis, C., Mommens, K., 2023. The health impact of freight transport-related air pollution on vulnerable population groups. Environ. Pollut. 329, 121555. https://doi.org/10.1016/j.envpol.2023.121555

CEICDATA.COM, 2025. South Africa Registered Motor Vehicles, 2005 – 2024 | CEIC Data. https://www.ceicdata.com/en/indicator/south-africa/motor-vehicle-registered (accessed 5.19.25).

Cowling, N., 2025. South Africa: total number of registered vehicles 2024| Statista. https://www.statista.com/statistics/1546840/south-africa-number-of-vehicles-registered-by-category/ (accessed 5.19.25).

Xie, Y., Posada, F., Sen, A., 2022. Soot-free road transport in South Africa: A cost-benefit analysis of Euro VI heavy-duty vehicle standards (Working Paper 2022-26). International Council for Clean Transportation. https://theicct.org/publication/africa-me-hvs-soot-south-africa-dec22/