

Remote emissions sensing in Seoul

Cities in South Korea have established low-emission zone (LEZ) programs to reduce emissions from in-use vehicles and improve urban air quality. In the capital area, light-duty diesel vehicles with an emissions classification of Grade 5 manufactured before 2002 or 2005, depending on size, are banned from entering the zones. As a further step, Seoul established a Green Transport Zone in December 2019 which bans all diesel and gasoline Grade 5 vehicles from entering the zone (Figure 1). A new TRUE initiative study, performed in collaboration with the Seoul Metropolitan Government and Korea Environment Corporation (K-eco), analyzed remote sensing data to inform the future design of the Green Transport Zone.

KEY FINDINGS

- The analysis of the remote sensing data from the Seoul campaign shows that, for gasoline light-duty vehicles (LDVs), emissions increase as the emission grades increase. In addition, while the CO and HC emissions from diesel light-duty passenger vehicles are relatively low, the NO emissions from Grade 4 diesel LDVs are relatively high and are even higher than NO emissions from their Grade 5 counterparts.

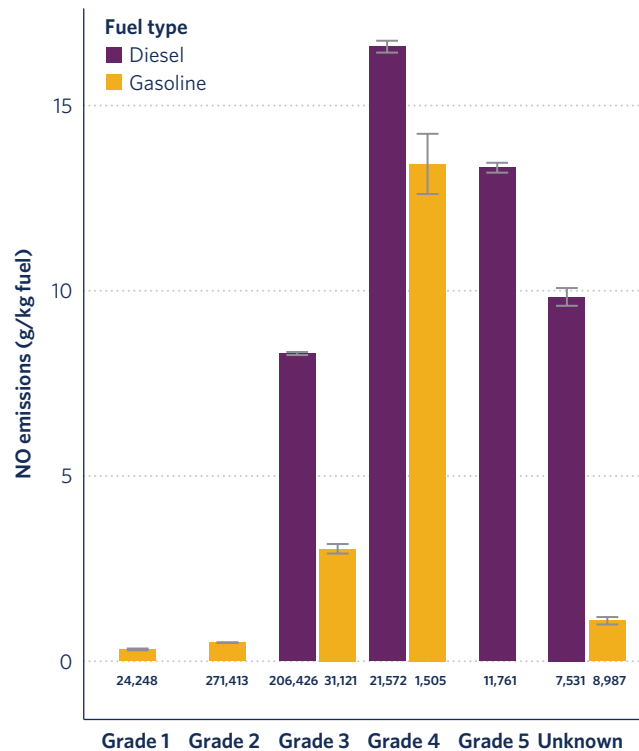


Figure 2. NO emissions from light-duty passenger vehicles by emission grade. Error bars indicate the 95% confidence interval. The number of measurements is presented at the bottom of each bar.



Figure 1. Location of Green Transportation Zone in the Seoul Metropolitan area.

- NO emissions of Grade 3 gasoline LDVs are still one third of those of Grade 3 diesel LDVs, even though Grade 3 gasoline LDVs are about one decade older than Grade 3 diesel LDVs.
- UV smoke, Grade 5 diesel LDVs retrofitted with a diesel particulate filter (DPF) is 37% lower than Grade 5 diesel LDVs without DPF but is 4.2 times higher than Grade 3 diesel vehicle with a DPF originally equipped. This implies that there are considerable differences in the efficiency of retrofitted and original DPFs.

RECOMMENDATIONS FOR THE GREEN TRANSPORT ZONE

- Real-world NO emissions from Grade 4 diesel LDVs measured are comparable or even higher than Grade 5 diesel LDVs. Currently, Grade 5 vehicles are banned from entering the Green Transport Zone in Seoul. This analysis indicates that emissions from Grade 4 vehicles are not lower than those from Grade 5 and should be banned from the Green Transport Zone as well.
- UV smoke from Grade 5 diesel LDVs retrofitted with a DPF are 37% lower than those without, but this reduction efficiency is much lower than expected. Therefore, the Seoul Metropolitan Government

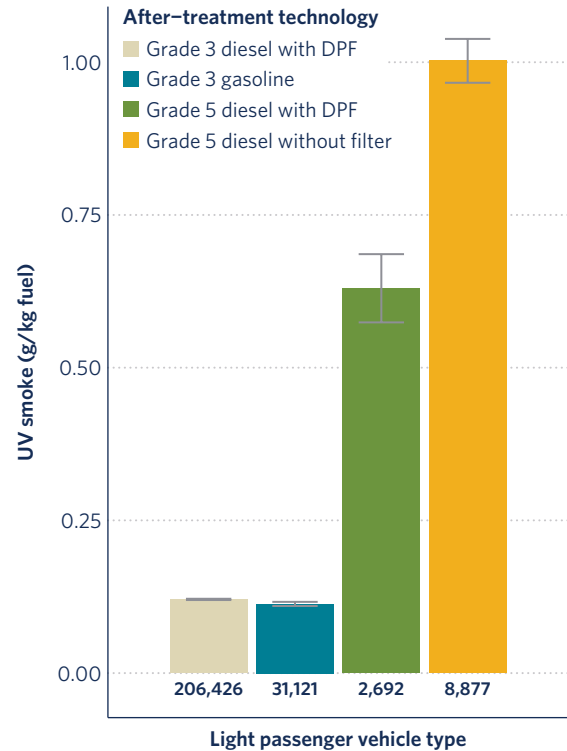


Figure 3. UV smoke from Grade 5 DPF-retrofitted diesel LDVs compared with Grade 5 diesel LDVs without filters and Grade 3 diesel and gasoline LDVs.

should consider policies to encourage the retirement of the older vehicle fleet rather than encouraging retrofitting the vehicles with DPFs.



TO FIND OUT MORE

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