

FACT SHEET FEBRUARY 2022

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



TO FIND OUT MORE

For details on the Seoul remote-sensing project and related questions, contact Liuhanzi Yang, <u>liuhanzi.yang@theicct.org</u>. For more information on TRUE, visit <u>www.trueinitiative.org</u>.