

Climate and health benefits of policies to address emissions from heavy-duty vehicles

BACKGROUND

Among transportation subsectors, on-road diesel vehicles are the leading contributor to air pollution and associated disease burdens. Within that group, heavy-duty vehicles are the main contributor to exhaust emissions, accounting for 86% of on-road diesel nitrogen oxides (NO_x) emissions in 2015. Besides the impact on air quality and public health, black carbon from diesel engine exhaust severely affects the climate as the particles produce significant near-term climate warming.

A new ICCT paper quantifies the health and climate benefits of key policies for reducing air pollutant emissions from heavy-duty vehicles in G20 economies. Specifically, the paper analyzes the benefits under four scenarios: currently adopted policies, expanded adoption of Euro VI-equivalent standards, adoption of potential next-generation emission standards, and accelerated fleet renewal programs.

KEY FINDINGS

- » Implementing Euro VI-equivalent standards over the 2023-2025 timeframe in G20 economies that have not adopted such standards could reduce their NO_x emission by 45%–85% in 2040 compared to 2020 levels.
- » A large decrease in black carbon emissions is also expected from the implementation of Euro VI-equivalent standards across the G20 economies, as diesel particulate filters are often used to comply with these standards. In G20 economies that have adopted these standards, black carbon emissions are projected to fall by 85%–99% over the next two decades compared to 2020 levels.

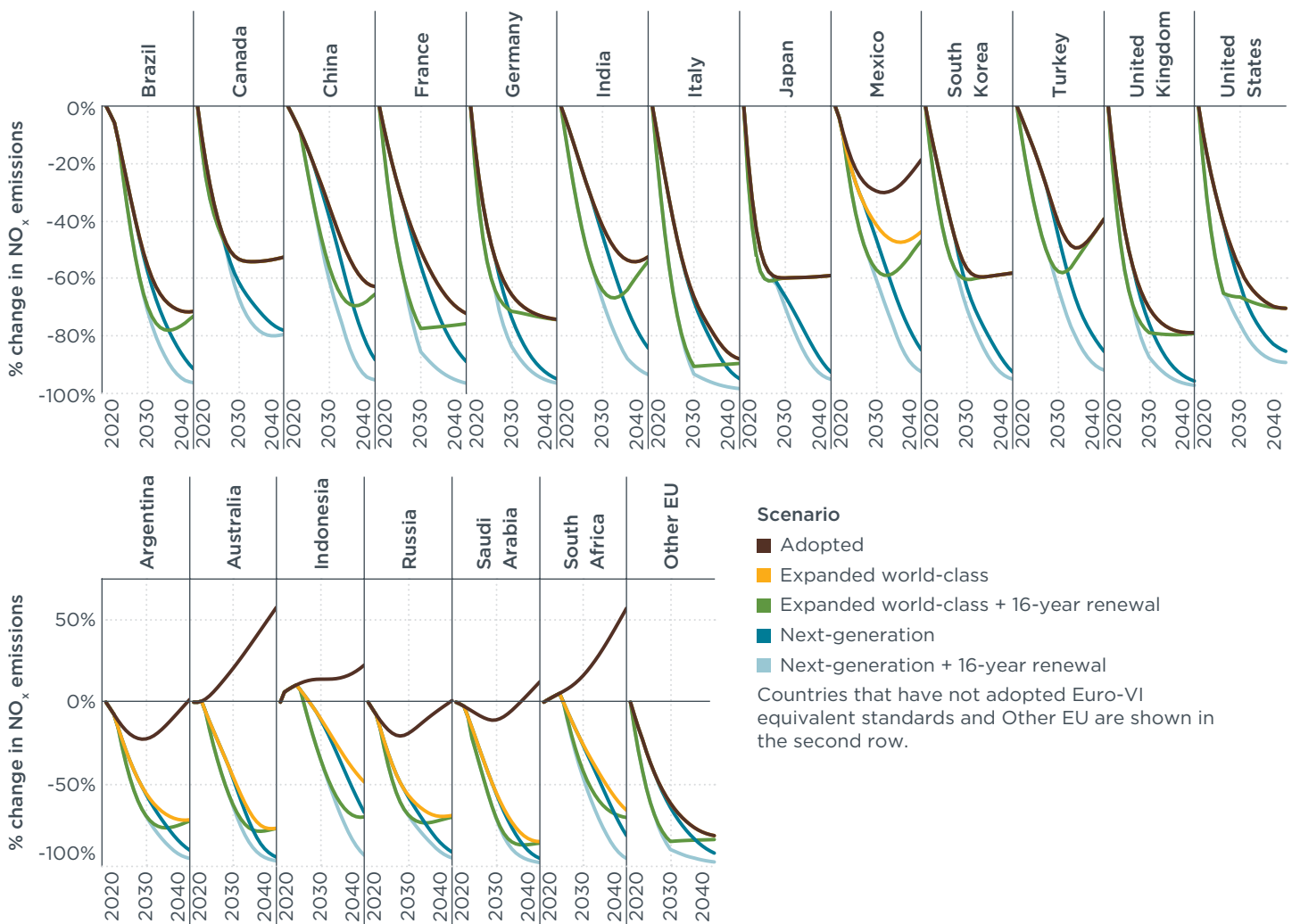


Figure 1. Normalized diesel HDV NO_x emissions from 2020 to 2040 by G20 economy. The y-axis shows the percent change in NO_x emissions from 2020.

- » The implementation of next-generation standards in G20 economies could reduce NO_x by 60%–95% in 2040 from 2020 levels. In addition, the implementation of next-generation standards could avoid more than 3 million premature deaths, 57 million disability-adjusted life years, and \$5 trillion of health damages over the next three decades.
- » Next-generation standards coupled with accelerated fleet renewal policies would achieve the greatest benefits by a wide margin. Cumulative avoided premature deaths attributable to diesel HDV emissions in G20 economies from 2020 to 2050 in this scenario would total 4 million, or four times the number under the expanded Euro VI-equivalent standards combined with accelerated fleet renewal scenario. These avoided premature deaths are associated with an estimated 72 million avoided disability-adjusted life years. In EU member countries like Germany, France, and Italy, accelerated fleet renewal policies coupled with next-generation standards are expected to achieve at least twice the monetary health benefits as Euro VI-equivalent with fleet renewal or next-generation alone. Next-generation policies combined with accelerated fleet renewal policies are expected to yield \$6.8 trillion of cumulative health benefits from 2020 to 2050.

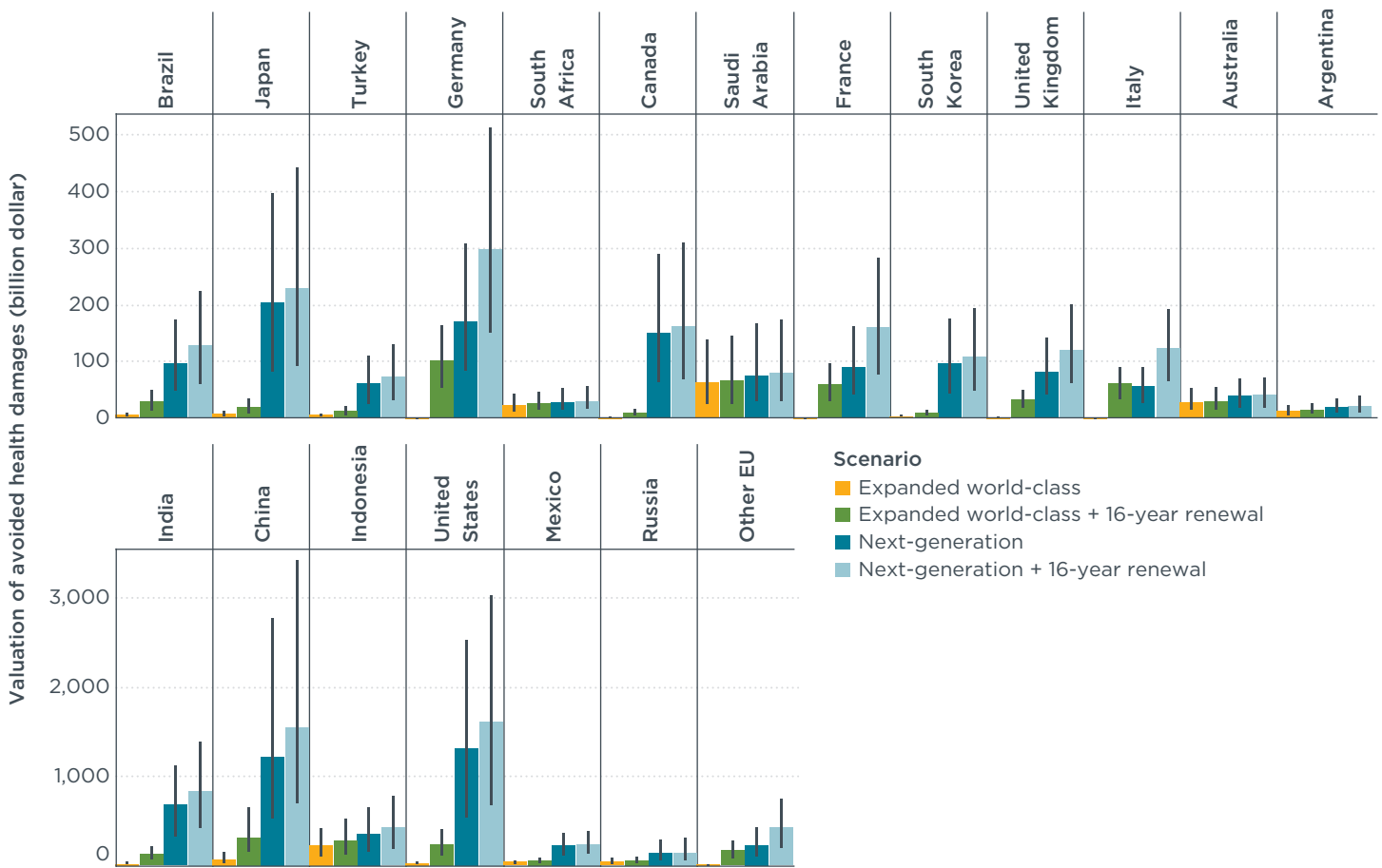


Figure 2. Valuation of cumulative avoided health damages (billions of dollars) from $PM_{2.5}$ and ozone mortality attributable to diesel HDV emissions compared with adopted policies, 2020–2050. A 3% social discount rate is applied to future years. Uncertainty bars reflect the 95% confidence interval in the relative risks only. Due to the substantial differences in health impact, results are shown on a different y-axis scale for the six countries with the most avoided deaths plus other EU (second row).

PUBLICATION DETAILS

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