

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

BACKGROUND

Among transportation subsectors, on-road diesel vehicles are the leading contributor to air pollution and associated disease burdens. In addition to the impact of emissions 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 (HDVs) in the G20 economies. Building off this research, the benefits for China were analyzed under four scenarios:

- » **Adopted:** Policies adopted by December 2020, including China VI.
- » **Expanded world-class and 16-year accelerated fleet renewal:** We assume all G20 economies will implement Euro VI-equivalents by 2025. Accelerated fleet renewal policies are added to adopted policies in China, resulting in 100% of in-use HDVs meeting China VI and next-generation standards 16 years after they are applied to new vehicles. Pre-China VI vehicles are assumed to be gradually replaced over this time period.
- » **Next-generation standards:** Building upon adopted policies, we assume China will implement next-generation emission standards in 2027, with 90% reduction in NO_x emissions rate from China VI levels.
- » **Next-generation and 16-year accelerated fleet renewal:** Building upon the next-generation scenario, 100% of in-use HDVs would meet China VI and next-generation standards 16 years after they are applied to new vehicles.

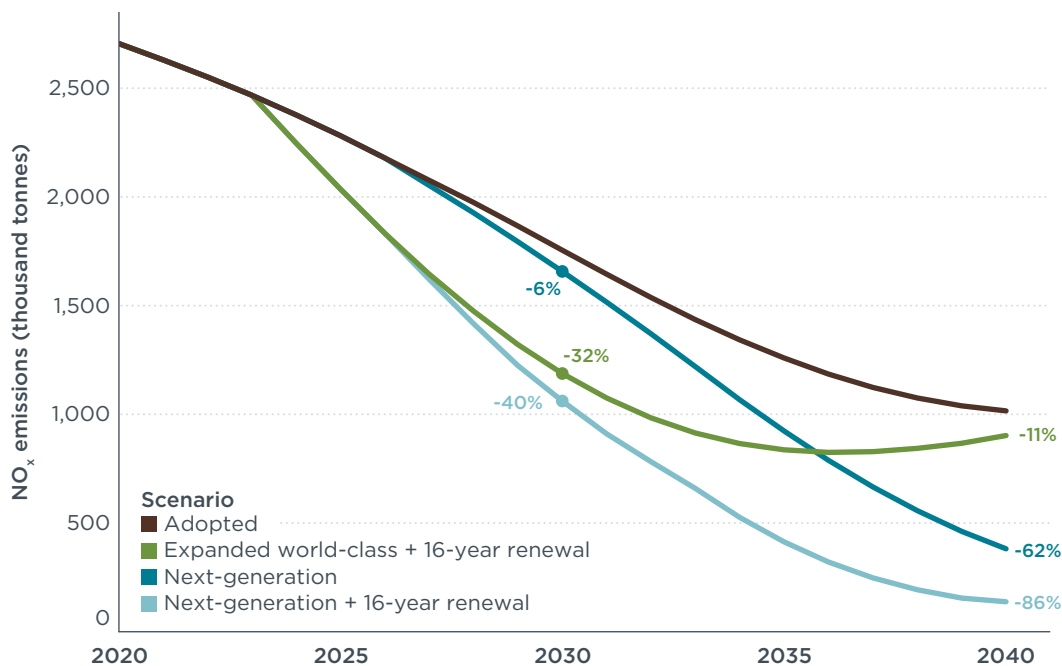


Figure 1. Diesel HDV exhaust NO_x emissions from 2020 to 2040 in China. Data labels show the percent change in NO_x emissions compared with adopted policies in 2030 and 2040.

KEY FINDINGS

- » Avoided HDV exhaust NO_x emissions in 2040 compared with adopted policies are projected to be 110 thousand tonnes (11% reduction) in the expanded world-class plus 16-year renewal scenario, 630 thousand tonnes (62% reduction) in the next-generation standards scenario, and 880 thousand tonnes (86% reduction) in the next-generation plus 16-year renewal scenario.
- » Cumulative avoided HDV exhaust NO_x emissions from 2020 to 2050 compared with adopted policies are projected to be 6,600 thousand tonnes in the expanded world-class plus 16-year renewal scenario, 12,600 thousand tonnes in the next-generation standards scenario, and 20,600 thousand tonnes in the next-generation plus 16-year renewal scenario.
- » Cumulative avoided HDV exhaust black carbon emissions from 2020 to 2050 compared with adopted policies are projected to be 137 thousand tonnes in the expanded world-class plus 16-year renewal scenario.
- » Cumulative climate impact mitigation potential (GWP20) for diesel HDV exhaust black carbon, CH₄ and N₂O emissions from 2020 to 2040 compared with adopted policies is projected to be 429 million tonnes CO₂e in the expanded world-class plus 16-year renewal scenario, accounting for 17% of the total mitigation potential among G20 economies.

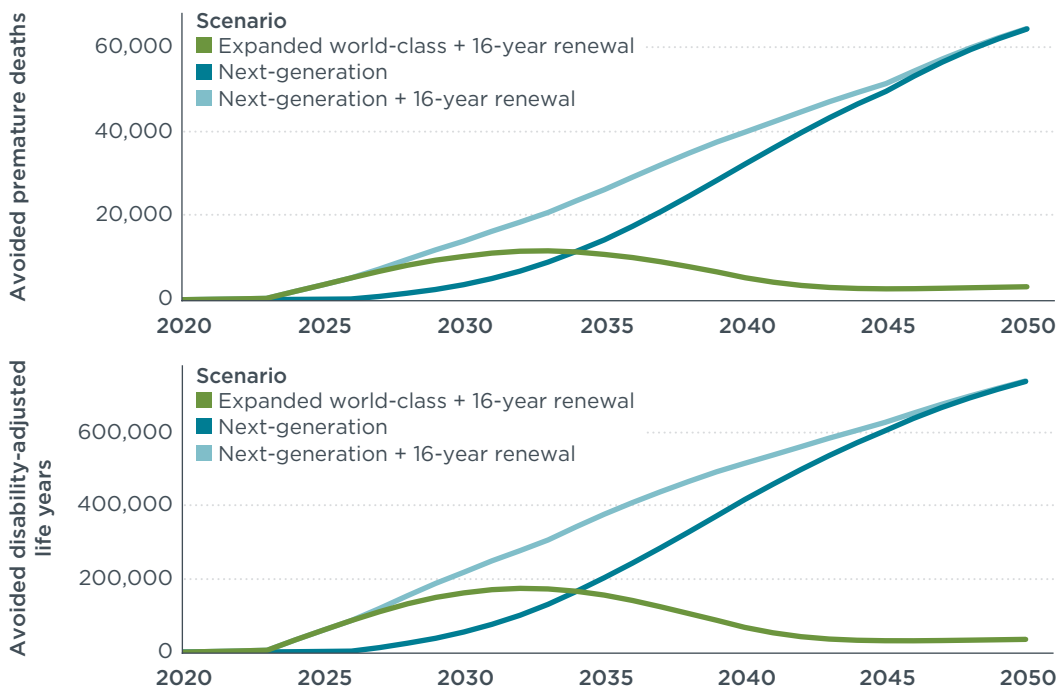


Figure 2. Avoided PM_{2.5} and ozone deaths and disability-adjusted life years attributable to diesel HDV emissions compared with adopted policies, 2020-2050.

- » Cumulative avoided PM_{2.5} and ozone premature death attributable to diesel HDV emissions from 2020 to 2050 compared with adopted policies are projected to be 171,000 in the expanded world-class plus 16-year renewal scenario, 689,000 in the next-generation standards scenario, and 864,000 in the next-generation plus 16-year renewal scenario. The majority of the estimated health benefits results from emission reductions in China, but emission reductions in other G20 economies that could have an impact on China are also taken into account.
- » Cumulative avoided PM_{2.5} and ozone disability-adjusted life years attributable to diesel HDV emissions from 2020 to 2050 compared with adopted policies are projected to be 2.5 million in the expanded world-class plus 16-year renewal scenario, 8.6 million in the next-generation standards scenario, and 11 million in the next-generation plus 16-year renewal scenario.
- » The valuation of cumulative avoided health damages (in 2020 U.S. dollars, 3% social discount rate) from PM_{2.5} and ozone mortality attributable to diesel HDV emissions from 2020 to 2050 compared with adopted policies are projected to be \$318 billion in the expanded world-class plus 16-year renewal scenario, \$1.2 trillion in the next-generation standards scenario, and \$1.5 trillion in the next-generation plus 16-year renewal scenario.

PUBLICATION DETAILS

Title: Air quality and health impacts of heavy-duty vehicles in G20 economies

Authors: Lingzhi Jin, Caleb Braun, Joshua Miller, Claire Buysse

Download: <https://theicct.org/publications/g20-hdv-impacts-jul2021>

Contact: Lingzhi Jin, lingzhi.jin@theicct.org