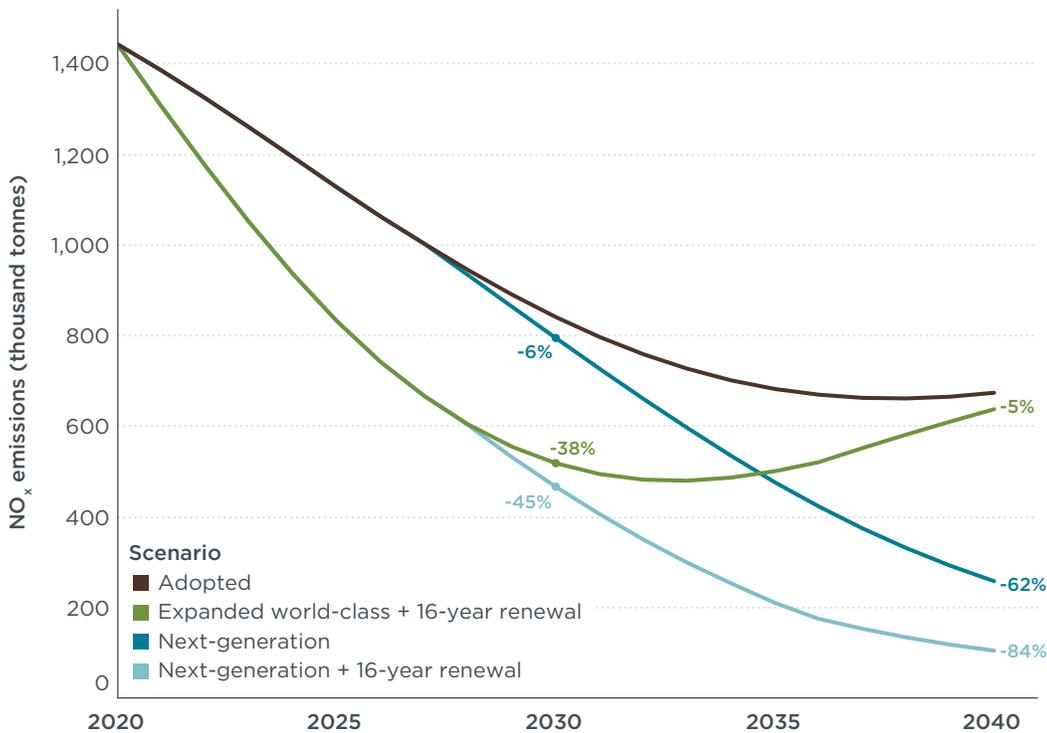


# Climate and health benefits of policies to address emissions from heavy-duty vehicles: India

## 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 paper analyzes the benefits for India under four scenarios:

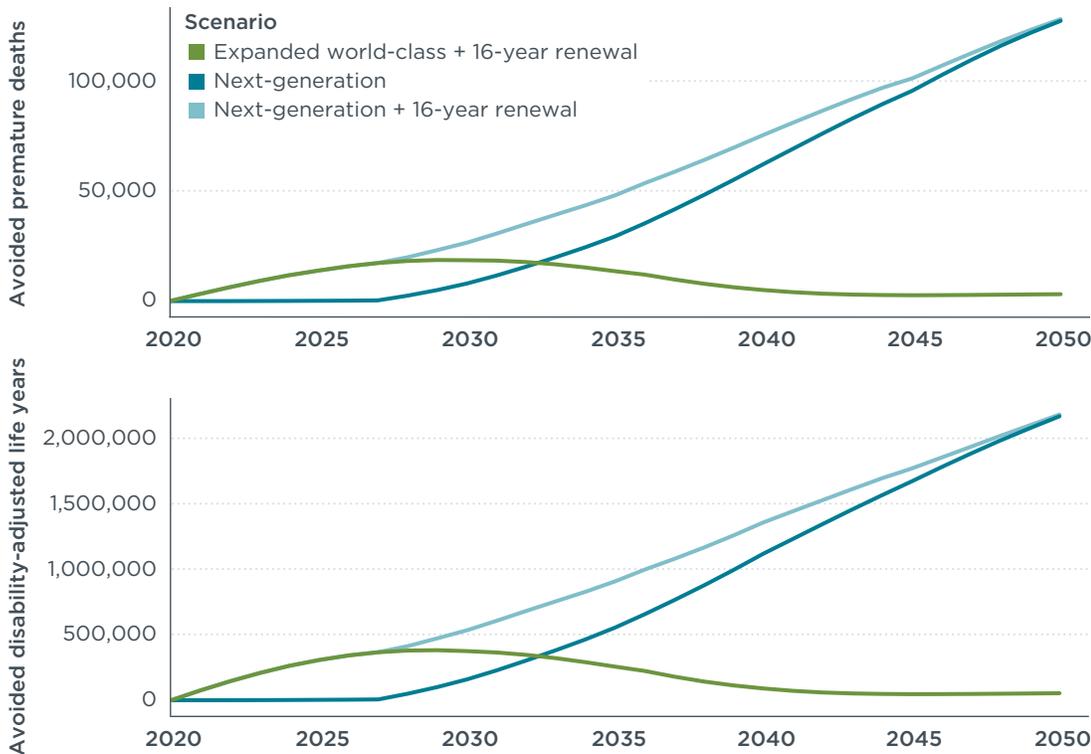
- » **Adopted:** Policies adopted by December 2020, including Euro VI-equivalent Bharat Stage VI.
- » **Expanded world-class and 16-year accelerated fleet renewal:** We assume all G20 economies will implement Euro VI-equivalents by 2025. Accelerated fleet renewal policies are added to the adopted policies scenario in India, resulting in 100% of in-use HDVs meeting Bharat Stage VI and next-generation standards 16 years after they are applied to new vehicles. Pre-Bharat Stage VI vehicles are assumed to be gradually replaced over this time period.
- » **Next-generation standards:** We assume India will implement next-generation emission standards in 2028, with 90% reduction in NO<sub>x</sub> emissions rate from Bharat Stage VI levels.
- » **Next-generation and 16-year accelerated fleet renewal:** Building upon the next-generation scenario, 100% of in-use HDVs would meet Bharat Stage VI and next-generation standards 16 years after they are applied to new vehicles.



**Figure 1.** Diesel HDV exhaust NO<sub>x</sub> emissions from 2020 to 2040 in India. Data labels show the percent change in NO<sub>x</sub> emissions compared with adopted policies in 2030 and 2040.

## KEY FINDINGS

- » Avoided diesel HDV exhaust NO<sub>x</sub> emissions in 2040 compared with adopted policies are projected to be 420 thousand tonnes (62% reduction) in the next-generation standards scenario, and 570 thousand tonnes (84% reduction) in the next-generation plus 16-year renewal scenario.
- » Cumulative avoided diesel HDV exhaust NO<sub>x</sub> emissions from 2020 to 2050 compared with adopted policies are projected to be 4,300 thousand tonnes in the expanded world-class plus 16-year renewal scenario, 8,600 thousand tonnes in the next-generation standards scenario, and 14,300 thousand tonnes in the next-generation plus 16-year renewal scenario.
- » Cumulative avoided diesel HDV exhaust black carbon emissions from 2020 to 2050 compared with adopted policies are projected to be 97 thousand tonnes in the expanded world-class plus 16-year renewal scenario.
- » Cumulative mitigation potential (GWP20) for diesel HDV exhaust black carbon, CH<sub>4</sub> and N<sub>2</sub>O emissions from 2020 to 2040 compared with adopted policies is projected to be 302 million tonnes CO<sub>2</sub>e in the expanded world-class plus 16-year renewal scenario, accounting for 12% 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 285,700 in the expanded world-class plus 16-year renewal scenario, 1,351,500 in the next-generation standards scenario, and 1,712,000 in the next-generation plus 16-year renewal scenario. The majority of the estimated health benefits result from emission reductions in India, but emission reductions in other G20 economies that could have an impact on India 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 5.7 million in the expanded world-class plus 16-year renewal scenario, 23.9 million in the next-generation standards scenario, and 31 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 \$129 billion in the expanded world-class plus 16-year renewal scenario, \$674 billion in the next-generation standards scenario, and \$840 billion in the next-generation plus 16-year renewal scenario.

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## PUBLICATION DETAILS

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