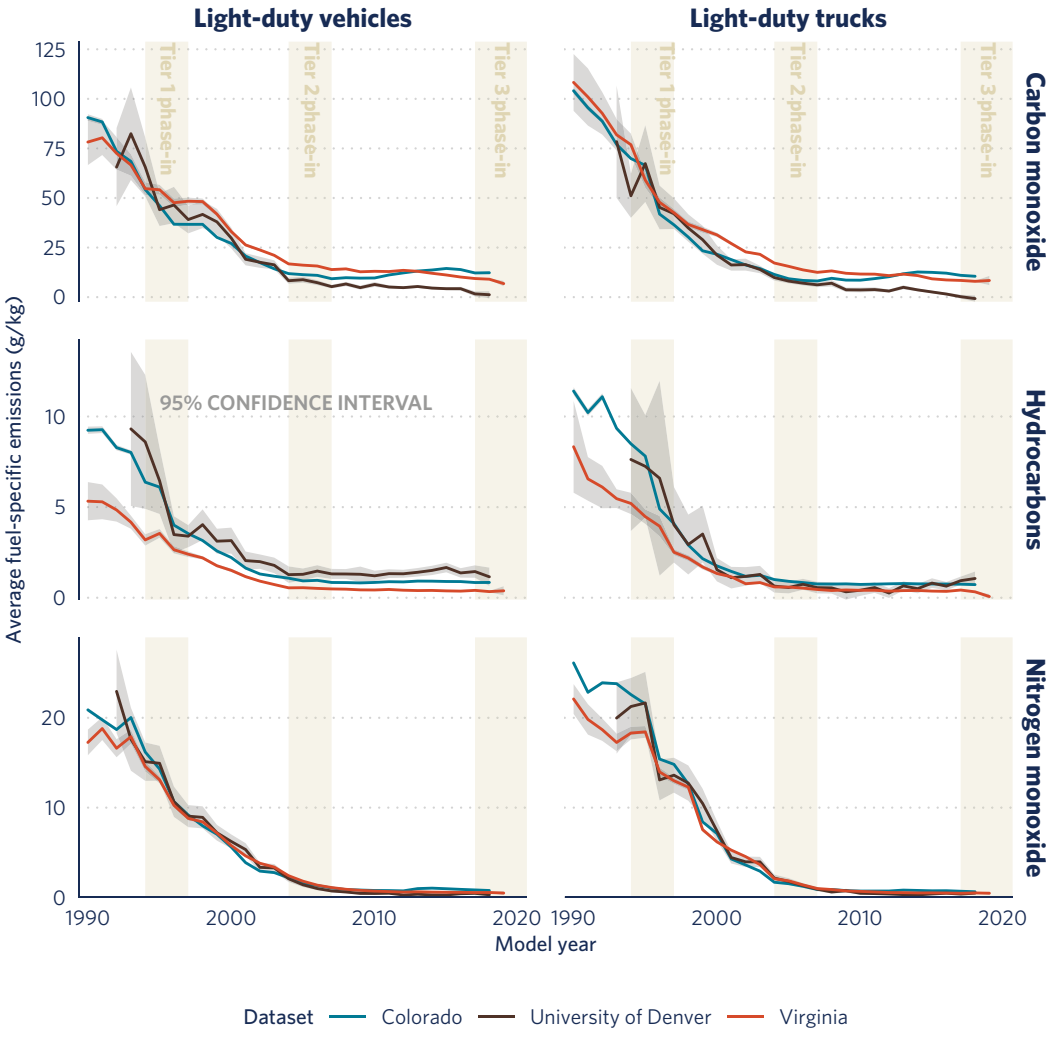
THE REAL URBAN EMISSIONS INITIATIVE

FACT SHEET

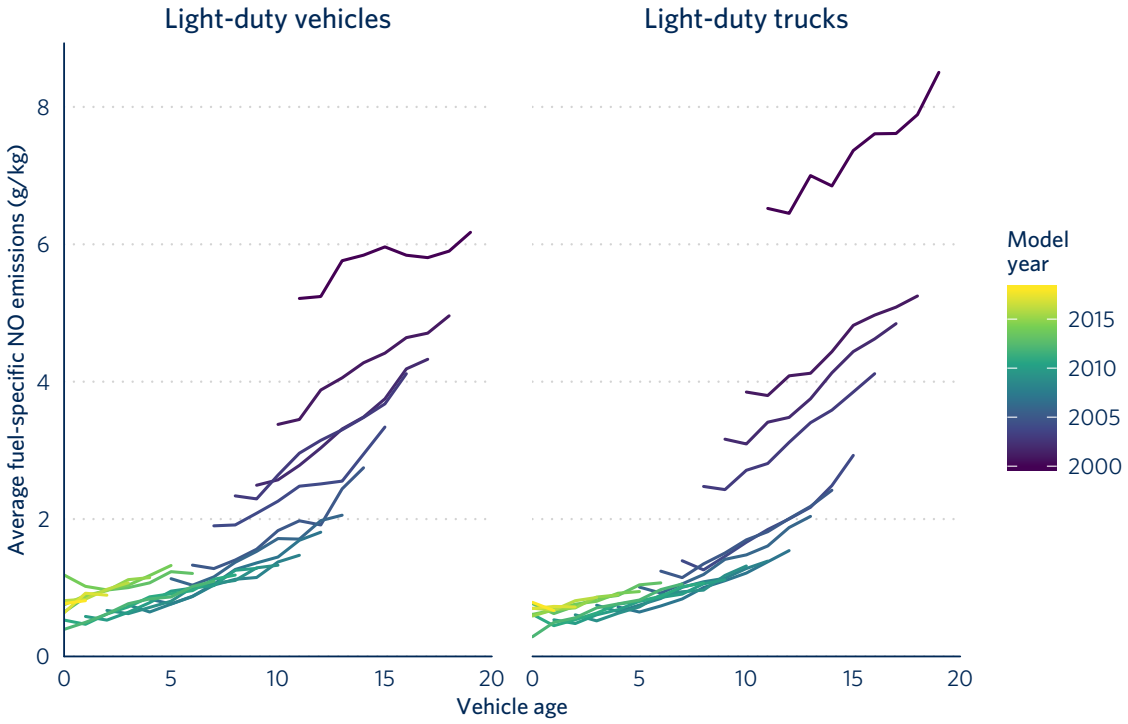
OCTOBER 2020

Real-world emissions in the United States: The TRUE U.S. remote sensing database

Remote sensing is an important tool for monitoring the real-world emissions of cars and trucks, and remote sensing data can be used to evaluate the effectiveness of emission control policies and identify emission defects and defeat devices. To complement its work on real-world emissions in Europe, TRUE has compiled remote sensing data from the states of Colorado and Virginia and the University of Denver to investigate the emissions of U.S. cars and trucks. The TRUE U.S. database includes nearly 60 million emissions records and is intended to support further research and the development of evidence-based emissions control policies in the United States. Analysis of the TRUE U.S. remote sensing database revealed the following key findings regarding the makeup and emissions of the U.S. fleet.



Average fuel-specific pollutant emissions (g/kg fuel) of gasoline light-duty vehicles by vehicle class, model year, and data source.

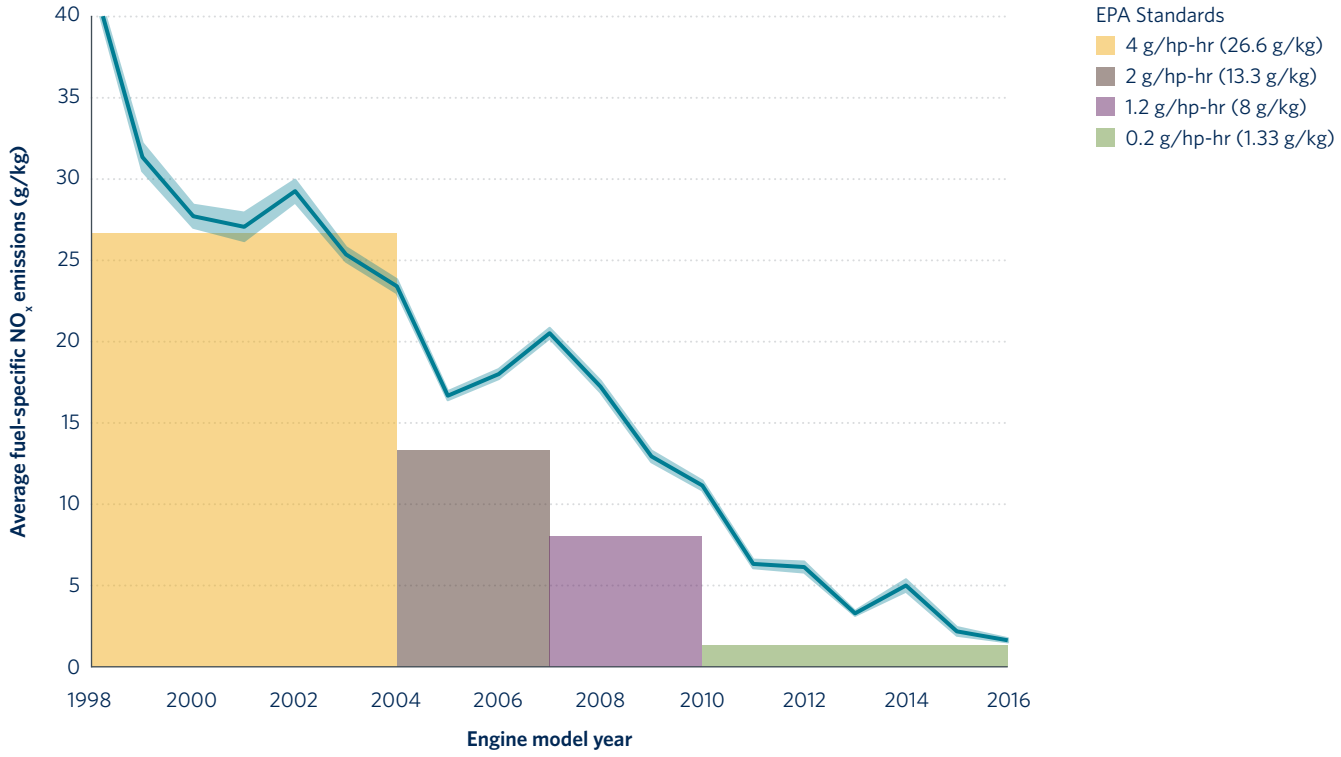


Average fuel-specific NO emissions of gasoline light-duty vehicles and light-duty trucks per model year and vehicle age.

KEY FINDINGS:

- Over the past three decades, fleet-average emissions for nitrogen monoxide (NO), carbon monoxide (CO), and hydrocarbons (HC) have shown a significant downward trend and have remained particularly low after the phase-in of the U.S. EPA Tier 2 standards in the mid-2000s.
- The NO emissions from light-duty vehicles of all model years increase with vehicle age as emission control technologies deteriorate. In older model years, the deterioration can exceed 0.2 g NO/kg fuel per year, an approximate median increase in emissions of 200% over the vehicle useful life defined in U.S. EPA emission standards. The rate of emissions increase declines with newer model years, suggesting that emissions deterioration is less pronounced in modern vehicles.
- Measured deterioration rates are much higher than projections submitted to the U.S. EPA by manufacturers. The average manufacturer-reported deterioration rate is 0.009 gNO_x/kg per year. This is about an order of magnitude lower than remote sensing deterioration rates for MY 2010 light-duty vehicles (0.09 gNO_x/kg per year) and light-duty trucks (0.08 gNO_x/kg per year).
- For light-duty vehicles, the contribution of the oldest vehicles in the fleet to total NO mass emissions has increased over time. In 2010, vehicles 15 years old and older made up approximatively 14% of the fleet but were responsible of 50% of total NO mass emissions. By 2018, the percentage of the fleet responsible for 50% of total NO emissions had decreased to 11%.
- The NO emissions distribution for heavy-duty vehicles has also become more skewed with time and the implementation of more stringent NO_x engine emission standards. Between 2010 and 2018, the proportion of the oldest vehicles in the fleet contributing to 50% of total mass emissions decreased from 30% to 16%.
- The analysis revealed a doubling of NO emissions for certain diesel pickup trucks under cold weather conditions. This finding warrants further investigation and highlights the value of remote sensing data in identifying vehicles with atypical real-world emissions performance.
- Although there was a 94% reduction in heavy-duty vehicle NO_x emissions from model year 2004 engines to model year 2016 engines, real-world emissions of most model years exceed EPA engine emission standards. Data show a considerable lag of 6 years or more between the adoption of EPA 2010 standards and the time when real-world emissions approached certification limits.
- The U.S. remote sensing data are consistent with other real-world emissions measurement techniques in showing elevated NO_x emissions from diesel trucks under low-speed urban operating conditions.

Remote sensing campaigns continue to find that real-world emissions can be much higher than emission standards. As new data become available, the TRUE U.S. database will be expanded, allowing for continued assessment of the real-world emissions of U.S. cars and trucks to support further decision making and policy development to address fleet emissions.



Average fuel-specific (g/kg) NO_x emissions of diesel heavy-duty trucks by engine model year and comparison to U.S. EPA standards.

DOWNLOAD THE PAPER AND CASE STUDIES

"Development and application of a United States real-world vehicle emissions database"
https://theicct.org/publications/true-us-database-development-oct2020

"Emissions deterioration of U.S. gasoline light-duty vehicles and trucks"
https://theicct.org/publications/true-us-database-emissions-deterioration-oct2020

"Remote sensing of heavy-duty vehicle emissions in the United States"
https://theicct.org/publications/true-us-database-hdv-emissions-oct2020

"Emissions distributions by vehicle age and policy implications"
https://theicct.org/publications/true-us-database-emissions-distribution-oct2020

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TO FIND OUT MORE

For details on the TRUE U.S. remote sensing database, contact **Tim Dallmann, t.dallmann@theicct.org**.
For more information on TRUE, visit **www.trueinitiative.org**.

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