FACT SHEET: U.S.

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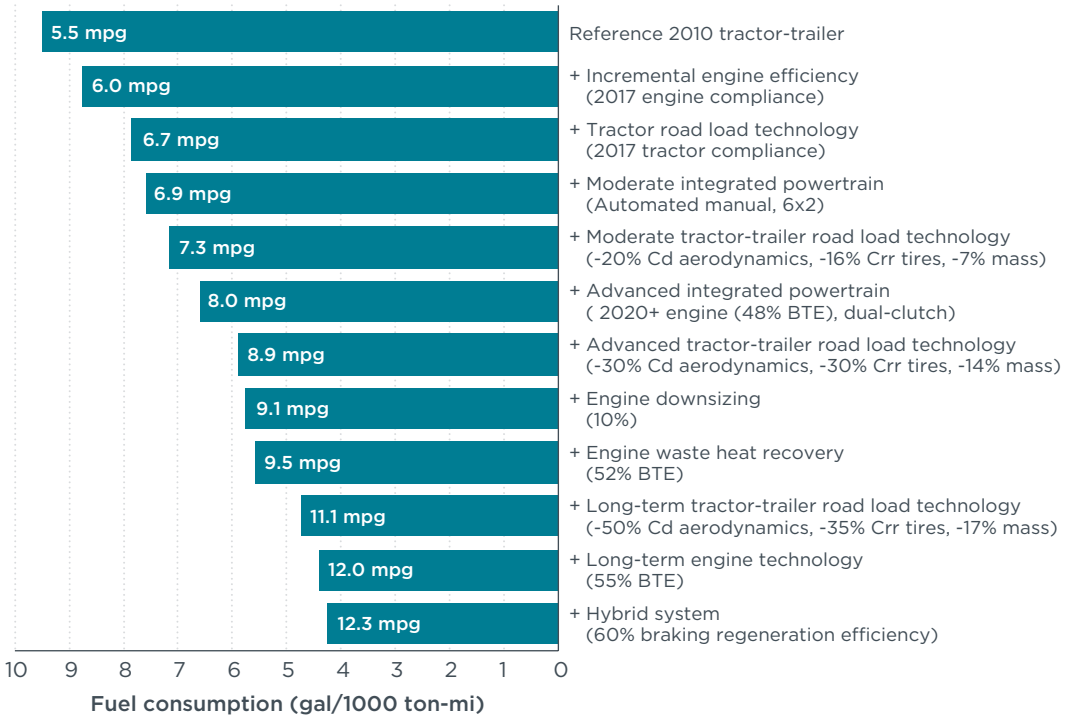
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

TRACTOR-TRAILER EFFICIENCY TECHNOLOGY POTENTIAL, 2020–2030

For decades, tractor-trailer fuel economy in the U.S. has averaged about 6 miles per gallon. The fuel-consumption and greenhouse-gas emission standards for medium- and heavy-duty vehicles adopted in 2011 represented the first effective step toward ensuring new efficiency technology would be widely deployed. Now the Environmental Protection Agency and the National Highway Traffic Safety Administration have begun work on a second phase of the regulation. One key question is what technologies are available to increase tractor-trailer efficiency for 2020 and beyond.

This analysis incorporates a new engine map and detailed energy audit into original simulation modeling of advanced tractor-trailer technologies, using the U.S. Department of Energy's Autonomie platform. Key technologies are modeled, based on public data and on industry developments. Modeling of the most advanced technologies draws on results from the Cummins-Peterbilt, Daimler, and Volvo team demonstrations in the Department of Energy's SuperTruck program.

The resulting model evaluates engine, transmission, and road load reduction technologies in several different technology packages. The figure below summarizes the results, ranging from reference 2010 technology, through compliance with the 2017 standards, to the most advanced efficiency technology.



Potential fuel-consumption reduction from tractor-trailer efficiency technologies in the 2020–2030 timeframe

KEY FINDINGS

(1) Available tractor-trailer efficiency technologies can reduce fuel use per ton-mile by almost 40% from the baseline 2010 technology before 2025.

(2) Emerging load-reduction and powertrain technologies can achieve at least a 50% reduction in fuel use in the 2025–2030 time frame. To be an effective technology-forcing standard, the Phase 2 regulation should ensure this level of efficiency gain and build in sufficiently long lead times to promote all promising advanced efficiency technologies.

(3) Similar efficiency results can be achieved with numerous different technology packages, taking varying approaches to advanced load-reduction and engine energy recovery and receiving varying contributions from aerodynamic, powertrain, and other improvements. The Phase 2 regulation should promote all available, cost-effective technologies, from engines to trailers.

(4) One-third to one-half of the overall potential tractor-trailer efficiency benefits (measured from baseline 2010 technology) come from engine efficiency improvements. Without sufficient engine-specific regulatory requirements, these engine-efficiency technologies appear unlikely to be commercialized by 2030.

(5) Several changes to the heavy-duty program's design and procedures are warranted: Direct use of engine map data for regulatory accounting of engine efficiency in integrated full-vehicle simulation; inclusion of grade in test cycles that better reflect real-world driving; streamlined procedures that promote emerging integrated engine-powertrain options; and requirements for trailer efficiency could each help promote promising technologies according to their real-world benefits.

PUBLICATION INFORMATION

Advanced tractor-trailer efficiency technology potential in the 2020-2030 timeframe

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