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American Council for an Energy-Efficient Economy

DOE's SuperTruck Program: Slashing Fuel Waste from Tractor-Trailers

"Many of the engine and drivetrain efficiency improvements and vehicle power demand reductions pioneered in SuperTruck I are headed for production with the latest model year 2017 product offerings by Cummins, Peterbilt and its key product delivery partners." *Cummins press release, 9/1/16*

WHAT IS SUPERTRUCK?

- A major Department of Energy technology innovation program with 15 industry partners, including six truck manufacturers that together represent 99% of the market for tractor trucks.[1] The voluntary program is run by the Vehicle Technologies Office.
- A $284 million public-private partnership in which industry matched federal grants dollar-for-dollar from 2010-2016 (SuperTruck I). A second phase (2017-2021) has been launched with a $160 million budget, equally shared by industry and government.[2]

OBJECTIVES OF SUPERTRUCK

SuperTruck I had three major objectives:[3]

- Develop and demonstrate 50% freight efficiency improvement from a 2009 model year Class 8 tractor truck, which translates to reaching almost 10 miles per gallon.[4]
- Improve engine efficiency by 8%, to achieve 50% brake thermal efficiency in a demonstration truck, and thereby boost fuel efficiency by 16%.
- Show pathways for a further 5% improvement in engine efficiency.

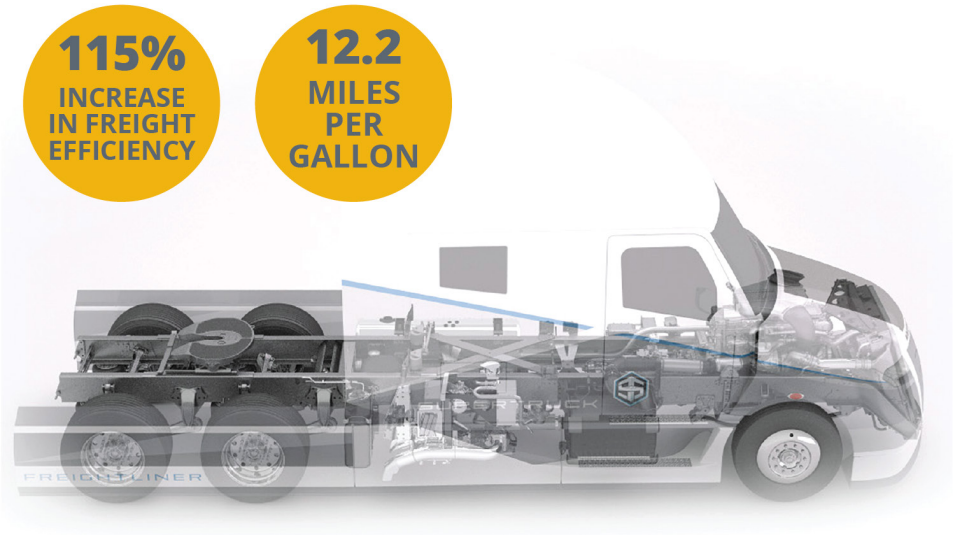
All industry teams met or exceeded these objectives. SuperTruck II aims to improve freight efficiency by 100% and demonstrate engines having thermal efficiency of 55%.[5]

WHY CLASS 8 TRACTOR TRUCKS?

Class 8 tractor trucks are the workhorses of freight movement, carrying as much as 80% of the total quantity of goods across the country and nearly half of all freight ton-miles.[6,7] These trucks have high mileage, driving well over 100,000 miles annually in their first few years on the road. They consume approximately 28 billion gallons of diesel a year, or 22% of total transportation energy use.[1,8]

BENEFITS OF SUPERTRUCK PROGRAM

Technology innovation and readiness. SuperTruck I encouraged industry to invest in high-risk/high-payoff technologies. Trucks developed under the program were the first to feature advanced technologies such as waste heat recovery, turbocompounding, engine



"[SuperTruck] wanted us to look at technologies that could be implemented in say the next 5 to 7 years, but also technologies that were 10 years or plus out. We were able to work on very high-risk, high-reward technologies, and provide functional demonstration on a line-haul program." *Derek Rotz, Principal Investigator, DTNA SuperTruck Project.*
Image: http://freightlinersupertruck.com/#main

downspeeding, and advanced aerodynamics. By 2030, SuperTruck technologies could penetrate as much as 68% of the market, assuming favorable technology cost and fuel prices.[6] The program also enabled the industry to examine the readiness of advanced technologies and their durability in real-world operation.

Oil savings, consumer savings. Adoption of SuperTruck technologies for all Class 8 trucks in the US would reduce oil consumption by 300 million barrels and save truck operators nearly $20 billion in fuel expenditures.[8] It would also reduce carbon dioxide emissions by approximately 128 million metric tons.[9]

Fuel cost savings in truck operation will be passed on to consumers. These savings increase disposable income and stimulate the economy.

Commercialization of fuel-efficiency technologies. Many technologies tested in SuperTruck I are now available in the commercial truck market. Cummins X15 and X12 engines incorporate most SuperTruck engine technologies. Volvo brought advanced piston design and turbo technologies from its SuperTruck engine into its 2017 models. Navistar and Daimler trucks now feature predictive cruise control and advanced aerodynamics, among other SuperTruck-developed improvements.[5] SuperTruck teams have already commercialized 21 technologies. An additional 26 are projected to be commercialized in the next two to four years, and 13 more in five to 10 years.[10]

US military applications. Technologies developed and verified in the SuperTruck program have broad applicability to the US Army's tactical wheeled vehicles and other military vehicles.[11]

Pathway to other truck markets. Because of their high mileage and high fuel demand, tractor trucks provide quick payback for efficiency technologies, and hence are often the initial market for new technologies. SuperTruck technologies developed and demonstrated in tractor trucks can make their way subsequently into other work vehicles, providing additional sales volume and fuel savings.

NOTES

1.https://energy.gov/sites/prod/files/2016/06/f32/Adoption%20of%20New%20Fuel%20Efficient%20Technologies%20from%20SuperTruck%20-%206-22-16%20%28002%29.pdf

2. https://www.trucks.com/2016/10/31/supertruck-program-5-year-phase/

3. https://www.nap.edu/read/18736/chapter/1

4. http://www.theicct.org/sites/default/files/publications/ICCT_SuperTruck-program_20140610.pdf

5. https://www.trucks.com/2016/10/31/supertruck-program-5-year-phase/

6. https://anl.app.box.com/s/3dfq5bvqrjni0veon68by33im7gsgchn

7. https://www.arb.ca.gov/msprog/onroad/caphase2ghg/presentations/1_4_roland_g_usdoe.pdf

8. https://www.energy.gov/articles/infographic-how-supertruck-making-heavy-duty-vehicles-more-efficient

9. Calculations used 42 gallons per barrel of oil and EIA's estimate of 22.38 pounds of CO_2 are produced from burning a gallon of diesel fuel

10. https://energy.gov/sites/prod/files/2016/09/f33/Revolutiona%CC%82%E2%82%ACNow%202016%20Report_2.pdf

11. http://www.calstart.org/Libraries/HTUF_Webinar_Presentations/SuperTruck_Technologies_for_the_Military_2014.sflb.ashx