The UCS Convoy:

Trucking Together toward Oil Savings and Clean Air

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

Medium- and heavy-duty trucks account for only 4 percent of all vehicles on U.S. highways, but about 20 percent of the diesel and gasoline U.S. vehicles consume.

The federal government has never set fuel efficiency standards for medium- and heavy-duty vehicles, so although some improvements in truck fuel economy have occurred, the opportunity for major gains remains.

For example, putting both existing and forthcoming technologies to work in tractor-trailers (the largest fuel users) could reduce fuel consumption at least 35 percent by 2017.[1]

This would save the trucks' owners money at the pump, reduce the nation's oil dependence, and help combat global warming.

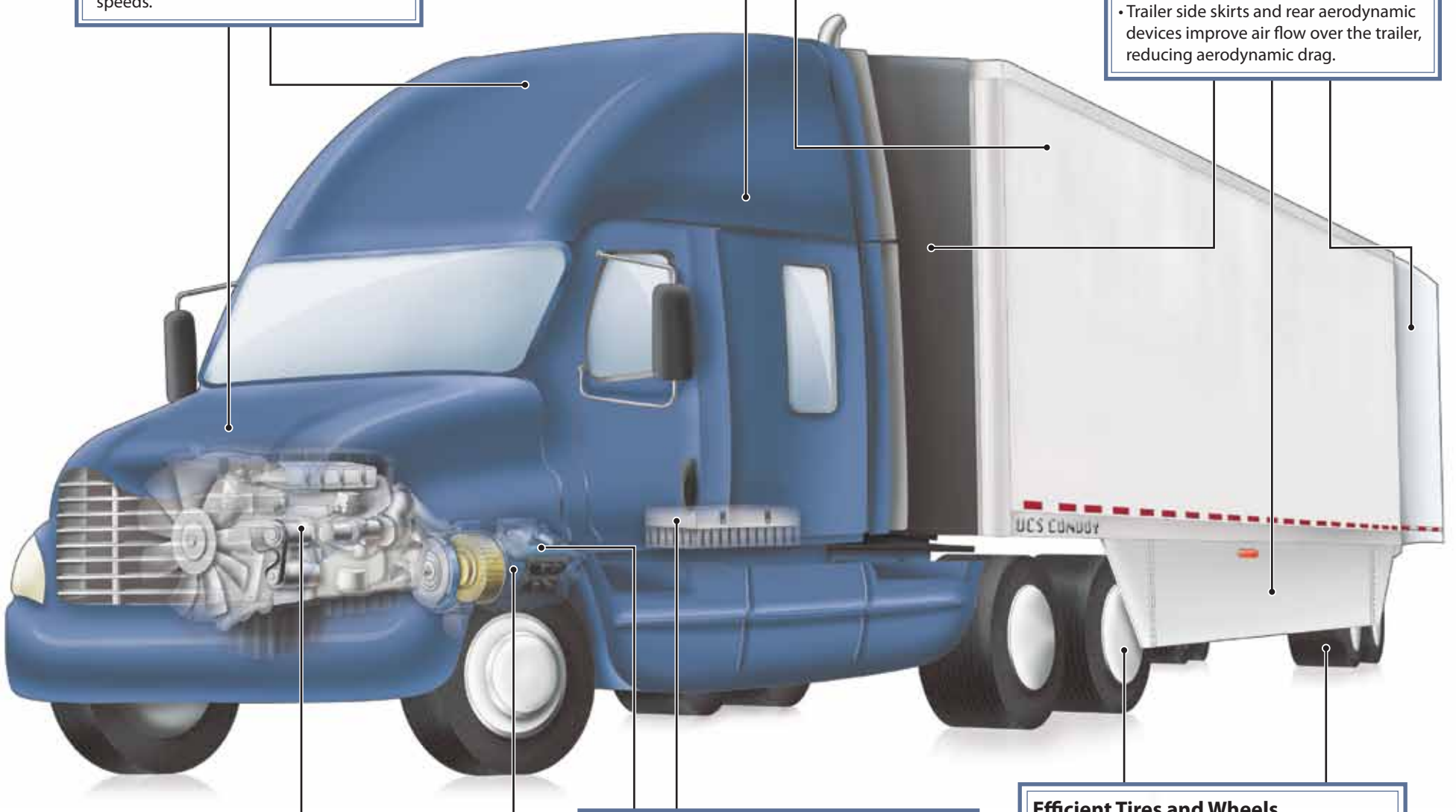
Oil Savings and Economic Benefits
Existing and near-term technologies can reduce tractor-trailer fuel consumption at least 35 percent by 2017 *

New tractor-trailer fuel economy (2017) (Current tractor-trailer fuel economy estimate is 6.5 mpg)	10 mpg
Increase in purchase price	$44,000
Annual fuel reduction and cost savings per truck (@ 120,000 miles per year and $3.50 per gallon)	7,000 gallons $24,500
Time to recoup investment (@ $3.50 per gallon of diesel)	2 years
Net savings after 5 years (Future savings discounted at 7 percent per year)	$56,000

Tractor Aerodynamics
(3% to 4% fuel reduction)
- Optimized shaping based on wind tunnel testing and computer simulation reduces the energy needed to move the vehicle through the air, especially at highway speeds.

Weight Reduction
(1% fuel reduction)
- Use of stronger, safer materials such as aluminum, high-strength steel, or composites reduces vehicle weight.

Trailer Aerodynamics
(5.5% to 8.5% fuel reduction)
- A gap reducer or full gap-closure device reduces wind resistance caused by the space between the tractor and trailer.
- Trailer side skirts and rear aerodynamic devices improve air flow over the trailer, reducing aerodynamic drag.



Engine Improvements
(5.5% to 15% fuel reduction)
- Optimized fuel system and engine controls increase engine efficiency.
- Replacing mechanical accessories such as air conditioning, power steering, and engine cooling systems with more efficient electrical systems reduces engine loads.
- Waste-heat recovery systems capture and reuse exhaust heat. Turbo-charging and turbo-compounding are examples of systems available today, while more advanced systems under development offer even greater efficiency gains.*

Hybridization and Idling Reduction
(6% to 10% fuel reduction)
- Battery storage systems or other alternatives can provide electricity and cooling/heating during rest periods to avoid engine idling.
- The electric motor/generator and energy storage of a hybrid system can capture and reuse braking energy and engine heat.*

Transmission and Driveline Improvements (5% to 7% fuel reduction)
- Automated manual transmissions optimize shifting while maintaining the efficiency of manual transmissions.
- Replacing standard two-drive axles with one drive axle and one non-drive axle reduces weight and driveline friction.

Efficient Tires and Wheels
(4.5% to 11% fuel reduction)
- Lower rolling resistance and wide-base single tires, which replace the standard dual-tire configuration, reduce wasted energy as tires roll down the road.
- Automatic tire-inflation devices keep tires at the most efficient air pressure.
- High-strength aluminum wheels reduce vehicle weight.

[1] Adapted from: National Research Council. 2010. *Technologies and approaches to reducing fuel consumption of medium- and heavy-duty vehicles.* Reductions from engine improvements use a 2010 engine as the baseline.

* Hybridization and advanced waste-heat recovery systems currently under development are expected to reach maturity by 2020. The benefits of these technologies are not included in the 2017 new tractor-trailer fuel economy improvements described above.