Advanced Technologies for Light-Duty Vehicles

Table 13. Technologies expected to have significant impacts on new light-duty vehicles

Vehicle component and technology	Technology description	Expected efficiency improvement (percent)	Initial incremental cost (2000 dollars)
Engine			
Advanced valve train	Four valves per cylinder; variable valve timing and lift; camless valve actuation	2.5-8.0	45-750
Friction reduction	Low-mass pistons and valves; reduced piston ring and valve spring tension; improved surface coatings and tolerances	2.0-6.5	25-177
Cylinder deactivation	Reduced cylinder operation at light load, lowering displacement and reducing pumping losses	4.5	250
Lean burn	Direct injection fuel system, enabling very lean air-fuel ratios	5.0	250
Transmission			
Control system	Electronic controls, improving efficiency through shift logic and torque converter lockup	0.5-2.0	8-60
Transmission	5-speed and 6-speed automatics; continuously variable transmissions	6.5-10.0	435-615
Accessory load			
Improved pumps	Reduced engine load from oil, water, and power steering pumps	0.3-0.5	10-15
Electric pumps	Electrically powered pumps, replacing mechanical pumps	1.0-2.0	50-150
Body			
Improved materials	High-strength alloy steel; aluminum castings; lightweight interiors; aluminum body and closures	3.3-13.2	0.4-1.2 dollars per pound of vehicle weight reduction
Unit body construction	Elimination of body-on-chassis structure	4.0	100
Improved aerodynamics	Reduction in drag coefficient, with improvements specific to body type	2.3-8.0	40-225
Drive train			
Advanced tires	Reduced rolling resistance	2.0-6.0	30-135
Improved 4-wheel drive	Reduced weight; improved electronic controls	2.0	100
Independent			
Safety and emissions	Improved safety and emission systems	-3.0	200