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Assumptions to the Annual Energy Outlook 2009

Table 7.7. Standard Technology Matrix for Freight Trucks

	Medium Light Trucks			Medium Heavy Trucks			Heavy Trucks		
Technology Type	Introd-uction Year	Capital Cost	Incr. Fuel Econ. Improve-ment	Introd-uction Year	Capital Cost	Incr. Fuel Econ. Improve-ment	Introd-uction Year	Capital Cost	Incr. Fuel Econ. Improve-ment
Areo dynamic I: Cab top deflector, sloping hood and cab side flares	2002	600.00	0.023	0	750.00	0.023	0	750.00	0.018
Closing/covering of gap between tractor and trailer, aero dynamic bumper, underside air baffles, wheel well covers	N/A	N/A	0.000	2004	800.00	0.036	2005	1500.00	0.023
Trailer leading and trailing edge curvatures	N/A	N/A	0.000	2005	400.00	0.009	2005	500.00	0.012
Aero Dynamics IV: pneumatic blowing	N/A	N/A	0.000	N/A	N/A	0.000	2010	2500.00	0.045
Tires I: radials	0	40.00	0.018	0	180.00	0.018	0	300.00	0.014
Tires II: low rolling resistance	2004	180.00	0.023	2005	280.00	0.023	2005	550.00	0.027
Tires III: super singles	N/A	N/A	0.000	N/A	N/A	0.000	2008	700.00	0.018
Tires IV: reduced rolling resistance from pneumatic blowing	N/A	N/A	0.000	N/A	N/A	0.000	2015	500.00	0.011
Transmission: lock-up, electronic controls, reduced friction	2005	750.00	0.018	2005	900.00	0.018	2005	1000.00	0.018
Diesel Engine I: turbocharged, direct injection with better thermal management	2003	700.00	0.045	2004	1000.00	0.072	N/A	N/A	0.000
Diesel Engine II: integrated starter/alternator with idle off and limited regenerative breaking	2005	1500.00	0.045	2005	1200.00	0.045	N/A	N/A	0.000
Diesel Engine III: improved engine iwth lower friction, better injectors, and efficient combustion	2012	2000.00	0.090	2008	2000.00	0.072	N/A	300.00	0.000
Diesel Engine IV: hybrid electric powertrain	2010	6000.00	0.360	2010	8000.00	0.360	N/A	N/A	0.000
Diesel Engine V: internal friction reduction - iimproved lubricants and bearings	N/A	N/A	0.000	N/A	N/A	0.000	2005	500.00	0.018
Diesel Engine VI: increased peak cylinder pressure	N/A	NA	0.000	N/A	N/A	0.000	2006	1000.00	0.036
Diesel Engine VII: improved injectors and more efficient combustion	N/A	N/A	0.000	N/A	N/A	0.000	2007	1500	0.054
Diesel Engine VIII: reduce waste heat improved thermal management	N/A	N/A	0.000	N/A	N/A	0.000	2010	2000	0.090

Table 7.7. Standard Technology Matrix for Freight Trucks (cont.)

	Medium Light Trucks			Medium Heavy Trucks			Heavy Trucks		
Technology Type	Introd-uction Year	Capital Cost	Incr. Fuel Econ. Improve-ment	Introd-uction Year	Capital Cost	Incr. Fuel Econ. Improve-ment	Introd-uction Year	Capital Cost	Incr. Fuel Econ. Improve-ment
Gasoline Engine I: electronic fuel injection, DOHC, multiple values	2003	700.00	0.045	2003	1000.00	0.045	N/A	N/A	0.000
Gasoline Engine II: integrated starter/alternator with idle off and limited regenerative breaking	2005	1000.00	0.045	2005	1200.00	0.072	N/A	N/A	0.000
Gasoline Engine III: direct injection (GDI)	2008	700.00	0.108	2008	1000.00	0.108	N/A	N/A	0.000
Gasoline Engine IV; hybrid electric powertrain	2010	6000.00	0.405	2010	8000.00	0.405	N/A	N/A	0.000
Weight Reduction I: high strength lightweight materials	2010	1300.00	0.045	2007	2000.00	0.045	2005	2000.00	0.090
Diesel Emission-NO_x I: exhaust recirculation, timing retard, selective catalytic reduction	2002	250.00	-0.040	2003	400.00	-0.040	2003	500.00	-0.040
Diesel Emissions-NO_x II: nitrogen enriched combustion air	2003	500.00	-0.005	2003	700.00	-0.005	2003	750.00	-0.005
Diesel Emissions-NO_x III: non-thermal plasma catalyst	2007	1000.00	-0.015	2006	1200.00	-0.015	2007	1250.00	-0.015
Diesel Emissions-NO_x IV: NO_x absorber system	2007	1500.00	-0.030	2006	2000.00	-0.030	2007	2500.00	-0.030
Diesel Emission-PM I: oxidation catalyst	2002	150.00	-0.005	2002	200.00	-0.005	2002	250.00	-0.005
Diesel Emission-PM II: catalytic particulate filter	2006	1000.00	-0.015	2006	1250.00	-0.025	2006	1500.00	-0.015
Diesel Emission-HC/CO I: oxidation catalyst	2002	150.00	-0.005	2002	200.00	-0.005	2002	250.00	-0.005
Diesl Emission-HC/CO II: closed crankcase system	2005	50.00	0.000	2005	65.00	0.000	2005	75.00	0.000
Gasoline Emission-PM I: Improved oxidation catalyst	2005	250.00	-0.003	2005	350.00	-0.003	N/A	N/A	0.000
Gasoline Emission-NO_x I: EGR/spark retard	2002	25.00	-0.015	2002	25.00	-0.015	N/A	N/A	0.000
Gasoline Emission-NO_x II: oxygen sensors	2003	75.00	0.000	2003	75.00	0.000	N/A	N/A	0.000
Gasoline Emission-NO_x III: secondary air/closed loop system	2008	50.00	0.000	2008	50.00	0.000	N/A	N/A	0.000

Table 7.7. Standard Technology Matrix for Freight Trucks (cont.)

	Medium Light Trucks			Medium Heavy Trucks			Heavy Trucks		
Technology Type	Introd-uction Year	Capital Cost	Incr. Fuel Econ. Improve-ment	Introd-uction Year	Capital Cost	Incr. Fuel Econ. Improve-ment	Introd-uction Year	Capital Cost	Incr. Fuel Econ. Improve-ment
Gasoline Emission-HC/CO I: oxygen sensors	2003	75.00	0.000	2003	75.00	0.000	N/A	N/A	0.000
Gasoline Emission-HC/CO II: evap. canister w/improved vaccum, materials, and connectors	2003	50.00	0.000	2003	50.00	0.000	N/A	N/A	0.000
Gasoline Emission-HC/CO III: oxidation catalyst	2005	250.00	-0.003	2005	350.00	-0.003	N/A	N/A	0.000

1. Payback period is same for the three modes.