

U.S. Department of Energy Energy Efficiency and Renewable Energy

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# Heavy Vehicle and Engine Resource Guide



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### **About This Guide**

The U.S. Department of Energy's Heavy Vehicle & Engine Resource Guide is a catalog of medium- and heavyduty engines and vehicles with alternative fuel and advanced powertrain options. This edition covers model year 2003 engines and vehicles. The information was collected by the National Renewable Energy Laboratory to provide fleet operators, policymakers, alternative fuel industry participants, and other interested parties with an overview of heavy vehicle and engine products currently available in the United States. In addition to product information, the guide includes:

- Contact information for vehicle and engine manufacturers as well as organizations and government agencies involved in the alternative fuel and advanced vehicle and engine market
- A glossary of commonly used alternative fuel and advanced vehicle and engine terms and acronyms
- A chart with applicable vehicle and engine emission certification specifications.

Product information, which was furnished by original equipment manufacturers, is divided into three categories: Alternative Fuel Medium and Heavy Engines; Natural Gas and Propane Medium and Heavy Vehicles; and Hybrid Electric and Battery Electric Heavy Vehicles. Respondents were asked to provide accurate, up-to-date information about all their heavy vehicle and engine products. All information in the guide is subject to change. Visit manufacturer Web sites for the most up-to-date product information.

Best efforts were made to collect information from all manufacturers offering commercially available medium and heavy vehicles and engines with alternative fuel and advanced technology options, and to collect information on all their alternative fuel products. However, some manufacturers and products may not appear in the guide.

### **Glossary of Abbreviations**

AC	Alternating current	R&D	Research and development
AFDC	Alternative Fuels Data Center (U.S.)	RFG	Reformulated gasoline
AFV	Alternative fuel vehicle	RPM	Revolutions per minute
amp-h	Amperes per hour	scf	Standard cubic feet
APU	Auxiliary power unit	SCFM	Standard cubic feet per minute
Btu	British thermal unit	V	Volts
CAA	Clean Air Act/Clean Air Act Amendments	VOC	Volatile organic compound
CFV	Clean fuel vehicle	ZEV	Zero-emission vehicle
CH <sub>4</sub>	Methane		
CNG	Compressed natural gas		
CO	Carbon monoxide		
CO <sub>2</sub>	Carbon dioxide		
DC	Direct current		
DGE	Diesel gallon equivalent		
DOE	Department of Energy (U.S.)		
DOT	Department of Transportation (U.S.)		
ECD	Emissions control device		
ECM	Electronic control module		
EGR	Exhaust gas recirculation		
EPAct	Energy Policy Act of 1992 (U.S.)		
EV	Electric vehicle		
ft-lb	Foot-pound		
FTP	Federal Test Procedure		
gal	Gallons		
GPM	Grams per mile		
GVWR	Gross vehicle weight rated		
HC	Hydrocarbons		
HD	Heavy-duty		
HEV	Hybrid-electric vehicle		
hp ICE	Horsepower		
ICE ILEV	Internal combustion engine Inherently low-emission vehicle		
in	Inches		
in <sup>3</sup>	Cubic inches		
kW	Kilowatt		
kW-h	Kilowatts per hour		
L	Liter		
lb	Pounds		
LNG	Liquefied natural gas		
LPG	Liquefied petroleum gas (propane)		
MPG	Miles per gallon		
MPH	Miles per hour		
N/A	Not available/not applicable		
NG	Natural gas		
NGV	Natural gas vehicle		
NiCd	Nickel-cadmium		
NiMH	Nickel metal hydride		
NMHC	Nonmethane hydrocarbon		
NMOG	Nonmethane organic gas		
NO <sub>x</sub>	oxides of nitrogen		
NREL	National Renewable Energy Laboratory (U.S.)		
OEM	Original equipment manufacturer		
psi	Pounds per square inch		
psig	Pounds per square inch gauge (above atmospheric	0	
	pressure)		

### Heavy Vehicle and Engine Emission Standards for the United States\*

2AR8 BULEV         1992 and later         Medium-ulty vehicles/engines, 8.501 to 10, 000 G/VW <sup>1</sup> 0.10.13         4.16.2         0.60.06         0.50.7           2AR8 ULEV,         1992 and later         Engines for incomplete MD vehicles, 8.501 + 1.40.00 G/VW         2.0 MMFC + NOx         7.2         0.05         2.0 MMFC + NOX           2AR8 ULEV,         1994 and later         Heavy duty cleasel engines/vehicles (functs)         1.2         1.55         0.17         5           2AR8 ULEV,         1996 and later         Heavy duty cleasel engines/vehicles (functs)         1.2         1.55         0.07         5           2AR8         1996 and later         Heavy duty cleasel engines/vehicles (functs mains bases)         1.2         1.5         0.05         0.5         0.57         5           2AR8         1996 and later         Heavy duty dised engines/vehicles (functs mains bases)         1.2         1.5         0.05 (0.07 in-use)         6           1.5 EPA         1998 and later         Heavy duty dised engines/vehicles 5.00 in 0.500 (Cluthan basis)         1.2         1.3         5         0.05 (0.07 in-use)         4         0.05 (0.07 in-use)         4         1.5         0.05 (0.07 in-use)         4         1.5         0.05 (0.07 in-use)         4         0.05 (0.07 in-use)         5         1.5         0.05 (0.07 i	Regulating agency	Effective MY	Applicable vehicle/engine classification	NMHC (g/bhp-h)	СО	PM (g/bhp-h)	NOx (g/bhp-h)
2ARB SULEY         1992 and later         Medium-July vehicless organises for incomplete MD vehicles, 8501+1400 GVW         2.8 MMHC + NOx         7.2         0.05         2.5 MMHC + NOx           2ARB SULEV.         1992 and later         Heavy-duty cleasel enginess/vehicles (trucks)         1.2         1.65         0.1         2.5 MMHC + NOx           2ARB SULEV.         1994 and later         Heavy-duty cleasel enginess/vehicles (trucks)         1.2         1.55         0.1         5           2ARB 1996 and later         Heavy-duty cleasel enginess/vehicles (trucks)         1.2         1.55         0.05         2         0.05         2         0.05         2         0.05         2         0.05         2         0.05         2         0.05         2         0.05         2         0.05         2         0.05 <td< th=""><th> ,</th><th></th><th></th><th></th><th>(g/bhp-h)</th><th></th><th></th></td<>	,				(g/bhp-h)		
2AR8 ULEV         1992 2003         Engines for incomplete M0 vehicles, 850114.000 CVW         2.5 NMHC + NOx         7.2         0.0         2.0 NMHC + NOx           2AR8 SULEV         1992 and later         Engines for incomplete M0 vehicles, 850114.000 CVW         2.0 NMHC + NOx         7.2         0.0         2.0 NMHC + NOx           2AR8         1994 and later         Heary-duty dised engines/vehicles (functs)         1.2 r         15.5         0.1 r         5           2AR8         1996 and later         Heary-duty dised engines/vehicles (functs)         1.2 r         15.5         0.05 r         4           2.5 EPA         1998 and later         Heary-duty dised engines/vehicles (funct s)         1.3 r         1.5 r         0.05 r         0.05 r         4           3.5 EPA         1998 and later         Heary-duty dised engines/vehicles over 1.60.0 Ib GVW (SI/OTor c)cle)         0.9         1.4 r         NA         4.0 (5.0 fF NG eng.)           3.5 EPA         1998 and later         Heary-duty dised engines/vehicles over 1.60.0 Ib GVW (SI/OTor c)cle)         0.9         1.4 r         NA         4.0 (5.0 fF NG eng.)           3.5 EPA CFF LEV         1998 2003         Heary-duty failed engines/vehicles over 1.60.0 Ib         2.5 NMHC + NOx         1.4 r         0.1         2.5 NMHC + NOx           3.5 EPA CFF LEV         1998 2003	CARB ULEV	1992-2003	Medium-duty vehicles/engines, 8,501 to 14, 000 lb GVW <sup>1</sup>	0.197/0.257	8.1/10.3	0.06/0.06	1.0/1.5
DARB SULEV.         1992 and later         Engines for incomplete MD vehicles, 8,01-14,000 OVW         2 0 MH/C + NOx         7.2         0.05         2 0 MH/C + NOx           ARB         1994 and later         Heavy-duty deset engines-whelds (urban transit buses)         1.2         15.5         0.1         5           ARB         1996 and later         Heavy-duty dieset engines-whelds (urban transit buses)         1.2         15.5         0.1         5           ARB         1996 and later         Heavy-duty dieset engines-whelds (urban transit buses)         1.2         15.5         0.05 (0.07 in-use)         4           JS. EPA         1998 and later         Heavy-duty disest engines-whelds (urban transit buses)         1.2         1.3         15.5         0.05 (0.07 in-use)         4           JS. EPA         1998 and later         Heavy-duty disest engines-whelds (urban transit buses)         1.2         1.4         NA         4.0 (5.0 for NG eng.)           JS. EPA         1998 and later         Heavy-duty disest engines-whelds (vCloutan transit buses)         2.5 MM/C + NOX         1.4         NA         4.0 (5.0 for NG eng.)           JS. EPA CFF ULEV         1998-2003         Heavy-duty diset engines-whelds (vCloutan transit buses)         2.5 MM/C + NOX         1.4         0.1         2.5 MM/C + NOX           JS. EPA CFF ULEV <td< td=""><td>CARB SULEV</td><td>1992 and later</td><td>Medium-duty vehicles/engines, 8,501 to 14, 000 lb GVW<sup>1</sup></td><td>0.1/0.13</td><td>4.1/5.2</td><td>0.06/0.06</td><td>0.5/0.7</td></td<>	CARB SULEV	1992 and later	Medium-duty vehicles/engines, 8,501 to 14, 000 lb GVW <sup>1</sup>	0.1/0.13	4.1/5.2	0.06/0.06	0.5/0.7
DARB         1994 and later         Heavy-duty dised engines/vehicles (trucks)         1.2         1.5         0.1         5           DARB         1994 and later         Heavy-duty dised engines/vehicles (trucks)         1.2         1.5         0.07         5           DARB         1996 and later         Heavy-duty dised engines/vehicles (trucks)         1.2         1.5         0.05         4           DARB         1996 and later         Heavy-duty dised engines/vehicles (trucks)         1.2         1.5         0.05         4           JS. EPA         1998 and later         Heavy-duty dised engines/vehicles (vican transt buses)         1.3         1.4         NA         4.0 (5.0 for NG eng.)           JS. EPA         1998 and later         Heavy-duty dised engines/vehicles over 1.400 to GVW (SUCtor cycle)         1.7         37.1         NA         4.0 (5.0 for NG eng.)           JS. EPA         1998 and later         Heavy-duty Biand CI engines over 8.500 to         2.5 NMHC + NOx         1.4         NA         4.0 (5.0 for NG eng.)           JS. EPA CIFE LEV         1998-2003         Heavy-duty SI and CI engines over 8.500 to         2.5 NMHC + NOx         1.4         0.1         2.5 NMHC + NOx           JS. EPA CIFE LEV         1998-2003         Heavy-duty SI and CI engines over 8.500 to         0         0         <	CARB ULEV A	1992-2003	Engines for incomplete MD vehicles, 8,501-14,000 GVW	2.5 NMHC + NOx	14.4	0.1	2.5 NMHC + NOx
DARB         1994 and later         Heavy-duty dised engines/whices (trucks)         1.2 a         15.5         0.07         5           ARB         1996 and later         Heavy-duty dised engines/whices (trucks)         1.2 a         15.5         0.05         4           JS. EPA         1996 and later         Heavy-duty dised engines/whices (trucks)         1.3         15.5         0.055         0.05         4           JS. EPA         1998 and later         Heavy-duty dised engines/whices (trucks)         1.3         15.5         0.055         0.055         4         0.056         4         0.056         4         0.056         4         0.056         4         0.056         4         0.056         4         0.056         4         0.056         4         0.056         0.056         4         0.056         0.056         4         0.056         0.056         4         0.056	CARB SULEV A	1992 and later	Engines for incomplete MD vehicles, 8,501-14,000 GVW	2.0 NMHC + NOx	7.2	0.05	2.0 NMHC + NOx
2ARB         1996 and later         Heavy-duty diesel engines/whites (trucks)         1.2         15.5         0.1         5           2ARB         1996 and later         Heavy-duty diesel engines/whites (truck transit buse)         1.2         15.5         0.05 (0.07 in-use)         5           1.5. EPA         1998 and later         Heavy-duty diesel engines/whites over 4.500 ib GVW (Clutaba buse)         2.5 INM+C + NOX         15.5         0.05 (0.07 in-use)         4           1.5. EPA         1998 and later         Heavy-duty diesel engines/whites over 4.500 ib GVW (SUCto cycle)         0.9         14.4         NA         4.0 (5.0 for NG eng.)           1.5. EPA         1998 and later         Heavy-duty diesel engines/whites over 4.500 ib         2.5 NMHC + NOX         3.8 NM+C + NOX (3.5 with Calif. Fuel)         15.5         0.1         3.8 NM+C + NOX (3.5 with Calif.           1.5. EPA CFF LEV         1998 2003         Heavy-duty SI and C1 engines over 8.500 ib         2.5 NMHC + NOX         14.4         0.1         2.5 NMHC + NOX           1.5. EPA CFF LEV         1998 2003         Heavy-duty SI and C1 engines over 8.500 ib         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         A         A         A <td>CARB</td> <td>1994 and later</td> <td>Heavy-duty diesel engines/vehicles (trucks)</td> <td>1.2 в</td> <td>15.5</td> <td>0.1 c</td> <td>5</td>	CARB	1994 and later	Heavy-duty diesel engines/vehicles (trucks)	1.2 в	15.5	0.1 c	5
2ARB         1998 and later         Heavy-duty diesel engines/vehicles (urban transit buses)         1.2         15.5         0.05         4           J.S. EPA         1998 and later         Heavy-duty diesel engines/vehicles (urban transit buses)         1.3         15.5         0.05 (0.07 In-use)         5           J.S. EPA         1998 and later         Heavy-duty diesel engines/vehicles over 6.500 Ib GVW (SlUth cycle)         0.9         14.4         NA         4.0 (5.0 for NG eng.)           J.S. EPA         1998 and later         Heavy-duty diesel engines/vehicles over 6.500 Ib         3.8 NMHC + NOx (3.5 with Calif. Fuel)         15.5         0.1         3.8 NMHC + NOX (3.5 with Calif. Fuel)           J.S. EPA CFF LEV         1998-2003         Heavy-duty SI and C lengines over 6.500 Ib         2.5 NMHC + NOX         14.4         0.1         2.5 NMHC + NOX           J.S. EPA CFF LEV         1998-2003         Heavy-duty SI and C lengines over 6.500 Ib         2.5 NMHC + NOX         14.4         0.1         2.5 NMHC + NOX           J.S. EPA CFF LEV         1998-2003         Heavy-duty sind C lengines over 6.500 Ib         2.5 NMHC + NOX         14.4         0.1         2.5 NMHC + NOX           J.S. EPA CFF LEV         1998-2003         Heavy-duty engines/vehicles over 6.500 Ib         2.5 NMHC + NOX         14.4         0.1         2.5 NMHC + NOX <td< td=""><td>CARB</td><td>1994 and later</td><td>Heavy-duty diesel engines/vehicles (urban transit buses)</td><td>1.2 в</td><td>15.5</td><td>0.07</td><td>5</td></td<>	CARB	1994 and later	Heavy-duty diesel engines/vehicles (urban transit buses)	1.2 в	15.5	0.07	5
13. EPA       1986 and later       Heavy-duty diesel engines/vehicles (ournant trans buses)       1.3       1.5       0.05 (0.07 In-use)       5         13. EPA       1986 and later       Heavy-duty diesel engines/vehicles over 14.000 In GVW (SI/Otto cycle)       0.9       1.4.4       NA       4.0 (5.0 for NG eng.)         13. EPA       1986 and later       Heavy-duty diesel engines/vehicles over 14.000 In GVW (SI/Otto cycle)       0.9       1.4.4       NA       4.0 (5.0 for NG eng.)         13. EPA       1988 and later       Heavy-duty diesel engines/vehicles over 14.000 In GVW (SI/Otto cycle)       0.9       1.7       NA       4.0 (5.0 for NG eng.)         15. EPA CFF LEV       1998-2003       Heavy-duty SI and CI engines over 3.500 Ib       2.5 NMHC + NOx       14.4       0.1       2.5 NMHC + NOx         15. EPA CFF LEV       1998-2003       Heavy-duty SI and CI engines over 3.500 Ib       0       0       0       0       0         23. EPA CFF LEV       1998-2003       Heavy-duty Gines/vehicles (except urban buses)       1.2       15.5       0.1       4         24.8 E LeV ×       2002-2003       Engines for incomplete MD vehicles, 8.501-14.000 GVW       3.0 NMHC + NOX       15.5       0.01       2.5 NOX + NMHC         2ARB       2002 and later       Urban transit buses (fleets choosing all fuels path)       2.8 NOX	CARB	1996 and later	Heavy-duty diesel engines/vehicles (trucks)	1.2 в	15.5	0.1	5
J.B. EPA         1998 and later         Heavy-duty diesel engines/vehicles 500 <sup>+</sup> LOV (C/L/uban buse)         2.5 MMHC + NOx         15.5         0.05 (D/T in-use)         4           J.B. EPA         1998 and later         Heavy-duty diesel engines/vehicles 500 <sup>+</sup> LOV (SI/Otto cycle)         0.7         37.1         NA         4.0 (5.0 for KG eng.).           J.S. EPA         1998 and later         Heavy-duty SI and CI engines over 8.500 lb         3.8 MMHC + NOx (3.5 with Calif. Fuel)         15.5         0.1         3.8 NMHC + NOX (3.5 with Calif. Fuel)           J.S. EPA CFF LEV         1998-2003         Heavy-duty SI and CI engines over 8.500 lb         2.5 MMHC + NOX         14.4         0.1         2.5 NMHC + NOX           J.S. EPA CFF LEV         1998-2003         Heavy-duty SI and CI engines over 8.500 lb         2.5 NMHC + NOX         14.4         0.1         2.5 NMHC + NOX           J.S. EPA CFF LEV         1998-2003         Heavy-duty SI and CI engines over 8.500 lb         2.5 NMHC + NOX         15.5         0.1         4           J.S. EPA CFF LEV         1998-2003         Heavy-duty engines/vehicles except urban buses)         1.2         15.5         0.1         4           J.S. EPA CFF LEV         1998-2003         Heavy-duty engines/vehicles except urban buses)         1.2         15.5         0.1         4         1.6         0.5         1.6	CARB	1996 and later	Heavy-duty diesel engines/vehicles (urban transit buses)	1.2 в	15.5	0.05	4
J.S. EPA       1998 and later       Heavy-duty disest engines/vehicles score 14,000 Ib GVW (SI/Otto cycle)       0.9       14.4       NA       4.0 (5.0 for NG eng.)         J.S. EPA       1998 and later       Heavy-duty disest engines/vehicles over 14,000 Ib GVW (SI/Otto cycle)       1.7       37.1       NA       4.0 (5.0 for NG eng.)         J.S. EPA CFF IEV       1998-2003       Heavy-duty SI and CI engines over 8,500 Ib       2.5 NMHC + NOx       14.4       0.1       2.5 NMHC + NOx         J.S. EPA CFF IEV       1998-2003       Heavy-duty SI and CI engines over 8,500 Ib       2.5 NMHC + NOx       7.2       0.05       2.5 NMHC + NOx         J.S. EPA CFF IEV       1998-2003       Heavy-duty SI and CI engines over 8,500 Ib       0       0       0       0         J.S. EPA CFF IEV       1998-2003       Heavy-duty SI and CI engines over 8,500 Ib       0       0       0       0         ARB       1998 and later       Heavy-duty SI and CI engines over 8,500 Ib       0.5 NMHC + NOx       14.4       0.1       3.0 NMHC + NOx         ARB       1998 and later       Heavy-duty engines/vehicles (except urban buses)       1.2       15.5       0.01       2.5 NOX + NMHC         ARB       2002 and later       Urban transit buses (fielts choosing delet path)       2.6 NOX + NMHC (opt.)/4.8 NOX fielet avg.       15.5       0.03	U.S. EPA	1996 and later	Heavy-duty diesel engines/vehicles (urban transit buses)	1.3	15.5	0.05 (0.07 in-use)	5
JS. EPA         1998 and later         Heavy-duty diseal engines/vehicles over 14.000 b GVW (SI/Otto cycle)         1.7         37.1         NA         4.0 (5 0 for NG eng.)           JS. EPA CFF LEV         1998-2003         Heavy-duty SI and CI engines over 8.500 lb         3.8 NMHC + NOx         15.5         0.1         3.8 NMHC + NOx (3.5 with Califf. Fuel)           JS. EPA CFF LEV         1998-2003         Heavy-duty SI and CI engines over 8.500 lb         2.5 NMHC + NOx         14.4         0.1         2.5 NMHC + NOx           JS. EPA CFF LEV         1998-2003         Heavy-duty SI and CI engines over 8.500 lb         2.5 NMHC + NOx         14.4         0.1         2.5 NMHC + NOx           JS. EPA CFF LEV         1998-2003         Heavy-duty SI and CI engines over 8.500 lb         2.5 NMHC + NOx         14.4         0.1         3.0 NMHC + NOX           JS. EPA CFF LEV         1998-2003         Engines for incomplete Molexies, 8.501-14.000 GVW         3.0 NMHC + NOX         14.4         0.1         3.0 NMHC + NOX           ZARB         2002 and later         Urban transit buses (fleets choosing diesel path)         2.5 NOX + NMHC (ADX / 8.8 NX fleet avg.         15.5         0.01         2.6 NOX + NMHC (ADX / 9.4 NOX           ZARB         2002 and later         Urban transit buses (fleets choosing diesel path)         1.8 to 3.8 NMHC + NOX         15.5         0.03         1.8 NO	U.S. EPA	1998 and later	Heavy-duty diesel engines/vehicles over 8,500 lb GVW (Cl/urban bus)	2.5 NMHC + NOx	15.5	0.05 (0.07 in-use)	4
J.S. EPA CFF LEV         1998-2003         Heavy-duty SI and Cl engines over 8,500 lb         3.8 NMHC + NOx (3.5 with Calif. Fuel)         15.5         0.1         3.8 NMHC + NOx (3.5 with Calif. Fuel)           J.S. EPA CFF ILEV         1998-2003         Heavy-duty SI and Cl engines over 8,500 lb         2.5 NMHC + NOx         7.2         0.05         2.5 NMHC + NOx           J.S. EPA CFF ULEV         1998-2003         Heavy-duty SI and Cl engines over 8,500 lb         2.5 NMHC + NOx         7.2         0.05         2.5 NMHC + NOx           J.S. EPA CFF ZEV         1998-2003         Heavy-duty SI and Cl engines over 8,500 lb         0         0         0         0         0           J.S. EPA CFF ZEV         1998-2003         Heavy-duty SI and Cl engines over 8,500 lb         0 <td>U.S. EPA</td> <td>1998 and later</td> <td>Heavy-duty diesel engines/vehicles 8,501-14,000 lb GVW (SI/Otto cycle)</td> <td>0.9</td> <td>14.4</td> <td>NA</td> <td>4.0 (5.0 for NG eng.)</td>	U.S. EPA	1998 and later	Heavy-duty diesel engines/vehicles 8,501-14,000 lb GVW (SI/Otto cycle)	0.9	14.4	NA	4.0 (5.0 for NG eng.)
Fuel         Fuel           SLEPA CFF ILEV         1998-2003         Heavy-duty SI and CI engines over 8,500 lb         2.5 NMHC + NOx         7.2         0.05         2.5 NMHC + NOx           JS. EPA CFF ULEV         1998-2003         Heavy-duty SI and CI engines over 8,500 lb         0         0         0         0           JS. EPA CFF ZEV         1998-2003         Heavy-duty SI and CI engines over 8,500 lb         0         0         0         0           JS. EPA CFF ZEV         1998-2003         Heavy-duty SI and CI engines over 8,500 lb         0         0         0         0           JS. EPA CFF ZEV         1998-2003         Engines for incomplete MD vehicles, 8,501-14,000 GVW         3.0 NMHC + NOx         14.4         0.1         3.0 NMHC + NOx           ZARB         2002 and later         Urban transit buses (fleets choosing diesel path)         2.5 NOX + NMHC (opt.)/4.8 NOX fleet avg.         15.5         0.01         2.5 NOX + NMHC (opt.)/4.8 NOX fleet avg.           ZARB         2002 and later         Urban transit buses (fleets choosing diesel path)         1.8 to 3 NMHC + NOX         15.5         0.03         1.8 NOX + NMHC (opt.)/4.8 NOX fleet avg.           ZARB         2002 and later         Urban transit buses (fleets choosing diesel path)         NA         15.5         0.1         2.4 (or 2.5 NMHC + NOX	U.S. EPA	1998 and later	Heavy-duty diesel engines/vehicles over 14,000 lb GVW (SI/Otto cycle)	1.7	37.1	NA	4.0 (5.0 for NG eng.)
J.S. EPA CFF ULEV         1998-2003         Heavy-duty SI and CI engines over 8,500 lb         2.5 NMHC + NOx         7.2         0.05         2.5 NMHC + NOx           J.S. EPA CFF ZEV         1998-2003         Heavy-duty SI and CI engines over 8,500 lb         0         0         0         0           J.S. EPA CFF ZEV         1998-2003         Engines for incomplete MD vehicles, 8,501-14,000 GVW         3.0 NMHC + NOX         14.4         0.1         3.0 NMHC + NOX           ZARB         2002-2003         Engines for incomplete MD vehicles, 8,501-14,000 GVW         3.0 NMHC + NOX         14.4         0.1         3.0 NMHC + NOX           ZARB         2002 and later         Urban transit buses (fleets choosing diesel path)         2.5 NOX + NMHC (apt.)/4.8 NOX fleet avg.         15.5         0.01         2.5 NOX + NMHC (opt.)/4.8 NOX fleet avg.           CARB         2002 and later         Heavy-duty engines/vehicles over 14,000 Ib GVW (except urban buses)         1.8 to 0.3 NMHC + NOX         15.5         0.03 to 0.01         1.8 to 0.3 NMHC + NOX           CARB         2004 and later         Heavy-duty engines/vehicles (except urban buses) ± r         2.4 2.5 NOX + NMHC         15.5         0.01         2.4 (or 2.5 NMHC + NOX w/ 0.5 N	U.S. EPA CFF LEV	1998-2003	Heavy-duty SI and CI engines over 8,500 lb	3.8 NMHC + NOx (3.5 with Calif. Fuel)	15.5	0.1	
J.S. EPA CFF ZEV         1988-2003         Heavy-duty SI and Cl engines over 8,500 lb         0         0         0         0           CARB         1998 and later         Heavy-duty engines/vehicles (except urban buses)         1.2         15.5         0.1         4           CARB         2002-2003         Engines for incomplete MD vehicles, 8,501-14,000 GVW         3.0 MMHC + NOX         14.4         0.1         3.0 MMHC + NOX           CARB         2002 and later         Urban transit buses (fleets choosing diesel path)         2.5 NOX + NMHC (opt.)/4.8 NOX fleet avg.         15.5         0.01         2.5 NOX + NMHC           CARB         2002 and later         Urban transit buses (fleets choosing alt. fuels path)         1.8 NOX + NMHC (opt.)/4.8 NOX fleet avg.         15.5         0.03         1.8 NOX + NMHC (opt.)/4.8 NOX fleet avg.           CARB         2002-2006         Heavy-duty engines/vehicles (except urban buses)         1.8 to 0.3 NMHC + NOX         15.5         0.03         1.8 NOX + NMHC (opt.)/4.8 NOX fleet avg.           CARB         2004 and later         Heavy-duty engines/vehicles (except urban buses)         1.8 to 0.3 NMHC + NOX         15.5         0.01         2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC expo           CARB         2004 and later         Urban transit buses (fleets choosing diesel path)         NA         15.5         0.01         2.4 (or 2.5 NMHC + NOX	U.S. EPA CFF ILEV	1998-2003	Heavy-duty SI and CI engines over 8,500 lb	2.5 NMHC + NOx	14.4	0.1	2.5 NMHC + NOx
CARB         1998 and later         Heavy-duty engines/vehicles (except urban buses)         1.2         15.5         0.1         4           CARB LEV a         2002-2003         Engines for incomplete MD vehicles, 8,501-14,000 GVW         3.0 NMHC + NOx         14.4         0.1         3.0 NMHC + NOx           CARB LEV a         2002 and later         Urban transit buses (fleets choosing diesel path)         2.5 NOx + NMHC/4.8 NOX fleet avg.         15.5         0.01         2.5 NOX + NMHC           CARB         2002 and later         Urban transit buses (fleets choosing alt. fuels path)         1.8 NOx + NMHC (opt.)/4.8 NOX fleet avg.         15.5         0.03         1.8 NOX + NMHC (opt.)/4.8 NOX fleet avg.           CARB         2002-2006 e         Heavy-duty engines/vehicles over 14,000 Ib GVW (except urban buses)         1.8 to 0.3 NMHC + NOX         15.5         0.03 to 0.01         1.8 to 0.3 NMHC + NOX           CARB         2004 and later         Urban transit buses (fleets choosing diesel path)         NA         15.5         0.01         0.5         NMHC cap)           CARB         2004 and later         Urban transit buses (fleets choosing diesel path)         NA         15.5         0.01         0.5         NMHC + NOX w/ 0.5           CARB ULEV a         2004 and later         Urban transit buses (fleets choosing diesel path)         NA         15.5         0.1 <td>U.S. EPA CFF ULEV</td> <td>1998-2003</td> <td>Heavy-duty SI and CI engines over 8,500 lb</td> <td>2.5 NMHC + NOx</td> <td>7.2</td> <td>0.05</td> <td>2.5 NMHC + NOx</td>	U.S. EPA CFF ULEV	1998-2003	Heavy-duty SI and CI engines over 8,500 lb	2.5 NMHC + NOx	7.2	0.05	2.5 NMHC + NOx
CARB         2002-2003         Engines for incomplete MD vehicles, 8,501-14,000 GVW         3.0 NMHC + NOx         14.4         0.1         3.0 NMHC + NOx           CARB         2002 and later         Urban transit buses (fleets choosing diesel path)         2.5 NOX + NMHC/4.8 NOX fleet avg.         15.5         0.01         2.5 NOX + NMHC           CARB         2002 and later         Urban transit buses (fleets choosing alt. fuels path)         1.8 NOX + NMHC (opt.)/4.8 NOX fleet avg.         15.5         0.03         1.8 NOX + NMHC (opt.)/4.8 NOX fleet avg.           CARB         2002-2006 ₀         Heavy-duty engines/vehicles over 14,000 lb GVW (except urban buses)         1.8 to 0.3 NMHC + NOX         15.5         0.03 to 0.01         1.8 to 0.3 NMHC + NOX           CARB         2002-2006 ₀         Heavy-duty engines/vehicles (except urban buses) [ ⊧ r         2.4-2.5 NOX + NMHC         15.5         0.01         1.8 to 0.3 NMHC + NOX           CARB         2004 and later         Urban transit buses (fleets choosing diesel path)         NA         15.5         0.01         0.5           CARB ULEV ₀         2004 and later         Otho-cycle engines used in incomplete vehicles 8,501-14,000 GVW r         2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         14.4         0.1         2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)           CARB SULEV ₀         2004 and later         Otho-cycle engines used in incomplete vehicles 8,501-	U.S. EPA CFF ZEV	1998-2003	Heavy-duty SI and CI engines over 8,500 lb	0	0	0	0
CARB       2002 and later       Urban transit buses (fleets choosing diesel path)       2.5 NOX + NMHC/4.8 NOX fleet avg.       15.5       0.01       2.5 NOX + NMHC         CARB       2002 and later       Urban transit buses (fleets choosing alt. fuels path)       1.8 NOX + NMHC (opt.)/4.8 NOX fleet avg.       15.5       0.03       1.8 NOX + NMHC (opt.)/4.8 NOX fleet avg.         CARB       2002-2006 b       Heavy-duty engines/vehicles over 14,000 lb GVW (except urban buses)       1.8 to 0.3 NMHC + NOX       15.5       0.01       1.8 to 0.3 NMHC + NOX         CARB       2004 and later       Heavy-duty engines/vehicles (except urban buses) [± r       2.4 co NOX + NMHC       15.5       0.1       2.4 co 2.5 NMHC + NOX w/ 0.5         CARB       2004 and later       Urban transit buses (fleets choosing diesel path)       NA       15.5       0.01       0.5         CARB       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW r       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)       14.4       0.1       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         CARB SULEV a       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW r       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)       15.5       0.1       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         CARB SULEV a       2004 and later       Otto-cycle engines used in vehicles of more than 14,000 GVW r       2.4	CARB	1998 and later	Heavy-duty engines/vehicles (except urban buses)	1.2	15.5	0.1	4
CARB       2002 and later       Urban transit buses (fleets choosing alt. fuels path)       1.8 NOX + NMHC (opt.)/4.8 NOX fleet avg.       15.5       0.03       1.8 NOX + NMHC (opt.)/4.8 NOX fleet avg.         CARB       2002-2006 b       Heavy-duty engines/vehicles over 14,000 lb GVW (except urban buses)       1.8 to 0.3 NMHC + NOX       15.5       0.03 to 0.01       1.8 to 0.3 NMHC + NOX         CARB       2004 and later       Heavy-duty engines/vehicles (except urban buses) £.F       2.4-2.5 NOX + NMHC       15.5       0.1       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         CARB       2004 and later       Urban transit buses (fleets choosing diesel path)       NA       15.5       0.01       0.5         CARB       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW F       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)       14.4       0.1       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         CARB       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW F       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)       14.4       0.1       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         CARB       2004 and later       Otto-cycle engines used in vehicles 6,501-14,000 GVW       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)       15.5       0.1       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         CARB       2004 and later       Otto-cycle engines used in incomplete vehicl	CARB LEV A	2002-2003	Engines for incomplete MD vehicles, 8,501-14,000 GVW	3.0 NMHC + NOx	14.4	0.1	3.0 NMHC + NOx
CARB       2002-2006       Heavy-duty engines/vehicles over 14,000 lb GVW (except urban buses)       1.8 to 0.3 NMHC + NOx       15.5       0.03 to 0.01       1.8 to 0.3 NMHC + NOx         CARB       2004 and later       Heavy-duty engines/vehicles (except urban buses) E,F       2.4-2.5 NOX + NMHC       15.5       0.1       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         CARB       2004 and later       Urban transit buses (fleets choosing diesel path)       NA       15.5       0.01       0.5         CARB ULEV a       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW r       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)       14.4       0.1       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         CARB SULEV a       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW r       2.0 NMHC + NOX w/ 0.5 NMHC cap)       14.4       0.1       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         CARB SULEV a       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW r       2.0 NMHC + NOX w/ 0.5 NMHC cap)       15.5       0.1       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         CARB a       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)       37.1       NA       2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)         CARB a       2004 and later       Otto-cycle engin	CARB	2002 and later	Urban transit buses (fleets choosing diesel path)	2.5 NOx + NMHC/4.8 NOx fleet avg.	15.5	0.01	2.5 NOx + NMHC
CARB2004 and laterHeavy-duty engines/vehicles (except urban buses) E.F2.4-2.5 NOX + NMHC15.50.12.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)CARB2004 and laterUrban transit buses (fleets choosing diesel path)NA15.50.010.5CARB ULEV a2004 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW F2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)14.40.12.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)CARB SULEV a2004 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW F2.0 NMHC + NOX7.20.12.0 NMHC + NOXCARB SULEV a2004 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW F2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)15.50.12.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)CARB SULEV a2004 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)15.50.12.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)CARB a2004 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)37.1NA2.4 (or 2.5 NMHC + NOX w/ 0.5 NMHC cap)CARB B a2005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW1.0 NMHC+NOX14.4NA1.0 NMHC+NOX NMHC cap)CARB B a2005 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW0.5 NMHC+NOX7.2NA0.5 NMHC+NOXCARB a2005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GV	CARB	2002 and later	Urban transit buses (fleets choosing alt. fuels path)	1.8 NOx + NMHC (opt.)/4.8 NOx fleet avg.	15.5	0.03	
DARB2004 and laterUrban transit buses (fleets choosing diesel path)NA15.50.010.5CARB2004 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW r2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)14.40.12.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)CARB SULEV 62004 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW r2.0 NMHC + NOx7.20.12.0 NMHC + NOxCARB SULEV 62004 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW r2.0 NMHC + NOx w/ 0.5 NMHC cap)15.50.12.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)CARB 62004 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)15.50.12.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)CARB 62005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW1.0 NMHC+NOx14.4NA1.0 NMHC+NOx w/ 0.5 NMHC cap)CARB 62005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW1.0 NMHC+NOx7.2NA0.5 NMHC + NOx w/ 0.5 NMHC cap)CARB 62005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW1.0 NMHC+NOx7.2NA0.5 NMHC + NOxCARB 62005 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW1.0 NMHC+NOx7.2NA0.5 NMHC + NOxJ.S. EPA CFF2004 and laterHeavy-duty diseles oner than 14,000 GVW1.0 NMHC+NOx7.2NA0.5 NMHC + NOXJ.S. EPA CFF200	CARB	2002-2006 D	Heavy-duty engines/vehicles over 14,000 lb GVW (except urban buses)	1.8 to 0.3 NMHC + NOx	15.5	0.03 to 0.01	1.8 to 0.3 NMHC + NOx
CARB ULEV 6       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW F       2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)       14.4       0.1       2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)         CARB SULEV 6       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW F       2.0 NMHC + NOx       7.2       0.1       2.0 NMHC + NOx         CARB 0       2004-2006       Heavy-duty engines       2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)       15.5       0.1       2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)         CARB 0       2004 and later       Otto-cycle engines used in vehicles of more than 14,000 GVW       2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)       37.1       NA       2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)         CARB 0LEV 6       2005 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW       1.0 NMHC + NOx w/ 0.5 NMHC cap)       37.1       NA       2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)         CARB 0LEV 6       2005 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW       1.0 NMHC + NOx       14.4       NA       1.0 NMHC + NOx         CARB 6       2005 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW       1.0 NMHC + NOX       7.2       NA       0.5 NMHC + NOX         J.S. EPA CFF       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,0	CARB	2004 and later	Heavy-duty engines/vehicles (except urban buses) E, F	2.4-2.5 NOx + NMHC	15.5	0.1	
CARB SULEV 6       2004 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW F       2.0 NMHC + NOx       7.2       0.1       2.0 NMHC + NOx         CARB SULEV 6       2004-2006       Heavy-duty engines       2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)       15.5       0.1       2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)         CARB 6       2004 and later       Otto-cycle engines used in vehicles of more than 14,000 GVW       2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)       37.1       NA       2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)         CARB ULEV 6       2005 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW       1.0 NMHC+NOx       14.4       NA       1.0 NMHC + NOx w/ 0.5 NMHC cap)         CARB ULEV 6       2005 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW       1.0 NMHC+NOx       14.4       NA       1.0 NMHC + NOx         CARB SULEV       2005 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW       0.5 NMHC + NOx       7.2       NA       0.5 NMHC + NOx         CARB SULEV       2005 and later       Otto-cycle engines used in vehicles of more than 14,000 GVW       0.5 NMHC + NOx       7.2       NA       0.5 NMHC + NOx         CARB SuLEV       2005 and later       Otto-cycle engines used in vehicles of more than 14,000 GVW       1.0 NMHC + NOx       37.1       NA	CARB	2004 and later	Urban transit buses (fleets choosing diesel path)	NA	15.5	0.01	0.5
CARB2004-2006Heavy-duty engines2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)15.50.12.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)CARB 62004 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)37.1NA2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)CARB ULEV 62005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW1.0 NMHC+NOx14.4NA1.0 NMHC+NOxCARB SULEV2005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW0.5 NMHC+NOx7.2NA0.5 NMHC+NOxCARB G2005 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW0.5 NMHC+NOx7.2NA0.5 NMHC+NOxCARB G2005 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW1.0 NMHC+NOx37.1NA1.0 NMHC+NOxCARB G2005 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW1.0 NMHC+NOx37.1NA1.0 NMHC+NOxJ.S. EPA CFF2004 and laterHeavy-duty diesel engines for vehicles over 8,500 lb2.4 NMHC + NOx15.50.1/0.052.4 NMHC + NOxJ.S. EPA CFF2005 and laterHeavy-duty gasoline engines, GVW 8,501-10,000 lb0.28 g/mileNANA0.9 g/mileJ.S. EPA CFF2005 and laterHeavy-duty gasoline engines, GVW 10,001-14,000 lb0.33 g/mileNANA1.0 g/mile	CARB ULEV G	2004 and later	Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW $_{\rm F}$	2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)	14.4	0.1	
CARB 62004 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)NA2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)CARB ULEV 62005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW1.0 NMHC+NOx14.4NA1.0 NMHC+NOxCARB SULEV2005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW0.5 NMHC+NOx7.2NA0.5 NMHC+NOxCARB SULEV2005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW0.5 NMHC+NOx7.2NA0.5 NMHC+NOxCARB 62005 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW1.0 NMHC+NOx37.1NA1.0 NMHC+NOxJ.S. EPA CFF2004 and laterHeavy-duty diesel engines for vehicles over 8,500 lb2.4 NMHC + NOx15.50.1/0.052.4 NMHC + NOxJ.S. EPA CFF2005 and laterHeavy-duty gasoline engines, GVW 8,501-10,000 lb0.28 g/mileNANA0.9 g/mileJ.S. EPA CFF2005 and laterHeavy-duty gasoline engines, GVW 10,001-14,000 lb0.33 g/mileNANA1.0 g/mile	CARB SULEV G	2004 and later	Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW F	2.0 NMHC + NOx	7.2	0.1	2.0 NMHC + NOx
NMHC cap)         CARB ULEV 6       2005 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW       1.0 NMHC+NOx       14.4       NA       1.0 NMHC+NOx         CARB SULEV       2005 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW       0.5 NMHC+NOx       7.2       NA       0.5 NMHC+NOx         CARB SULEV       2005 and later       Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW       0.5 NMHC+NOx       7.2       NA       0.5 NMHC+NOx         CARB 6       2005 and later       Otto-cycle engines used in vehicles of more than 14,000 GVW       1.0 NMHC+NOx       37.1       NA       1.0 NMHC+NOx         J.S. EPA CFF       2004 and later       Heavy-duty diesel engines for vehicles over 8,500 lb       2.4 NMHC + NOx       15.5       0.1/0.05       2.4 NMHC + NOx         J.S. EPA CFF       2005 and later       Heavy-duty gasoline engines, GVW 8,501-10,000 lb       0.28 g/mile       NA       NA       0.9 g/mile         J.S. EPA CFF       2005 and later       Heavy-duty gasoline engines, GVW 10,001-14,000 lb       0.33 g/mile       NA       NA       1.0 g/mile	CARB	2004-2006	Heavy-duty engines	2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)	15.5	0.1	2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)
CARB SULEV2005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW0.5 NMHC+NOx7.2NA0.5 NMHC+NOxCARB G2005 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW1.0 NMHC+NOx37.1NA1.0 NMHC+NOxJ.S. EPA CFF2004 and laterHeavy-duty diesel engines for vehicles over 8,500 lb2.4 NMHC + NOx15.50.1/0.052.4 NMHC + NOxJ.S. EPA CFF2005 and laterHeavy-duty gasoline engines, GVW 8,501-10,000 lb0.28 g/mileNANA0.9 g/mileJ.S. EPA CFF2005 and laterHeavy-duty gasoline engines, GVW 10,001-14,000 lb0.33 g/mileNANA1.0 g/mile	CARB G	2004 and later	Otto-cycle engines used in vehicles of more than 14,000 GVW	2.4 (or 2.5 NMHC + NOx w/ 0.5 NMHC cap)	37.1	NA	
CARB SULEV2005 and laterOtto-cycle engines used in incomplete vehicles 8,501-14,000 GVW0.5 NMHC+NOx7.2NA0.5 NMHC+NOxCARB G2005 and laterOtto-cycle engines used in vehicles of more than 14,000 GVW1.0 NMHC+NOx37.1NA1.0 NMHC+NOxJ.S. EPA CFF2004 and laterHeavy-duty diesel engines for vehicles over 8,500 lb2.4 NMHC + NOx15.50.1/0.052.4 NMHC + NOxJ.S. EPA CFF2005 and laterHeavy-duty gasoline engines, GVW 8,501-10,000 lb0.28 g/mileNANA0.9 g/mileJ.S. EPA CFF2005 and laterHeavy-duty gasoline engines, GVW 10,001-14,000 lb0.33 g/mileNANA1.0 g/mile	CARB ULEV G	2005 and later	Otto-cycle engines used in incomplete vehicles 8,501-14,000 GVW	1.0 NMHC+NOx	14.4	NA	1.0 NMHC+NOx
J.S. EPA CFF2004 and laterHeavy-duty diesel engines for vehicles over 8,500 lb2.4 NMHC + NOx15.50.1/0.052.4 NMHC + NOxJ.S. EPA CFF2005 and laterHeavy-duty gasoline engines, GVW 8,501-10,000 lb0.28 g/mileNANA0.9 g/mileJ.S. EPA CFF2005 and laterHeavy-duty gasoline engines, GVW 10,001-14,000 lb0.33 g/mileNANA1.0 g/mile	CARB SULEV	2005 and later		0.5 NMHC+NOx	7.2	NA	
J.S. EPA CFF       2005 and later       Heavy-duty gasoline engines, GVW 8,501-10,000 lb       0.28 g/mile       NA       NA       0.9 g/mile         J.S. EPA CFF       2005 and later       Heavy-duty gasoline engines, GVW 10,001-14,000 lb       0.33 g/mile       NA       NA       1.0 g/mile	CARB G	2005 and later	Otto-cycle engines used in vehicles of more than 14,000 GVW	1.0 NMHC+NOx	37.1	NA	1.0 NMHC+NOx
J.S. EPA CFF 2005 and later Heavy-duty gasoline engines, GVW 10,001-14,000 lb 0.33 g/mile NA NA 1.0 g/mile	U.S. EPA CFF	2004 and later	Heavy-duty diesel engines for vehicles over 8,500 lb	2.4 NMHC + NOx	15.5	0.1/0.05	2.4 NMHC + NOx
J.S. EPA CFF 2005 and later Heavy-duty gasoline engines, GVW 10,001-14,000 lb 0.33 g/mile NA NA 1.0 g/mile	U.S. EPA CFF	2005 and later	Heavy-duty gasoline engines, GVW 8,501-10,000 lb	0.28 g/mile	NA	NA	0.9 g/mile
	U.S. EPA CFF			5	NA	NA	
	U.S. EPA CFF	2005 and later			NA	NA	1.0 g/bhp-hr HC+NOx

#### Heavy Vehicle and Engine Emission Standards for the United States\* (cont.)

Regulating agency	Effective MY	Applicable vehicle/engine classification	NMHC (g/bhp-h)	CO	PM (g/bhp-h)	NOx (g/bhp-h)
				(g/bhp-h)		
CARB	2007 and later	Urban transit buses (fleets choosing diesel path)	NA	NA	0.01	0.2
CARB	2007 and later	Urban transit buses (fleets choosing alt. fuels path)	NA	NA	0.01	0.2
CARB	2007 and later	Heavy-duty engines/vehicles (other than transit)	0.14	15.5	0.01	0.2
U.S. EPA	2007 and later н	Heavy-duty diesel and gasoline engines/vehicles	0.14	15.5	0.01	0.2
U.S. EPA	2008 and later	Heavy-duty Otto-cycle engines/vehicles	0.14	14.4	0.01	O.20
U.S. EPA	2008 and later	Complete heavy-duty vehicles, GVW 8,501-10,000 lb	0.195 g/mile	7.3 g/mi	0.02 g/mi	0.2 g/mi
U.S. EPA	2008 and later	Complete heavy-duty vehicles, GVW 10,001-14,000 lb	0.23 g/mile	8.1 g/mile	0.02 g/mile	0.4 g/mile
* For more detailed information, visit the EPA Office of Transportation and Air Quality web site at www.epa.gov/otaq or the CARB web site at www.arb.ca.gov						

A. Optional standards

B. NMHC standard applies to petroleum-, natural gas & propane-powered engines; THC standard for other vehicles is 1.3

C. PM standard for urban transit buses is 0.07 g/bhp-hr under transient operating conditions

D. Optional standards effective 10/2002

E. Standards apply to engines fueled with petroleum- or alcohol-based fuel, natural gas or propane

F. Optional certification for manufacturers of engines used in incomplete vehicles 8,501-14,000 lb GVW

G. Manufacturer may opt to certify to option 1 or 2 federal NMHC+NOx standards

H. Standards phased in from 2007 to 2010 for diesel, 2008-2009 for gasoline

I. 1st standard listed is for engines/vehicles 8,501-10,000 lb GVW; 2nd is for those 10,001-14,000 lb GVW

### **Information Sources for Heavy Vehicles and Engines**

#### Trade associations, R&D groups, government agencies, advocacy groups, etc.

### Advanced Transportation Technology Institute

(formerly Electric Transit Vehicle Institute) 1617-B Wilcox Blvd. Chattanooga, TN 37406 Contact: John Powell Phone: 423-622-3884 Fax: 423-622-0744 Web site: <u>http://www.atti-info.org/</u>

## Alternative Fuels Data Center and Hotline, U.S. Department of Energy

Phone: 800-423-1363/703-934-3069 E-mail: hotline@afdc.nrel.gov Web site: http://www.afdc.doe.gov/

#### **American Bioenergy Association**

209 Pennsylvania Ave. NE Washington, DC 20003 Contact: Megan Smith Phone: 202-546-4551 Fax: 202-467-6541 E-mail: info@biomass.org Web site: http://www.biomass.org/

#### **American Bus Association**

1100 New York Ave. NW, Suite 1050 Washington, DC 20005-3934 Contact: Peter Pantuso Phone: 202-842-1645 Fax: 202-842-0850 Web site: <u>http://www.buses.org/</u>

#### **American Public Transportation Association**

1666 K St. NW, Suite 1100 Washington, DC 20006 Contact: William Millar Phone: 202-496-4800 Fax: 202-496-4324 Web site: http://www.apta.com/

#### **American Trucking Associations**

2200 Mill Rd. Alexandria, VA 22314 Contact: Vern Garner Phone: 888-333-1759/703-838-1700 Fax: 703-838-0291 Web site: http://www.truckline.com/

#### California Air Resources Board (CARB)

Mobile Source Operations Division P.O. Box 8001 El Monte, CA 91734-2301 Contact: Allen Lyons Phone: 626-450-6152 Web site: http://www.arb.ca.gov/

#### **California Energy Commission**

1516 9th St., MS-29 Sacramento, CA 95814-5512 Contact: Jerry Wiens Heavy-Duty Advanced Technology Dept. Phone: 916-654-4649 E-mail: jwiens@energy.state.ca.us Web site: http://www.energy.ca.gov/ CEC Alternative Fuels Hotline Phone: 800-232-4685

#### **California Fuel Cell Partnership**

3300 Industrial Blvd., Suite 1000, West Sacramento, CA 95691 Contact: Joe Irvin Phone: 916-371-3870 Fax: 916-375-2008 Web site: http://www.cafcp.org/

**California Natural Gas Vehicle Partnership** Contact: Norma Glover Web site: <u>http://:www.cngvp.org</u>

#### CALSTART/WestStart Advanced Vehicle Consortium

2180 E. Foothill Blvd. Pasadena, CA 91107 Contact: John Boesel Phone: 626-744-5600 Fax: 626-744-5610 Web site: http://www.calstart.org/

#### Clean Cities Program, U.S. Department of Energy Forrestal Bldg. EE-10 1000 Independence Ave. SW Washington, DC 20585-0121 Contact: Shelley Launey Phone: 800-224-8437/703-934-3068 Fax: 703-586-1600 E-mail: <u>ccities@nrel.gov</u>

Web site: http://www.ccities.doe.gov/

#### Electric Drive Transportation Association (formerly Electric Vehicle Association of the Americas)

701 Pennsylvania Ave. NW, 3rd Floor Washington, DC 20004 Contact: Kateri Callahan Phone: 202-508-5995 Fax: 202-508-5924 Web site: http://www.evaa.org/

#### **Electric Power Research Institute**

3412 Hillview Ave. Palo Alto, CA 94304-1395 Contact: Andra Michel, Bob Graham, Mark Duvall Phone: 650-855-2556 Fax: 650-855-2737 Web site: http://www.epri.com/

#### **Engine Manufacturers Association**

Two N. LaSalle St., Suite 2200 Chicago, IL 60602 Contact: Jed R. Mandel Phone: 312-827-8700 Fax: 312-827-8737 Web site: http://www.engine-manufacturers.org/

#### Gas Technology Institute

1700 South Mt. Prospect Rd. Des Plaines, IL 60018 Contact: William E. Liss Phone: 847-768-0753 Fax: 847-768-0501 Web site: http://www.gastechnology.org/

#### International Association for Natural Gas Vehicles

P.O. Box 28-590 Auckland, New Zealand Contact: Dr. Garth Harris Phone: 64-9-524-0945 Fax: 64-9-520-3122 Web site: <u>http://www.iangv.org/</u>

#### National Alternative Fuels Training Consortium

1460 Earl Core Rd. Morgantown, WV 26505 Contact: Al Ebron Phone: 304-293-7882 Fax: 304-293-6944 Web site: http://naftp.nrcce.wvu.edu/

#### National Association of Fleet Managers Inc.

100 Wood Ave. South, Suite 310 Iselin, NJ 08830 Contact: David Lefevre Phone: 732-494-8100 Fax: 732-494-6789 Web site: http://www.nafa.org/

#### **National Biodiesel Board**

3337A Emerald Lane Jefferson City, MO 65110-4898 Contact: Joe Jobe Phone: 573-635-3893 or 800-841-5849 Fax: 573-635-7913 Web site: <u>http://www.nbb.org/</u>

#### National Propane Gas Association (Washington Office)

1150 17th St. NW, Suite 310 Washington, DC 20036 Contact: Richard Roldan Phone: 202-466-7200 Fax: 202-466-7205 Web site: http://www.npga.org/

#### National Renewable Energy Laboratory

1617 Cole Blvd. Golden, CO 80401-3393 Contact: Margo Melendez Phone: 303-275-4479 Fax: 303-275-4415 Web site: http://www.nrel.gov/

#### **Natural Gas Vehicle Coalition**

400 N. Capitol St. NW Washington, DC 20001 Contact: Richard Kolodziej Phone: 202-824-7360 Fax: 202-824-7367 Web site: http://www.ngvc.org/

#### **Propane Education & Research Council**

1776 K St. NW, Suite 204 Washington, DC 20006 Contact: Roy Willis Phone: 202-452-8975 Fax: 202-452-9054 Web site: http://www.propanecouncil.org/

#### **Propane Vehicle Council**

1150 17th St. NW, Suite 310 Washington, DC 20036 Contact: Brian Feehan Phone: 202-530-0479 Fax: 202-429-0977 E-mail: <u>info@propanevehicle.org</u> Web site: <u>http://www.propanevehicle.org/</u>

#### Society of Automotive Engineers Inc. (Automotive Headquarters) 755 W. Big Beaver, Suite 1600 Troy, MI 48084 Phone: 248-273-2455 Fax: 248-273-2494 E-mail: automotive hq@sae.org

Web site: <u>http://www.sae.org/</u>

#### U.S. Department of Energy Office of FreedomCAR and Vehicle Technologies 1000 Independence Ave. SW Washington, DC 20585 Contact: Edward Wall Phone: 202-586-0410 Web site: http://www.eere.energy.gov/vehiclesandfuels

U.S. Department of Transportation, Federal Highway Administration 400 7th St. SW Washington, DC 20590 Phone: 202-366-0537 Web site: http://www.fhwa.dot.gov/

#### U.S. Department of Transportation, Federal Transit

Administration

400 7th St. SW Washington, DC 20590 Contact: Barbara Sisson, Office of Research, Demonstration and Innovation Phone: 202-366-4052 Web site: http://www.fta.dot.gov/

#### U.S. Environmental Protection Agency Office of

Transportation and Air Quality 1200 Pennsylvania Ave NW, 6401A Washington, DC 20460 Contact: Margo T. Oge Phone: 202-564-1682 Fax: 202-564-1686 Web site: http://www.epa.gov/otaq

#### U.S. Fuel Cell Council

1625 K St. NW, Suite 725 Washington, DC 20006 Contact: Bob Rose Phone: 202-293-5500 Fax: 202-785-4313 Web site: http://www.usfcc.com/

### **Vehicle and Engine Manufacturer Contact Information**

#### **Alternative Fuels Technologies**

Contact: Juanita Diaz Phone: 806-359-3327 E-mail:jdiaz@altlngusa.com

#### Arrow Engine Co.

Contact: Kavas Mistry Phone: 800-331-3662 Fax: 918-592-1481 Web site: http://www.arrowengine.com/

#### Autocar (formerly Volvo GM Heavy Trucks)

Contact: Mike Poppovich Phone: 765-489-5499, ext. 2501 Web site: http://www.autocartruck.com/

#### Blue Bird Corp.

Contact: Bill Fay Phone: 800-486-7122 Fax: 478-474-9131 E-mail: <u>wffay@blue-bird.com</u> Contact: Rusty Mitchell Phone: 478-822-2262 E-mail: <u>rusty.mitchell@blue-bird.com</u> Web site: http://www.blue-bird.com/

#### **Champion Bus Inc./Thor Industries**

Contact: Paul Allmacher Phone: 800-776-4943 Fax: 810-724-1844 E-mail: <u>cbisls2@tir.com</u> Web site: <u>http://www.championbus.com/</u>

#### **Clean Air Power/Caterpillar**

Contact: Kevin Campbell Phone: 909-393-7933 Fax: 858-332-4991 Contact: Tara Schaenman Phone: 858-332-4830 E-mail: tschaenman@cleanairpower.com Web site: http://www.cleanairpower.com/

#### Crane Carrier Co.

Contact: Richard Hugger Phone: 918-836-1651 Fax: 918-832-7348 E-mail: <u>rhugger@cranecarrier.com</u> Web site: <u>http://www.cranecarrier.com/</u>

#### **Cummins Westport Inc.**

Contact: Scott Davidson Phone: 812-377-1734 Fax: 812-377-1309 E-mail: <u>sdavidson@cumminswestport.com</u> Contact: Alexis Boudreau Phone: 604-718-2012 E-mail: <u>aboudreau@cumminswestport.com</u> Web site: http://www.cumminswestport.com/

#### **Detroit Diesel Corp.**

Contact: Chuck Yount Phone: 313-592-3753 Fax: 313-592-8176 E-mail: <u>charles.yount@detroitdiesel.com</u> Contact: Frank Stranzl Phone: 313-592-5668 Fax: 313-592-8176 E-mail: <u>frank.stanzl@detroitdiesel.com</u> Web site: <u>http://www.detroitdiesel.com</u>/

#### **ElDorado National/Thor Industries**

Contact: Gentry Shaw Phone: 909-591-9557 Fax: 909-591-5285 E-mail: <u>gshaw@eldorado-ca.com</u> Web site: <u>http://www.eldoradonational.com/</u>

#### **Electric Vehicles International, LLC**

Contact: Larry Pike Phone: 800-618-3722 Fax: 765-643-3726 Web site: http://www.evi-usa.com/

#### Elgin Sweeper Co.

Contact: Brian Giles Phone: 847-741-5370 Fax: 847-742-3035 E-mail: <u>bgiles@elginsweeper.com</u> Web site: <u>http://www.elginsweeper.com/</u>

#### Freightliner Custom Chassis Corp.

Contact: Bryan Henke Phone: 864-487-1700 Fax: 864-487-6400 E-mail: <u>bryanhenke@freightliner.com</u> Web site: <u>http://www.freightlinerchassis.com/</u> Freightliner Trucks Contact: Stephen Morelli Phone: 503-745-8324 E-mail: <u>stevemorelli@freightliner.com</u> Contact: Dennis Manchester Phone: 336-292-4190 E-mail: <u>dennismanchester@freightliner.com</u> Contact: Scott Smith Phone: 503-745-7420 E-mail: <u>scottsmith@freightliner.com</u> Web site: <u>http://www.freightliner.com</u>/

#### **Goshen Coach**

Contact: Ed Parr Phone: 574-206-7006 E-mail: <u>emparr@goshencoach.com</u> Web site: <u>http://www.goshencoach.com/</u>

#### **Heil Environmental Industries**

Contact: Larry Stone Phone: 800-824-4345 Fax: 423-855-3477 E-mail: <u>lstone@heilco.com</u> Web site: <u>http://www.heilco.com/</u>

#### **ISE Research Corp.**

Contact: Tom Bartley Phone: 619-287-8785 Fax: 619-287-8795 E-mail: <u>tbartley@isecorp.com</u> Web site: <u>http://www.iseresearch.com/</u>

#### **Jasper Engines & Transmissions**

Contact: Calvin Thorn Phone: 800-827-7455, ext. 2027 Fax: 812-634-1820 E-mail: <u>cthorn@jasperengines.com</u> Web site: http://www.jasperengines.com/

#### John Deere Power Systems

Contact: Tom Cummings Phone: 319-292-5220 Fax: 319-292-5075 Web site: http://www.deere.com/

#### **Kalmar Industries**

Contact: Ron Gage Phone: 800-982-1527 or 903-759-5490 Fax: 903-297-8166 Web site: http://www.kalmarind.com/

#### **Kenworth Trucks**

Contact: Evan Campbell Phone: 206-828-5758 Contact: Brian Lindgren Phone: 425-828-5678 E-mail: <u>blindgren@paccar.com</u> Web site: <u>http://www.kenworth.com/</u> Mack Trucks Inc. Contact: Stephen Ginter Phone: 610-709-3259 Fax: 610-709-2380 E-mail: <u>steve\_ginter@macktrucks.com</u> Web site: <u>http://www.macktrucks.com/</u>

#### McNeilus Truck Manufacturing (Division of Oshkosh Truck) Contact: Tom Harris Phone: 507-374-6321 E-mail: tharris@mcneilusco.com

Contact: James Johnston Phone: 507-374-6321 E-mail: <u>dyerhart@mcneilusco.com</u> Web site: http://www.mcneilusco.com/

#### Molly Corp.

Contact: Stillman Bradish Phone: 207-646-5908, ext. 15 Fax: 207-646-6497 E-mail: <u>sbradish@mollycorp.com</u> Web site: <u>http://www.mollycorp.com/</u>

#### **Motor Coach Industries**

Contact: John Andrews Phone: 847-285-2100 Fax: 847-285-2106 E-mail: <u>marketing@mcicoach.com</u> Contact: Lori Pontarelli E-mail: <u>lori.pontarelli@mcicoach.net</u> Web site: <u>http://www.mcicoach.com/</u>

#### Neoplan USA Corp.

Contact: James Gaspard Phone: 719-336-3256 Fax: 719-336-4201 E-mail: james.gaspard@neoplan.com Web site: http://www.neoplanusa.com/

#### **New Flyer of America**

Contact: Roger Hristovski Phone: 204-224-1251 Fax: 204-224-4214 E-mail: <u>roger\_hristovki@newflyer.com</u> Web site: http://www.newflyer.com/

#### North American Bus Industries

Contact: Richard Himes Phone: 818-610-0330 Fax: 818-610-0335 E-mail: <u>rich.himes@nabiusa.com</u> Web site: <u>http://www.nabiusa.com</u>/

#### Nova Bus Corp.

Contact: Jean-Pierre Baracat Phone: 450-974-6052 Fax: 450-974-3001 E-mail: jean-pierre.baracat@volvo.com Web site: http://www.novabus.com/ **Optima Bus (formerly Chance Coach Inc.)** Contact: Steve Kratzer Phone: 316-779-7710, ext. 344 Fax: 316-779-7727 Web site: <u>http://www.optimabus.com/</u>

#### **Orion Bus Industries**

Contact: Mark Brager Phone: 905-403-7806 Fax: 905-403-8600 E-mail: <u>mbrager@orionbus.com</u> Web site: <u>http://www.orionbus.com/</u>

#### Peterbilt Motors Co.

Contact: Bob Wood Phone: 925-556-7469 Fax: 925-556-7473 E-mail: bob.wood@paccar.com Contact: Jim Zito Phone: 940-591-4084 Web site: http://www.peterbilt.com/

#### Solectria Corp.

Contact: Doug Alderton Phone: 781-932-9009 E-mail: <u>alderton@solectria.com</u> Web site: <u>http://www.solectria.com/</u>

#### Spartan Motors Chassis Inc.

Contact: Roy Englebrecht Phone: 517-543-6400 Fax: 517-543-7728 E-mail: <u>rfengelb@spartanmotors.com</u> Web site: <u>http://www.spartanmotors.com/</u>

#### **Specialty Vehicles Inc.**

Contact: Dale DeLine Phone: 800-784-8726 Fax: 714-848-2114 E-mail: <u>dale.deline@specialtyvehicles.com</u> Web site: http://www.specialtyvehicles.com/

#### **Starcraft Bus**

Contact: Art Henderson Phone: 800-348-7440, ext. 202 E-mail: <u>ahenderson@forestriverinc.com</u> Web site: <u>http://www.forestriverinc.com/</u>

#### Startrans Bus Division/Supreme Corp.

Contact: Samuel Craig Phone: 877-258-1391 Fax: 574-642-4108 E-mail: <u>sam.craig@startransbus.com</u> Web site: <u>http://www.startransbus.com/</u>

#### Sterling Truck Corp./Western Star Trucks

Contact: Jim Crowcroft Phone: 440-269-5597 Fax: 440-269-5979 E-mail: jimcrowcroft@sterlingtrucks.com/ Web site: http://www.sterlingtrucks.com/ Thomas Built Buses Contact: Ken Heagecock Phone: 336-889-4871 Fax: 336-841-5734 Web site: http://www.thomasbus.com/

#### TransTeq

Contact: Dale Hill Phone: 303-382-1041 Fax: 303-297-3990 E-mail: <u>dale.hill@transteq.com</u> Web site: http://www.transteq.com/

#### **Trolley Enterprises Inc.**

Contact: Joe Perez Phone: 954-429-3100 Fax: 954-429-3307 Web site: <u>http://www.trolleyenterprises.com/</u>

#### TYMCO Inc.

Contact: Tom Roberts Phone: 800-258-9626 or 254-799-5546 Fax: 254-799-2722 E-mail: <u>video@tymco.net</u> Web site: <u>http://www.tymco.com/</u>

#### Wittke

Contact: Rob Gnatovich Phone: 877-948-8531 Fax: 403-529-1821 E-mail: <u>robert@wittke.com</u> Web site: <u>http://www.wittke.com/</u>

# **Alternative Fuel Medium and Heavy Engines**

Alternative Fuels Technologies, L Web site: <u>http://www.altlngusa.com/</u>	LC Phone: 970-249 Dealer locator V Dealer locator V	Web site: N/A
AFT 466 NG Fuel type: CNG, LNG Displacement: 7.6 L Rated horsepower: 250 hp Peak torque: 643 ft-lb	Emission certifications: CARB Low NO <sub>x</sub> (1.4), EPA Heavy-Duty Emission control device: Yes Number of cylinders: 6 Dry weight: 800 lb Applications: Truck, transit bus, school bus, off-road	Model description: Stoichiometric closed- loop, block-learn, three-way emission control catalyst technology; single point fuel management; turbocharger wastegate; SAE J 1939 laptop serial port technology. Warranty information: Standard 2-yr parts and workmanship warranty. Other warranties available upon request of a given proposal/contract.
Paytoch Corporation	Phone: 888-229	-2447
Baytech Corporation Web site: http://www.baytechcorp.com/	Dealer locator	Web site: N/A
web site: <u>http://www.baytechcorp.com/</u>	Dealer locator	
6.0 ILEV Fuel type: CNG Displacement: 6.0 L Rated horsepower: 300 hp Peak torque: 360 ft-lb	Emission certifications: EPA ILEV (Clean Fuel Fleet) Emission control device: Yes Number of cylinders: 8 Dry weight: N/A Applications: Truck, shuttle bus	Model description: Precise CNG fuel injection with stoichiometric, closed-loop, computer-controlled emission control system; performance and fuel economy similar to base gasoline engine. Available in the following models: GM/Chevy van cutaway, C/K trucks, Isuzu NPR, W3500, Workhorse chassis. Warranty information: Same as base gasoline engine.
<b>6.0 ULEV</b> Fuel type: CNG Displacement: 6.0 L Rated horsepower: 300 hp Peak torque: 360 ft-lb	Emission certifications: EPA LEV (Clean Fuel Fleet) Emission control device: Yes Number of cylinders: 8 Dry weight: N/A Applications: Truck, shuttle bus	Model description: Precise CNG fuel injection with stoichiometric, closed-loop, computer-controlled emission control system; performance and fuel economy similar to base gasoline engine. Available in the following models: GM/Chevy van cutaway, C/K trucks, Isuzu NPR, W3500, Workhorse chassis. Warranty information: Same as base gasoline engine.
<b>5.7 ILEV</b> Fuel type: CNG Displacement: 5.7 L Rated horsepower: 211 hp Peak torque: 275 ft-lb	Emission certifications: CARB Low NO <sub>x</sub> (1.3), EPA ILEV (Clean Fuel Fleet) Emission control device: Yes Number of cylinders: 8 Dry weight: N/A Applications: Truck, shuttle bus, street sweeper	Model description: Precise CNG fuel injection with stoichiometric, closed-loop, computer-controlled emission control system; performance and fuel economy similar to base gasoline engine. Available in the following models: Isuzu NPR, GM W3500/4500, P chassis, Workhorse chassis, van cutaway. Warranty information: Same as base gasoline engine.

5.7 ULEV Fuel type: CNG Displacement: 5.7 L Rated horsepower: 211 hp Peak torque: 275 ft-lb	Emission certifications: CARB Low NO <sub>x</sub> (1.3), EPA ULEV (Clean Fuel Fleet) Emission control device: Yes Number of cylinders: 8 Dry weight: N/A Applications: Truck, shuttle bus, street sweeper	Model description: Precise CNG fuel injection with stoichiometric, closed-loop, computer-controlled emission control system; performance and fuel economy similar to base gasoline engine. Available in the following models: Isuzu NPR, GM W3500/4500, P chassis, Workhorse chassis, van cutaway. Warranty information: Same as base gasoline engine.
<b>4.3 ILEV</b> Fuel type: CNG Displacement: 4.3 L Rated horsepower: 118 hp Peak torque: 184 ft-lb	Emission certifications: EPA ILEV (Clean Fuel Fleet) Emission control device: Yes Number of cylinders: 6 Dry weight: N/A Applications: Truck	Model description: Precise CNG fuel injection with stoichiometric, closed-loop, computer-controlled emission control system; performance and fuel economy similar to base gasoline engine. Available in the following models: P chassis and Workhorse chassis, step vans. Warranty information: Same as base gasoline engine.
Clean Air Power/Caterpillar	Phone: 858-332-4 Dealer locator We	
Web site: http://www.cleanairpower.com/	Dealer locator ph	one: N/A
Dual-Fuel C12 Fuel type: CNG, LNG Displacement: 12.0 L Rated horsepower: 410 hp Peak torque: 1,250 ft-lb	Emission certifications: CARB Low NO <sub>x</sub> (2.5) Emission control device: Yes Number of cylinders: 6 Dry weight: 2,035 lb Applications: Truck, transit bus, school bus, off-road	Model description: The Dual-Fuel system operates primarily on natural gas with diesel fuel acting as the ignition source; if the natural gas fuel supply is interrupted, the engine can continue to operate on diesel for safe return to a fueling site. Warranty information: Warranty period from date of delivery to the first user is the longer of 12 months, or the balance of the limited warranty provided by Caterpillar, Inc. on the engine for which the Dual Fuel system is being supplied; provided, however, that no such warranty period exceeds 24 months.
Dual-Fuel C10 Fuel type: CNG, LNG Displacement: 10.3 L Rated horsepower: 315 hp Peak torque: 1,050 ft-lb	Emission certifications: CARB Low NO <sub>x</sub> (2.5) Emission control device: Yes Number of cylinders: 6 Dry weight: 2,015 lb Applications: Truck, transit bus, school bus, off-road	Model description: The Dual-Fuel system operates primarily on natural gas with diesel fuel acting as the ignition source; if the natural gas fuel supply is interrupted, the engine can continue to operate on diesel for safe return to a fueling site. Warranty information: Warranty period from date of delivery to the first user is the longer of 12 months, or the balance of the limited warranty provided by Caterpillar, Inc. on the engine for which the Dual Fuel system is being supplied; provided, however, that no such warranty period exceeds 24 months.

Dual-Fuel 3126 Fuel type: CNG, LNG Displacement: 7.2 L Rated horsepower: 250 hp Peak torque: 660 ft-lb	Emission certifications: CARB Low NO <sub>x</sub> (2.5) Emission control device: Yes Number of cylinders: 6 Dry weight: 1,450 lb Applications: Truck, transit bus, school bus, trolley, shuttle bus, off- road	Model description: The Dual-Fuel system operates primarily on natural gas with diesel fuel acting as the ignition source; if the natural gas fuel supply is interrupted, the engine can continue to operate on diesel for safe return to a fueling site. Warranty information: 36 mo/150,000 mi (243,000 km)/3,600 operating hours, whichever occurs first after date of delivery to the first user.
Cummins Westport Inc. Web site: <u>http://www.cumminswestport.com/</u>		100 eb site: <u>http://www.cumminswestport.com/</u> one: 604-718-8100
<b>B Gas Plus—BG 230</b> Fuel type: CNG, LNG Displacement: 5.9 L Rated horsepower: 230 hp Peak torque: 500 ft-lb	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Emission control device:</b> Yes <b>Number of cylinders:</b> 6 <b>Dry weight:</b> 1,018 lb <b>Applications:</b> Truck, school bus, trolley, shuttle bus, yard spotter, street sweeper	Model description: Full drive by wire; lean burn, spark-ignited, electronically controlled engine designed and certified to operate on natural gas. Warranty information: Bus: 2-yr full warranty with no mileage limitations extended major components coverage to 3 yr or 300,000 mi; other applications: 2 yr, full warranty, no mileage limitations.
B Gas Plus—BG 195 Fuel type: CNG, LNG Displacement: 5.9 L Rated horsepower: 195 hp Peak torque: 420 ft-lb	<b>Emission certifications:</b> CARB Low $NO_x$ (1.8), EPA Heavy-Duty <b>Emission control device:</b> Yes <b>Number of cylinders:</b> 6 <b>Dry weight:</b> 1,018 lb <b>Applications:</b> Truck, school bus, trolley, shuttle bus, yard spotters, street sweeper	Model description: Full drive by wire; lean burn, spark-ignited, electronically controlled engine designed and certified to operate on natural gas. Warranty information: Bus: 2-yr full warranty with no mileage limitations, extended major components coverage to 3 yr or 300,000 mi; other applications: 2 yr, full warranty, no mileage limitations.
B LPG Plus—BG 195 Fuel type: LPG Displacement: 5.9 L Rated horsepower: 195 hp Peak torque: 420 ft-lb	Emission certifications: EPA Heavy- Duty Emission control device: Yes Number of cylinders: 6 Dry weight: N/A Applications: Truck, school bus, trolley, shuttle bus, yard spotter, street sweeper	Model description: Full drive by wire; lean burn, spark-ignited, electronically controlled engine designed and certified to operate on HD-10 propane (LPG). Warranty information: Bus: 2-yr full warranty with no mileage limitations, extended major components coverage to 3 yr or 300,000 mi; other applications: 2 yr, full warranty, no mileage limitations.
B Gas Plus—BG 200 Fuel type: CNG, LNG Displacement: 5.9 L Rated horsepower: 200 hp Peak torque: 465 ft-lb	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty Emission control device: Yes Number of cylinders: 6 Dry weight: 1,018 lb Applications: Truck, school bus, trolley, shuttle bus, yard spotter, street sweeper	Model description: Full drive by wire; lean burn, spark-ignited, electronically controlled engine designed and certified to operate on natural gas; Euro 3 emission certification. Warranty information: Bus: 2-yr full warranty with no mileage limitations, extended major components coverage to 3 yr or 300,000 mi; other applications: 2 yr, full warranty, no mileage limitations.

C Gas Plus—CG 250 Fuel type: CNG, LNG Displacement: 8.3 L Rated horsepower: 250 hp Peak torque: 660 ft-lb	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Emission control device:</b> Yes <b>Number of cylinders:</b> 6 <b>Dry weight:</b> 1,330 lb <b>Applications:</b> Truck, school bus, trolley, shuttle bus, refuse truck	Model description: Full drive by wire; lean burn, spark-ignited, electronically controlled engine designed and certified to operate on natural gas; Euro 3 emission certification. Warranty information: Bus: 2-yr full warranty with no mileage limitations, extended major components coverage to 3 yr or 300,000 mi; other applications: 2 yr/100,000 mi full warranty.
C Gas Plus—CG 275 Fuel type: CNG, LNG Displacement: 8.3 L Rated horsepower: 275 hp Peak torque: 750 ft-lb	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Emission control device:</b> Yes <b>Number of cylinders:</b> 6 <b>Dry weight:</b> 1,330 lb <b>Applications:</b> Truck, transit bus, school bus, shuttle bus, refuse truck	Model description: Full drive by wire; lean burn, spark-ignited, electronically controlled engine designed and certified to operate on natural gas; Euro 3 emission certification. Warranty information: Bus: 2-yr full warranty with no mileage limitations, extended major components coverage to 3 yr or 300,000 mi; other applications: 2 yr/100,000 mi full warranty.
C Gas Plus—CG 280 Fuel type: CNG, LNG Displacement: 8.3 L Rated horsepower: 280 hp Peak torque: 850 ft-lb	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Emission control device:</b> Yes <b>Number of cylinders:</b> 6 <b>Dry weight:</b> 1,330 lb <b>Applications:</b> Truck, transit bus, school bus, refuse truck	Model description: Full drive by wire; lean burn, spark-ignited, electronically controlled engine designed and certified to operate on natural gas; Euro 3 emission certification. Warranty information: Bus: 2-yr full warranty with no mileage limitations, extended major components coverage to 3 yr or 300,000 mi; other applications: 2 yr/100,000 mi full warranty.
Detroit Diesel Corp. Web site: <u>http://www.detroitdiesel.com/</u>	Dealer locator p	-5000 Web site: <u>http://www.detroitdiesel.com/</u> phone: 313-592-5000
Series 50G Fuel type: CNG, LNG Displacement: 8.5 L Rated horsepower: 275 hp Peak torque: 900 ft-lb	<b>Emission certifications:</b> CARB Low NOx (1.2), EPA Heavy-Duty <b>Emission control device:</b> No <b>Number of cylinders:</b> 4 <b>Dry weight:</b> 2,479 lb <b>Applications:</b> Transit bus	<b>Model description:</b> Certified to 1.2g/hp-h NO <sub>x</sub> + NMHC. <b>Warranty information:</b> 2-yr/unlimited miles.
Jasper Alternate Fuels Web site: <u>http://www.jasperengines.com/</u>	Phone: 800-827-74 Dealer locator We Dealer locator pho	eb site: N/A
Jasper 466 Fuel type: CNG Displacement: 7.6 L Rated horsepower: 250 hp Peak torque: 632 ft-lb	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (2.5), EPA ULEV (Clean Fuel Fleet) <b>Emission control device:</b> Yes <b>Number of cylinders:</b> 6 <b>Dry weight:</b> 1,600 lb <b>Applications:</b> Truck, transit bus, school bus, trolley, shuttle bus	Model description: AFT 466 natural gas assembly, advanced air delivery system, portal injection, remanufactured for Alternative Dual Fuels Inc. (806- 355-5679). Warranty information: See http://www.jasperengines.com./

John Deere Power Systems Web site: <u>http://www.johndeere.com/</u>	Dealer locator ph	eb site: http://www.johndeere.com/
6081H 250 Fuel type: CNG Displacement: 8.1 L Rated horsepower: 250 hp Peak torque: 800 ft-lb	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Emission control device:</b> Yes <b>Number of cylinders:</b> 6 <b>Dry weight:</b> 1,470 lb <b>Applications:</b> School bus	<ul> <li>Model description: Adaptive-learn system maintains peak performance. Closed-loop control system monitors combustion efficiency. Oil change intervals up to 25,000 miles.</li> <li>Warranty information: School bus applications: 5 yr or 100,000 mi. Commercial bus: 2 yr, unlimited miles. Extended warranty also available.</li> </ul>
6081H 275 Fuel type: CNG Displacement: 8.1 L Rated horsepower: 275 hp Peak torque: 800 ft-lb	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Emission control device:</b> Yes <b>Number of cylinders:</b> 6 <b>Dry weight:</b> 1,470 lb <b>Applications:</b> Refuse truck	<ul> <li>Model description: Adaptive-learn system maintains peak performance. Closed-loop control system monitors combustion efficiency. Oil change intervals up to 25,000 miles.</li> <li>Warranty information: Refuse truck: 2 yr or 150,000 mi, whichever occurs first. Extended warranty is also available.</li> </ul>
6081H 280 Fuel type: CNG Displacement: 8.1 L Rated horsepower: 280 hp Peak torque: 900 ft-lb	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Emission control device:</b> Yes <b>Number of cylinders:</b> 6 <b>Dry weight:</b> 1,470 lb <b>Applications:</b> Transit bus, refuse truck	<ul> <li>Model description: Adaptive-learn system monitors peak performance. Closed-loop control system monitors combustion efficiency. Oil change intervals up to 25,000 miles.</li> <li>Warranty information: Transit bus: 2 years, unlimited miles, whichever occurs first. Refuse truck: 2 yr or 150,000 mi, whichever occurs first. Extended warranty is also available.</li> </ul>
	Phone: 610-709-3	
Mack Trucks, Inc. Web site: <u>http://www.macktrucks.com/</u>	Dealer locator We http://www.macktr Dealer locator ph	rucks.com/default.aspx?pageid=8
Eco-Tech E7G 325 Fuel type: CNG, LNG Displacement: 12 L Rated horsepower: 325 hp Peak torque: 1,050 ft-lb	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (2.4), EPA Heavy-Duty <b>Emission control device:</b> No <b>Number of cylinders:</b> 6 <b>Dry weight:</b> 2,100 lb <b>Applications:</b> Truck	Model description: Closed-loop, lean- burn electronic engine. Inductive, direct- fire ignition, coil-on-plug design without external spark plug wires. Compression ratio of 11.5:1 with wastegate turbo for excellent fuel economy. Warranty information: 3-yr/300,000- mi warranty with 5-yr/500,000-mi warranty on major components. Custom warranties available.

# **Natural Gas and Propane Medium and Heavy Vehicles**

	Phone: 765-4	89-5499	
Autocar LLC	Dealer locator Web site: N/A		
Web site: http://www.autocartruck.com/ Xpeditor Applications: Truck Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 280 Transmission makes/models: Allison MD/HD Transmission type: Automatic	Dealer locatoEmission certifications: CARB LowNOx (1.8), EPA ULEV (Clean FuelFleet), EPA Heavy-DutyFuel capacity: N/AEstimated driving range: N/AGVW: 66,000 lbSeating capacity:2	<ul> <li><b>br phone:</b> N/A</li> <li><b>Model description:</b> Fuel tanks provided by the body manufacturer, not Autocar; capacity and driving range cannot be addressed.</li> <li><b>Warranty information:</b> Contact Herb Cooper, Service and Warranty Manager (765-489-6039) or Barry Bledsoe, Service and Warranty Administrator (765-489- 6032).</li> </ul>	
Blue Bird Corp. Web site: <u>http://www.blue-bird.com/</u>	bird.com/dist	or Web site: <u>http://www.blue-</u>	
<b>CSFE Commercial Series</b> Applications: Transit bus, shuttle bus Fuel type: CNG, LNG Engine makes/models: Cummins Westport B Gas Plus—BG 230 Transmission makes/models: Allison MT643, B300, B300R Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty Fuel capacity: N/A Estimated driving range: N/A GVW: 30,000 lb Seating capacity: 49	Model description: Front-engine transit or shuttle bus. Warranty information: N/A	
Xcel 102 Applications: Transit bus, shuttle bus Fuel type: CNG Engine makes/models: Deere 6081H 250 Transmission makes/models: Allison Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Fuel capacity:</b> N/A <b>Estimated driving range:</b> N/A <b>GVW:</b> 36,200 lb <b>Seating capacity:</b> 49	Model description: Transit or shuttle bus in lengths of 30, 35, and 40 ft with wheelbases of 150, 217, and 273 in. Warranty information: N/A	
Ultra LF Series Applications: Transit bus, shuttle bus Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 230 Transmission makes/models: Allison LCT 200 Series Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty Fuel capacity: N/A Estimated driving range: N/A GVW: 28,660 lb Seating capacity: 35	Model description: Low-floor commercial transit or shuttle bus available in 30 ft (with 157-in wheelbase) and 35 ft (with 222-in wheelbase). Warranty information: N/A	
Micro Bird Applications: Shuttle bus, school bus Fuel type: CNG Engine makes/models: Ford VRG 220 Transmission makes/models: N/A Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (0.5), EPA ULEV (Clean Fuel Fleet) Fuel capacity: 2,250 scf Estimated driving range: N/A GVW: 14,050 lb Seating capacity: 30	Model description: Student transport shuttle on Ford E-450 super-duty chassis. Ideal for special-needs transportation. Rust-free aluminum body and roof panels. Warranty information: N/A	

<b>CS Series Rear-Engine</b> Applications: Transit bus, shuttle bus <b>Fuel type:</b> CNG <b>Engine makes/models:</b> Cummins Westport B Gas Plus—BG 230; Deere 6081H 250, 6081H 275 <b>Transmission makes/models:</b> Allison AT545, MT643, B300, B300R <b>Transmission type:</b> Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Fuel capacity:</b> N/A <b>Estimated driving range:</b> N/A <b>GVW:</b> 31,000 lb <b>Seating capacity:</b> 49	Model description: Available in 32- to 39-ft transit or shuttle bus. Warranty information: N/A
All American RE Applications: School bus Fuel type: CNG Engine makes/models: Deere 6081H 250 Transmission makes/models: Allison 2000 Series Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty Fuel capacity: N/A Estimated driving range: N/A GVW: N/A Seating capacity: 84	Model description: School bus available in 66-passenger (with 189-in. wheelbase) or 84-passenger (with 273-in. wheelbase) models. Warranty information: N/A
Champion Bus, Inc.	Phone: 800-7 Dealer locato	76-4943 r Web site: N/A
Web site: <u>http://www.championbus.com/</u>		r phone: 810-724-6474
<b>CTS</b> <b>Applications:</b> Transit bus, shuttle bus <b>Fuel type:</b> LNG <b>Engine makes/models:</b> Cummins Westport B Gas Plus—BG 195 <b>Transmission makes/models:</b> Allison 2000 <b>Transmission type:</b> Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty Fuel capacity: 36 gal Estimated driving range: 300 mi GVW: 25,500 lb Seating capacity: 32	<ul> <li>Model description: Built on a Freightliner rail chassis with a custom design bus body unique to Champion. Meets all ADA requirements.</li> <li>Warranty information: Body: 5- yr/75,000 mi. Contact: Dick Cutcher (810- 724-6474).</li> </ul>
CTS Applications: Transit bus, shuttle bus Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 195 Transmission makes/models: Allison 2000 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Fuel capacity:</b> 5,200 scf <b>Estimated driving range:</b> N/A <b>GVW:</b> 25,500 lb <b>Seating capacity:</b> 32	Model description: Built on a Freightliner rail chassis with a custom design bus body unique to Champion. Meets all ADA requirements. Warranty information: Body: 5- yr/75,000 mi. Contact: Dick Cutcher (810- 724-6474).
CTS Applications: Transit bus, shuttle bus Fuel type: LPG Engine makes/models: Cummins Westport B LPG Plus—BG 195 Transmission makes/models: Allison 2000 Transmission type: Automatic	Emission certifications: EPA Heavy- Duty Fuel capacity: 100 gal Estimated driving range: 300 mi GVW: 25,500 lb Seating capacity: 32	Model description: Built on a Freightliner rail chassis with a custom design bus body unique to Champion. Meets all ADA requirements. Warranty information: Body: 5- yr/75,000 mi. Contact: Dick Cutcher (810- 724-6474).
<b>Defender</b> Applications: Transit bus, shuttle bus Fuel type: CNG Engine makes/models: GM VORTEC 6000 Transmission makes/models: Allison 1000 Transmission type: Automatic	Emission certifications: EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 3,596 scf Estimated driving range: 175 mi GVW: 19,500 lb Seating capacity: 32	<ul> <li>Model description: Medium-duty cutaway model available on GM cutaway chassis. Built to last 7-10 yr in severe duty service. Available to meet all ADA requirements.</li> <li>Warranty information: Chassis: 3- yr/36,000-mi. Body: 5-yr/75,000-mi. Contact: Dick Cutcher (810-724-6474).</li> </ul>

<b>CTS Trolley</b> Applications: Trolley Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 230 Transmission makes/models: Allison 2000 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Fuel capacity:</b> 5,200 scf <b>Estimated driving range:</b> N/A <b>GVW:</b> 25,500 lb <b>Seating capacity:</b> 32	<ul> <li>Model description: Built on a Freightliner rail chassis with a custom design bus body unique to Champion. Meets all ADA requirements.</li> <li>Warranty information: Body: 5- year/75,000 miles. Contact: Dick Cutcher (810-724-6474).</li> </ul>
CTS Trolley Applications: Trolley Fuel type: LPG Engine makes/models: Cummins Westport B LPG Plus—BG 195 Transmission makes/models: Allison 2000 Transmission type: Automatic	Emission certifications: EPA Heavy- Duty Fuel capacity: 100 gal Estimated driving range: N/A GVW: 25,500 lb Seating capacity: 32	<ul> <li>Model description: Built on a Freightliner rail chassis with a custom design bus body unique to Champion. Meets all ADA requirements.</li> <li>Warranty information: Body: 5- yr/75,000 mi. Contact: Dick Cutcher (810- 724-6474).</li> </ul>
<b>Challenger</b> Applications: Transit bus, shuttle bus Fuel type: CNG Engine makes/models: Ford VRG 220, GM VORTEC 6000 Transmission makes/models: GM 4L80E, Ford 4R100 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (0.5), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 3,596 scf <b>Estimated driving range:</b> 175 mi <b>GVW:</b> 12,300 lb <b>Seating capacity:</b> 25	Model description: Ford or Chevrolet cutaway chassis model buses with an all- steel inner cage structure for maximum durability and protection. Available options to meet ADA. Warranty information: Chassis: 3-yr/ 36,000-mi. Body: 5-yr/75,000-mi. Contact: Dick Cutcher (810-724-6474).
<b>Challenger</b> Applications: Transit bus, shuttle bus Fuel type: LPG Engine makes/models: Ford VRG 330 Transmission makes/models: GM 4L80E, Ford 4R100 Transmission type: Automatic	Emission certifications: N/A Fuel capacity: 68 gal Estimated driving range: 300 mi GVW: 12,300 lb Seating capacity: 25	Model description: Ford or Chevrolet cutaway chassis model buses with an all- steel inner cage structure for maximum durability and protection. Available options to meet ADA. Warranty information: Chassis: 3-yr/ 36,000-mi. Body: 5-yr/75,000-mi. Contact: Dick Cutcher (810-724-6474).
<b>Crusader</b> Applications: Transit bus, shuttle bus Fuel type: LPG Engine makes/models: Ford VRG 220, GM VORTEC 6000 Transmission makes/models: GM 4L80E, Ford 4R100 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (0.5), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 68 gal Estimated driving range: 300 mi GVW: 14,050 lb Seating capacity: 25	Model description: Ford or Chevrolet cutaway chassis model buses with an all- steel inner cage structure for maximum durability and protection. Available options to meet ADA. Warranty information: Chassis: 3-yr/ 36,000-mi. Body: 5-yr/75,000-mi. Contact: Dick Cutcher (810-724-6474).
<b>Crusader</b> Applications: Transit bus, shuttle bus Fuel type: CNG Engine makes/models: Ford VRG 220, GM VORTEC 6000 Transmission makes/models: GM 4L80E, Ford 4R100 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (0.5), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 3,596 scf Estimated driving range: 175 mi GVW: 14,050 lb Seating capacity: 25	Model description: Ford or Chevrolet cutaway chassis model buses with an all- steel inner cage structure for maximum durability and protection. Available options to meet ADA. Warranty information: Chassis: 3-yr/ 36,000-mi. Body: 5-yr/75,000-mi. Contact: Dick Cutcher (810-724-6474).

Crane Carrier Company Web site: <u>http://www.cranecarrier.com/</u>	Dealer locator p	Veb site: <u>http://www.cranecarrier.com/</u> hone: N/A
LCF Applications: Truck Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 280; Deere 6081H 275, 6081H 280 Transmission makes/models: Allison MD3560P, HD4560P Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 9,625 scf Estimated driving range: N/A GVW: 66,000 lb Seating capacity: 2	Model description: Low cab forward, tilt cab designed for refuse collection. Heavy- duty chassis with left, right, or dual steering. Front-mounted radiator, under cab. Single or tandem rear drive axles. Warranty information: Chassis: 1-yr/12,000 mi or 2,000 h; Cummins: 2 yr/12,000 mi; John Deere: 2 yr/150,000 mi; Allison: 2-yr/unlimited miles. Extended warranties available.
LCF Applications: Truck Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, C Gas Plus—CG 280 Transmission makes/models: Allison MD3560P, HD4560P Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 18,563 Estimated driving range: N/A GVW: 66,000 lb Seating capacity:2	Model description: Low cab forward, tilt cab designed for refuse collection. Heavy- duty chassis with left, right, or dual steering. Front-mounted radiator, under cab. Single or tandem rear drive axles. Warranty information: Chassis: 1-yr/12,000 mi or 2,000 h; Cummins: 2 yr/100,000 mi; John Deere: 2 yr/150,000 mi; Allison: 2-yr/unlimited miles. Extended warranties available.
LET 2 Applications: Truck Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, C Gas Plus—CG 280 Transmission makes/models: Allison MD3560P, HD4560P Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: N/A Estimated driving range: N/A GVW: 66,000 lb Seating capacity: 5	Model description: Low entry (both sides) tilt cab designed for refuse collection. Heavy-duty chassis with left, right, or dual steering. Remote mounted radiator, above engine and behind cab. Single or tandem rear drive axles. Warranty information: Chassis: 1-yr/12,000 mi or 2,000 h; Cummins: 2 yr/100,000 mi; John Deere: 2 yr/150,000 mi; Allison: 2-yr/unlimited miles. Extended warranties available.
LWT Applications: Truck Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 275 Transmission makes/models: Allison MD3560P, HD4560P Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: N/A Estimated driving range: 200 mi GVW: 60,000 lb Seating capacity: 2	Model description: Low entry (both sides) tilt cab designed for refuse collection. Heavy-duty frame with weight reducing aluminum components. Tank(s) on side of frame. Single or tandem rear drive axles. Warranty information: Chassis: 1-yr/12,000 mi or 2,000 h; Cummins: 2 yr/100,000 mi; John Deere: 2 yr/150,000 mi; Allison: 2-yr/unlimited miles. Extended warranties available.

LWT Applications: Truck Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, C Gas Plus—CG 280 Transmission makes/models: Allison MD3560P, HD4560P Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 9,625 scf <b>Estimated driving range:</b> 200 mi <b>GVW:</b> 60,000 lb <b>Seating capacity:</b> 2	Model description: Low entry (both sides) tilt cab designed for refuse collection. Heavy-duty frame with weight reducing aluminum components. Tank(s) on side of frame, above frame behind cab or on refuse body. Single or tandem rear- drive axles. Warranty information: Chassis: 1-yr/12,000 mi or 2,000 h; Cummins: 2 yr/100,000 mi; John Deere: 2 yr/150,000 mi; Allison: 2-yr/unlimited miles. Extended warranties available.
El Dorado National	Phone: 800-3	
Web site: http://www.enconline.com/		or Web site: N/A
MST 2 Applications: Transit bus Fuel type: LPG Engine makes/models: Cummins Westport B LPG Plus—BG 195 Transmission makes/models: Allison Series 2000 Transmission type: Automatic	Emission certifications: EPA Heavy- Duty Fuel capacity: 100 gal Estimated driving range: 300 mi GVW: 25,500 lb Seating capacity: 28	or phone: N/A         Model description: 26-30 ft conventional floor body on chassis. Front engine.         Warranty information: Contact Robert Mendoza (909-591-9557).
MST 2 Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 230 Transmission makes/models: Allison Series 2000 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Fuel capacity:</b> 7,462 scf <b>Estimated driving range:</b> 200 mi <b>GVW:</b> 25,500 lb <b>Seating capacity:</b> 28	Model description: 26-30 ft conventional floor body on chassis. Front engine. Warranty information: Contact Robert Mendoza (909-591-9557).
Transmark Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 250 Transmission makes/models: Allison B300R Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 12,092 scf <b>Estimated driving range:</b> 300 mi <b>GVW:</b> 29,800 lb <b>Seating capacity:</b> 32	Model description: 30-32 ft conventional floor, body on chassis. Warranty information: Contact Robert Mendoza (909-591-9557).
<b>Transmark</b> Applications: Transit bus Fuel type: LPG Engine makes/models: Cummins Westport B LPG Plus—BG 195 Transmission makes/models: Allison B300R Transmission type: Automatic	Emission certifications: EPA Heavy- Duty Fuel capacity: 84 gal Estimated driving range: 300 mi GVW: 29,800 lb Seating capacity: 32	<ul> <li>Model description: 30-32 ft conventional floor, body on chassis. Rear engine. Front control.</li> <li>Warranty information: Contact Robert Mendoza (909-591-9557).</li> </ul>

<b>Transmark</b> Applications: Transit bus Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 280 Transmission makes/models: Allison B300R Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 112 gal <b>Estimated driving range:</b> 300 mi <b>GVW:</b> 29,800 lb <b>Seating capacity:</b> 32	Model description: 30-32 ft conventional floor, body on chassis. Warranty information: Contact Robert Mendoza (909-591-9557).
<b>EZ-Rider 2</b> Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 250 Transmission makes/models: Allison B300R Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 12,092 scf <b>Estimated driving range:</b> 300 mi <b>GVW:</b> 31,800 lb <b>Seating capacity:</b> 29	Model description: 30-ft low-floor. Rear engine. Warranty information: Contact Robert Mendoza (909-591-9557).
<b>EZ-Rider 2</b> Applications: Transit bus Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 280 Transmission makes/models: Allison B300R Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 210 gal <b>Estimated driving range:</b> 250 mi <b>GVW:</b> 34,000 lb <b>Seating capacity:</b> 29	Model description: 30-ft low-floor. Warranty information: Contact Robert Mendoza (909-591-9557).
Axess Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 280 Transmission makes/models: Allison B400R Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 24,184 scf <b>Estimated driving range:</b> 400 mi <b>GVW:</b> 43,420 lb <b>Seating capacity:</b> 43	Model description: Low-floor, 40-ft transit bus. Roof-mounted CNG tanks. Warranty information: Contact Robert Mendoza (909-591-9557).
Axess Applications: Transit bus Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 280 Transmission makes/models: Allison B400R Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 238 gal <b>Estimated driving range:</b> 400 mi <b>GVW:</b> 43,420 lb <b>Seating capacity:</b> 43	Model description: 40-ft, low-floor. Rear engine. Warranty information: Contact Robert Mendoza (909-591-9557).
Elgin Sweeper Company Web site: <u>http://www.elginsweeper.com/</u>		41-5370 r Web site: <u>http://www.elginsweeper.com/</u> r phone: 847-741-5370
Broom Bear Applications: Street sweeper Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 250 Transmission makes/models: Allison MD3560 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 7,280 scf Estimated driving range: N/A GVW: 33,000 lb Seating capacity: 2	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 7,280 scf Estimated driving range: N/A GVW: 33,000 lb Seating capacity: 2

Broom Bear Applications: Street sweeper Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 250 Transmission makes/models: Allison MD3560 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> N/A <b>Estimated driving range:</b> N/A <b>GVW:</b> 33,000 lb <b>Seating capacity:</b> 2	<ul> <li>Model description: Mechanical broom- type street sweeper. 10-ft wide sweep path, 4.5-yd<sup>3</sup> hopper with variable height side dump from ground level to 10-ft, 2-in. Fully dual control FL70 conventional chassis.</li> <li>Warranty information: One year parts and labor.</li> </ul>
Crosswind Applications: Street sweeper Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 195 Transmission makes/models: Allison 2000 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Fuel capacity:</b> 7,839 scf <b>Estimated driving range:</b> N/A <b>GVW:</b> 32,000 lb <b>Seating capacity:</b> 2	Model description: Regenerative air-type street sweeper, 12-ft wide sweep path, 8- yd <sup>3</sup> rear dump hopper. Fully dual control. SC8000 cab-over chassis or FL70 conventional chassis. Warranty information: One year parts and labor.
<b>Crosswind</b> Applications: Street sweeper Fuel type: LPG Engine makes/models: Cummins Westport B LPG Plus—BG 195 Transmission makes/models: Allison 2000 Transmission type: Automatic	Emission certifications: EPA Heavy- Duty Fuel capacity: N/A Estimated driving range: N/A GVW: 32,000 lb Seating capacity: 2	Model description: Regenerative air-type street sweeper, 12-ft wide sweep path, 8- yd <sup>3</sup> rear dump hopper. Fully dual control. SC8000 cab-over chassis or FL70 conventional chassis. Warranty information: One year parts and labor.
Eagle Applications: Street sweeper Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 195 Transmission makes/models: Allison 2000 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Fuel capacity:</b> 7,839 scf <b>Estimated driving range:</b> N/A <b>GVW:</b> 32,000 lb <b>Seating capacity:</b> 2	<b>Model description:</b> Mechanical broom- type sweeper, 10-ft wide sweep path, 4.5- yd <sup>3</sup> hopper with variable height, side dump from ground level to 10-ft, 2-in Fully dual control SC8000 cab-over chassis or FL70 conventional chassis. <b>Warranty information:</b> One year parts and labor.
<b>Eagle</b> Applications: Street sweeper Fuel type: LPG Engine makes/models: Cummins Westport B LPG Plus—BG 195 Transmission makes/models: Allison 2000 Transmission type: Automatic	Emission certifications: EPA Heavy- Duty Fuel capacity: N/A Estimated driving range: N/A GVW: 32,000 lb Seating capacity: 2	<b>Model description:</b> Mechanical broom- type sweeper, 10-ft wide sweep path, 4.5- yd <sup>3</sup> hopper with variable height, side dump from ground level to 10-ft, 2-in Fully dual control SC8000 cab-over chassis or FL70 conventional chassis. <b>Warranty information:</b> One-year parts and labor.
Ford Motor Co. Web site: <u>http://www.fleet.ford.com/</u>		58-3835 r Web site: <u>http://www.fleet.ford.com/</u> r phone: 877-258-3835
<b>E-450 Cutaway</b> Applications: Shuttle bus, truck, school bus Fuel type: CNG Engine makes/models: Ford VRG 220 Transmission makes/models: Ford Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (0.5), EPA ULEV (Clean Fuel Fleet) Fuel capacity: 2,313 scf Estimated driving range: 150 mi GVW: 14,050 lb Seating capacity: N/A	<ul> <li>Model description: Super-duty cutaway for shuttle, small school bus, and small truck applications. Available with 158-in. and 176-in. wheelbase.</li> <li>Warranty information: Standard new vehicle limited warranty.</li> </ul>

Freightliner Custom Chassis Web site: <u>http://www.freightlinerchassis.com</u>	n/ Dealer locator Dealer locator Dealer locator Dealer locator Dealer locator Dealer locator p	Web site: N/A
MB55 Commercial Bus Chassis Applications: Transit bus, shuttle bus, trolley Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 195 Transmission makes/models: Allison 2000 Series Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty Fuel capacity: 6,000 scf Estimated driving range: 300 mi GVW: 25,500 lb Seating capacity: N/A	Model description: The MB55 offers a 4- and 5-tank CNG option. Warranty information: Contact 1-800- FTL-HELP.
MB55 Commercial Bus Chassis Applications: Transit bus, shuttle bus, trolley Fuel type: LPG Engine makes/models: Cummins Westport B LPG Plus—BG 195 Transmission makes/models: Allison 2000 Series Transmission type: Automatic	Emission certifications: EPA Heavy- Duty Fuel capacity: N/A Estimated driving range: 300 mi GVW: 25,500 lb Seating capacity: N/A	<b>Model description:</b> N/A <b>Warranty information:</b> Contact 1-800- FTL-HELP.
General Motors Web site: <u>http://www.gm.com/</u>	Phone: N/A Dealer locator Dealer locator	
GMC Savana Cutaway (dedicated) Applications: Shuttle bus, truck Fuel type: CNG Engine makes/models: GM VORTEC 6000 Transmission makes/models: N/A Transmission type: Automatic	Emission certifications: EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: N/A Estimated driving range: 320 mi GVW: 12,300 lb Seating capacity: N/A	Model description: Cutaway van with wheelbases of 139 and 159 in. Four-speed automatic transmission. Onboard fuel capacity of 29.7 GGE @ 3,600 psi. Warranty information: Standard.
GMC Savana Cutaway (bi-fuel) Applications: Shuttle bus, truck Fuel type: CNG Engine makes/models: GM VORTEC 6000 Bi-fuel Transmission makes/models: N/A Transmission type: Automatic	Emission certifications: EPA ULEV (Clean Fuel Fleet) Fuel capacity: N/A Estimated driving range: N/A GVW: 12,300 lb Seating capacity: N/A	Model description: Cutaway van with wheelbases of 139 and 159 in. Four-speed automatic transmission. CNG/gasoline engine. Warranty information: Standard.
Chevrolet Express Cutaway (dedicated) Applications: Shuttle bus, truck Fuel type: CNG Engine makes/models: GM VORTEC 6000 Transmission makes/models: N/A Transmission type: Automatic	Emission certifications: EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: N/A Estimated driving range: 320 mi GVW: 12,300 lb Seating capacity: N/A	Model description: Cutaway van with wheelbases of 139 and 159 in. Four-speed automatic transmission. Onboard fuel capacity of 29.7 GGE @ 3,600 psi. Warranty information: Standard.

Chevrolet Express Cutaway (bi- fuel) Applications: Shuttle bus, truck Fuel type: CNG Engine makes/models: GM VORTEC 6000 Bi-fuel Transmission makes/models: N/A Transmission type: Automatic	Emission certifications: EPA ULEV (Clean Fuel Fleet) Fuel capacity: N/A Estimated driving range: N/A GVW: 12,300 lb Seating capacity: N/A	Model description: Cutaway van with wheelbases of 139 and 159 in. Four-speed automatic transmission. CNG/gasoline engine. Warranty information: Standard.
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Cashan Casah	Phone: 574-264-7511
Goshen Coach	Dealer locator Web site: http://www.goshencoach.com/
Web site: http://www.goshanoogh.gom/	Dealer locator web site. <u>http://www.goshencouch.com/</u>

XX7-1	Dealer locato	web site. <u>http://www.gosheneoaen.com/</u>
Web site: <u>http://www.goshencoach.com/</u>	Dealer locato	r phone: N/A
GC 2 CNG Applications: Shuttle bus Fuel type: CNG Engine makes/models: Ford VRG 220 Transmission makes/models: Ford 4R100 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (0.5), EPA ULEV (Clean Fuel Fleet) Fuel capacity: 15,400 scf Estimated driving range: 200 mi GVW: 14,050 lb Seating capacity: 15	Model description: Shuttle bus built on Ford E-450 CNG chassis. Goshen Coach bus has been crash-tested and tested at the Federal Bus Testing Facility (Altoona test) in the 7-yr/ 200,000 mi category. Warranty information: Contact Marsha Hunt (574-264-7511).
<b>EuroShuttle</b> Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 230 Transmission makes/models: Allison 2000 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty Fuel capacity: 20,625 scf Estimated driving range: 200 mi GVW: 25,500 lb Seating capacity: 26	Model description: Front-engine rear- drive medium-duty bus built on a Freightliner MB55 CNG chassis. Warranty information: Contact Marsha Hunt (574-264-7511).

Kalmar Industries Corp. Web site: http://www.magnumterminaltractor	Phone: 903-7: Dealer locato Dealer locato Dealer locato	r Web site: N/A
<b>PT-122/ST102</b> Applications: Terminal tractor Fuel type: LPG Engine makes/models: Cummins Westport B LPG Plus—BG 195 Transmission makes/models: Allison MD 3060 Transmission type: Automatic	Emission certifications: EPA Heavy- Duty Fuel capacity: 46 gal Estimated driving range: 200 mi GVW: 17,000 lb Seating capacity: 1	Model description: Purpose-built vehicle for moving travelers and containers. Warranty information: Contact Ricardo Jaramillo (903-759-5490).

Mack Trucks, Inc. Web site: <u>http://www.macktrucks.com/</u>	Phone: 610-709 Dealer locator <u>http://www.mac</u>	
	Dealer locator	phone: N/A
MR Applications: Truck, MR Tractor Fuel type: LNG Engine makes/models: Mack Eco-Tech E7G-325 Transmission makes/models: Allison HD4560 5 or 6 speed Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (2.4), EPA Heavy-Duty Fuel capacity: 150 gal Estimated driving range: 300 mi GVW: 80,000 lb Seating capacity: 2	Model description: For refuse, concrete pumping, fuel oil delivery, and block truck applications. Warranty information: Engine: 3-yr/ 300,000-mi; major components: 5- yr/500,000-mi; custom warranties available with the best standard warranties in the industry.

LE Applications: Truck Fuel type: LNG Engine makes/models: Mack Eco-Tech E7G-325 Transmission makes/models: Allison HD4560 5 or 6 speed Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (2.4), EPA Heavy-Duty <b>Fuel capacity:</b> 150 gal <b>Estimated driving range:</b> 300 mi <b>GVW:</b> 80,000 lb <b>Seating capacity:</b> 2	Model description: Dual steer refuse chassis. Available options include front, side, and rear load refuse bodies. The LE chassis is also available with a drop frame for manual side loading. LNG fuel system is factory-installed option. Warranty information: Engine: 3-yr/ 300,000-mi; major components: 5- yr/500,000-mi; custom warranties available with the best standard warranties in the industry.
Neoplan USA Corporation Web site: <u>http://www.neoplanusa.com/</u>	Phone: 719-33 Dealer locator Dealer locator	Web site: N/A
AN 460LF Applications: Transit bus, commuter bus Fuel type: CNG Engine makes/models: Detroit Diesel Series 60G 400, Series 60G 330 Transmission makes/models: Allison B500 R Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (2.5), EPA Heavy-Duty <b>Fuel capacity:</b> 22,000 scf <b>Estimated driving range:</b> 300 mi <b>GVW:</b> 67,000 lb <b>Seating capacity:</b> 57	Model description: 60-ft, low-floor; commuter or city transit interior. Articulated. Warranty information: Standard.
AN 440LF Applications: Transit bus, airport shuttle Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, Detroit Diesel Series 50G Transmission makes/models: Allison B400R Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 22,000 scf Estimated driving range: 300 mi GVW: 42,000 lb Seating capacity: 36	Model description: 40-ft, low-floor. Warranty information: Standard.
New Flyer of America	Phone: 204-224 Dealer locator	4-1251 Web site: <u>http://www.newflyer.com/</u>
Web site: <u>http://www.newflyer.com/</u>	Dealer locator	
<b>C30LF</b> Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 250 Transmission makes/models: Allison B300R Transmission type: Either	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 12,092 scf <b>Estimated driving range:</b> 350 mi <b>GVW:</b> 38,000 lb <b>Seating capacity:</b> 25	<ul> <li>Model description: The C30LF is a 30-ft, heavy-duty low-floor transit bus that has been fully tested, proven and is ready to move people to their destinations through any temperature or weather extreme found in North America.</li> <li>Warranty information: Standard warranties apply with option of purchasing extended warranty.</li> </ul>
C35LF Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, Detroit Diesel Series 50G Transmission makes/models: Allison B400R Transmission type: Either	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 18,138 scf Estimated driving range: 350 mi GVW: 39,500 lb Seating capacity: 30	<ul> <li>Model description: The C35LF is a 35-ft heavy-duty low-floor transit bus that has been designed to reduce emissions in a durable and proven platform.</li> <li>Warranty information: Standard warranties apply with option of purchasing extended warranty.</li> </ul>

<b>C40LF</b> Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, Detroit Diesel Series 50G Transmission makes/models: Allison B400R Transmission type: Either	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 21,161 scf Estimated driving range: 350 mi GVW: 40,600 lb Seating capacity: 40	Model description: The C40LF is a 40-ft heavy-duty transit vehicle that set the standard in the low floor urban transit industry. Warranty information: Standard warranties apply with option of purchasing extended warranty.
North American Bus Industries Web site: <u>http://www.nabiusa.com/</u>	, Inc. (NABI) Dealer locator Dealer locator	Web site: N/A
<b>35 LFW</b> Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, Detroit Diesel Series 50G Transmission makes/models: Allison B400R, ZF HP592 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 18,000 scf Estimated driving range: 350 mi GVW: 41,150 lb Seating capacity: 30	Model description: 35-ft low-floor heavy- duty city transit bus with one or two passenger doors. Choice of seats, passenger windows, interior trim, HVAC, etc. Warranty information: Provided upon request.
<b>35 LFW</b> Applications: Transit bus Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, Detroit Diesel Series 50G Transmission makes/models: Allison B400R, ZF HP592 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 408 gal Estimated driving range: 350 mi GVW: 41,150 lb Seating capacity: 30	Model description: 35-ft low-floor heavy- duty city transit bus with one or two passenger doors. Choice of seats, passenger windows, interior trim, HVAC, etc. Warranty information: Provided upon request.
<b>40 LFW</b> Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 250, C Gas Plus—CG 275, C Gas Plus—CG 280; Detroit Diesel Series 50G Transmission makes/models: Allison B400R, ZF HP592 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 24,000 scf Estimated driving range: 350 mi GVW: 41,150 lb Seating capacity: 40	Model description: 40-ft, low-floor heavy-duty city transit bus with one or two passenger doors. Choice of seats, passenger windows, interior trim, HVAC, etc. Warranty information: Provided upon request.
<b>40 LFW</b> Applications: Transit bus Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, Detroit Diesel Series 50G Transmission makes/models: Allison B400R, ZF HP592 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 408 gal Estimated driving range: 350 mi GVW: 41,150 Seating capacity: 40	Model description: 40-ft low-floor heavy- duty city transit bus with one or two passenger doors. Choice of seats, passenger windows, interior trim, HVAC, etc. Warranty information: Provided upon request.

<b>40C-LFW</b> Applications: Transit bus Fuel type: LNG Engine makes/models: C Gas Plus—CG 275, Detroit Diesel Series 50G Transmission makes/models: Allison B400R, ZF HP592 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 408 gal <b>Estimated driving range:</b> 350 mi <b>GVW:</b> 39,150 lb <b>Seating capacity:</b> 40	Model description: 40-ft, all-compositelow-floor, heavy-duty city transit bus withone or two passenger doors. Choice ofseats, passenger windows, interior trim,HVAC, etc.Warranty information: Provided uponrequest.
<b>40C-LFW</b> Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, Detroit Diesel Series 50G Transmission makes/models: Allison B400R, ZF HP592 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 24,000 scf <b>Estimated driving range:</b> 350 mi <b>GVW:</b> 39,150 lb <b>Seating capacity:</b> 40	Model description: 40-ft all composite low-floor, heavy-duty city transit bus with one or two passenger doors. Choice of seats, passenger windows, interior trim, HVAC, etc. Warranty information: Provided upon request.
<b>45C-LFW</b> Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, Detroit Diesel Series 50G Transmission makes/models: Allison B400R, ZF HP592 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 24,000 scf <b>Estimated driving range:</b> 350 mi <b>GVW:</b> 41,720 lb <b>Seating capacity:</b> 46	Model description: 45-ft, all-composite, low-floor, heavy-duty city transit bus with one or two passenger doors. Choice of seats, passenger windows, interior trim, HVAC, etc. Warranty information: Provided upon request.
<b>45C-LFW</b> Applications: Transit bus Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 275, Detroit Diesel Series 50G Transmission makes/models: Allison B400R, ZF HP592 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 408 gal Estimated driving range: 350 mi GVW: 41,720 lb Seating capacity: 46	Model description: 45-ft, all-composite, low-floor, heavy-duty city transit bus with one or two passenger doors. Choice of seats, passenger windows, interior trim, HVAC, etc. Warranty information: Provided upon request.
60 LFW Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 280 Transmission makes/models: Allison B500 R, ZF HP602 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 27,088 scf <b>Estimated driving range:</b> 350 mi <b>GVW:</b> 65,000 lb <b>Seating capacity:</b> 60	Model description: 60-ft, low-floor, heavy-duty articulated city transit bus with up to three passenger doors. Choice of seats, passenger windows, interior trim, HVAC, etc. Warranty information: Provided upon request.
60 LFW Applications: Transit bus Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 280 Transmission makes/models: Allison B500R, ZF HP602 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 408 gal <b>Estimated driving range:</b> 350 mi <b>GVW:</b> 65,000 lb <b>Seating capacity:</b> 60	Model description: 60-ft, low-floor, heavy-duty articulated city transit bus with up to three passenger doors. Choice of seats, passenger windows, interior trim, HVAC, etc. Warranty information: Provided upon request.

<b>60C-LFW</b> Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 280 Transmission makes/models: Allison B500 R, ZF HP602 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 27,088 scf Estimated driving range: 350 mi GVW: 65,000 lb Seating capacity: 60	Model description: 60-ft, BRT low-floor, heavy-duty articulated city transit bus with rail-like styling. Up to three passenger doors. Choice of seats, passenger windows, interior trim, HVAC, etc. Warranty information: Provided upon request.
60C-LFW Applications: Transit bus Fuel type: LNG Engine makes/models: Cummins Westport C Gas Plus—CG 280 Transmission makes/models: Allison B500 R, ZF HP602 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 408 gal Estimated driving range: 350 mi GVW: 65,000 lb Seating capacity: 60	Model description: 60-ft, BRT low-floor, heavy-duty articulated city transit bus with rail-like styling. Up to three passenger doors. Choice of seats, passenger windows, interior trim, HVAC, etc. Warranty information: Provided upon request.
Optima Bus Corp. Web site: <u>http://www.optimabus.com/</u>		Web site: http://www.optimabus.com/
	Dealer locator   Emission certifications: EPA Heavy-	Model description: The American
American Heritage Streetcar Applications: Trolley Fuel type: LPG Engine makes/models: Cummins Westport B LPG Plus—BG 195 Transmission makes/models: Allison Series Transmission type: Automatic	Duty Fuel capacity: 44 gal Estimated driving range: 250 mi GVW: 29,500 lb Seating capacity: 28	Heritage Streetcar from Optima Bus Corporation is a fully enclosed coach that seats up to 28 passengers with two forward-facing wheelchair positions. <b>Warranty information:</b> 1-yr complete coverage. Contact Joseph Gibson, Vice President Sales & Marketing (888-391- 1777).
American Heritage Streetcar Applications: Trolley Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 195 Transmission makes/models: Allison Series Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty Fuel capacity: 6,000 scf Estimated driving range: 250 mi GVW: 29,500 lb Seating capacity: 28	<ul> <li>Model description: The American Heritage Streetcar from Optima Bus Corporation is fully enclosed coach that seats up to 28 passengers with two forward facing wheelchair positions.</li> <li>Warranty information: 1-yr complete coverage. Contact Joseph Gibson, Vice President Sales &amp; Marketing (888-391- 1777).</li> </ul>
Orion Bus Industries	Phone: 905-4 Dealer locato	r Web site:
Web site: <u>http://www.orionbus.com/</u>		ionbus.com/orion/0,0-11-9894-1-10756-1-0- 94-0-0-0-0-0-0_00.html <b>r phone: N/A</b>
Orion VII CNG Low-Floor Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 280, Detroit Diesel Series 50G Transmission makes/models: Allison, ZF, Voith Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 21,000 scf Estimated driving range: 350 mi GVW: 42,000 lb Seating capacity: 44	Model description: The Orion VII CNG is a heavy-duty, low-floor transit bus. Designed for years of reliable service, it is manufactured by North America's most experienced CNG transit bus builder. Warranty information: N/A

Orion V CNG High-floor Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport C Gas Plus—CG 280, Detroit Diesel Series 50G Transmission makes/models: ZF, Allison, Voith Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 21,000 scf <b>Estimated driving range:</b> 350 mi <b>GVW:</b> 40,500 lb <b>Seating capacity:</b> 47	Model description: The Orion V CNG transit bus is a highly reliable, heavy-duty vehicle designed for years of service. Orion is the most experienced CNG bus manufacturer in North America. Warranty information: N/A
Peterbilt Motors Co. Web site: <u>http://www.peterbilt.com/</u>	Phone: 925-556 Dealer locator Dealer locator	Web site: <u>http://www.peterbilt.com/</u>
<b>320</b> <b>Applications:</b> Truck <b>Fuel type:</b> LNG <b>Engine makes/models:</b> Clean Air Power/Caterpillar Dual-Fuel C10; Cummins Westport C Gas Plus—CG 275, C Gas Plus—CG 280 <b>Transmission makes/models:</b> Allison/Eaton-Fuller <b>Transmission type:</b> Either	Emission certifications: CARB Low NO <sub>x</sub> (2.5), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 119 gal Estimated driving range: 300 mi GVW: 66,000 lb Seating capacity: 3	Model description: Low cab forward, LH steer or RH steer. Custom wheelbase and frame configuration. Warranty information: See www.peterbilt.com.
<b>320</b> Applications: Truck Fuel type: CNG Engine makes/models: Clean Air Power/Caterpillar Dual-Fuel C10; Cummins Westport C Gas Plus—CG 275, C Gas Plus—CG 280 Transmission makes/models: Allison/Eaton-Fuller Transmission type: Either	Emission certifications: CARB Low NO <sub>x</sub> (2.5), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty Fuel capacity: 16,362 scf Estimated driving range: 300 mi GVW: 66,000 lb Seating capacity: 3	Model description: Low cab forward, LH steer or RH steer. Custom wheelbase and frame configuration. Warranty information: See www.peterbilt.com.
Supreme/Specialty Vehicles Web site: <u>http://www.specialtyvehicles.com</u>	<u>http://www.s</u>	tor Web site: specialtyvehicles.com/
		tor phone: 800-784-8726
TR 35 RE Applications: Trolley Fuel type: CNG Engine makes/models: Clean Air Power/Caterpillar Dual-Fuel 3126 Transmission makes/models: Allison B300 Transmission type: Automatic	Emission certifications: CARB Low NOx (2.5) Fuel capacity: 21,600 scf Estimated driving range: 300 mi GVW: 31,000 lb Seating capacity: 35	Model description: Transit trolley, underfloor tanks, rear engine. Warranty information: 1-yr./50,000-mi.
Thomas Built Buses Web site: <u>http://www.thomasbus.com/</u>	Phone: 336-889-4871 Dealer locator Web site: http://www.thomasbus.com/locator/ Dealer locator phone: N/A	
Saf-T-Liner Applications: School bus Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 230, Deere 6081H 280 Transmission makes/models: Allison MD3060 Transmission type: Automatic	Emission certifications: CARB Low NOx (1.8), EPA Heavy-Duty Fuel capacity: 16,225 scf Estimated driving range: N/A GVW: 36,200 lb Seating capacity: 84	Model description: Equipped with composite CNG tanks. Warranty information: N/A

TransitLiner Applications: Transit bus Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 230, Deere 6081H 280 Transmission makes/models: Allison MD3060 Transmission type: Automatic	<b>Emission certifications:</b> CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty <b>Fuel capacity:</b> 16,225 scf <b>Estimated driving range:</b> N/A <b>GVW:</b> 36,200 lb <b>Seating capacity:</b> 45	Model description: Equipped with composite CNG tanks. Warranty information: N/A
Trolley Enterprises	Phone: 800-303	3-1493
Web site: http://www.trolleventerprises.com	Dealer locator	
web site: <u>http://www.ttoneyenterprises.com</u>	Dealer locator	
Replica Trolley (propane) Applications: Trolley Fuel type: LPG Engine makes/models: Cummins Westport B LPG Plus—BG 195 Transmission makes/models: Allison 2400 Transmission type: Automatic	Emission certifications: EPA Heavy- Duty Fuel capacity: N/A Estimated driving range: N/A GVW: 33,000 lb Seating capacity: 50	Model description: ADA-approved, Altoona-tested, Freightliner or Spartan chassis; open or enclosed coach. Warranty information: Engine: 5-yr/300,000-mi; Freightliner chassis: 3-yr/100,000-mi; Complete coach: 5-yr/250,000-mi
Replica Trolley (natural gas) Applications: Trolley Fuel type: CNG Engine makes/models: Cummins Westport B Gas Plus—BG 195 Transmission makes/models: Allison 2400 Transmission type: Automatic	Emission certifications: CARB Low NO <sub>x</sub> (1.8), EPA Heavy-Duty Fuel capacity: N/A Estimated driving range: N/A GVW: 33,000 lb Seating capacity: 50	Model description: ADA-approved, Altoona-tested, Freightliner or Spartan chassis; open or enclosed coach. Warranty information: Engine: 5-yr/300,000-mi; Freightliner chassis: 3-yr/100,000-mi; Complete coach: 5-yr/250,000-mi
TYMCO Web site: <u>http://www.tymco.com/</u>	Phone: 254-799 Dealer locator Dealer locator	
Model 600 CNG	Emission certifications: CARB Low	Model description: Freightliner FL70
Applications: Street sweeper Fuel type: CNG Engine makes/models: Baytech 5.7 ULEV, Cummins Westport C Gas Plus— CG 250 Transmission makes/models: Allison MD3060P Transmission type: Automatic	NO <sub>x</sub> (1.3), EPA ULEV (Clean Fuel Fleet), EPA Heavy-Duty <b>Fuel capacity:</b> 7,872 scf <b>Estimated driving range:</b> 100 mi <b>GVW:</b> 32,000 lb <b>Seating capacity:</b> 2	CNG, dual-steering, TYMCO-designed vertical stack fuel storage. Rear engine is Chevrolet 5.7L KEM CNG. Warranty information: 1 yr/1,000 h
Model 600 LPG Applications: Street sweeper Fuel type: LPG Engine makes/models: Cummins Westport B LPG Plus—BG 195 Transmission makes/models: Allison MD3060P Transmission type: Automatic	Emission certifications: EPA Heavy- Duty Fuel capacity: 48 gal Estimated driving range: 125 mi GVW: 32,000 lb Seating capacity: 2	Model description: Fuel tank has dual liquid port fuel system, which feeds separately to truck and auxiliary engine. Warranty information: 1 yr/1,000 h

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# Hybrid Electric and Battery Electric Heavy Vehicles

Ebus Web site: http://www.ebus.com/	Phone: 562-904-3474 Dealer locator Web site: N/A	
<b>Battery-Electric Shuttle</b> Applications: Shuttle bus Drivetrain type: Pure electric APU fuel type: N/A Battery type: Lead acid, nickel cadmium Battery voltage: N/A Battery capacity: N/A Battery weight: N/A Traction motor peak power: N/A Traction motor continuous power: N/A APU peak power: N/A	Dealer locator p Emission certification: EPA Heavy- Duty Regenerative braking: Yes Type of charger: Conductive Charge time: 8 h Discharge rate: N/A Maximum speed: 40 mph GVW: 19,500 lb Seating capacity: 22 Driving range: 90 mi	<b>Available chassis:</b> N/A <b>Available chassis:</b> N/A <b>Model Description:</b> Open-air, ADA-         compliant and Altoona-tested shuttle         vehicle. <b>Warranty information:</b> 1 yr/12,000 mi is         standard; option to extend.
<b>Battery-Electric Transit Bus</b> Applications: Transit bus, shuttle bus Drivetrain type: Pure electric APU fuel type: N/A Battery type: Lead acid, nickel cadmium Battery voltage: N/A Battery capacity: N/A Battery weight: N/A Traction motor peak power: N/A Traction motor continuous power: N/A APU peak power: N/A	Emission certification: EPA Heavy- Duty Regenerative braking: Yes Type of charger: Conductive Charge time: 8 h Discharge rate: N/A Maximum speed: 40 mph GVW: 19,500 lb Seating capacity: 22 Driving range: 90 mi	Available chassis: N/A Model Description: Low-floor, 22-ft, Altoona-tested transit bus; ADA- compliant; quiet ride. Warranty information: 1 yr/12,000 mi is standard; option to extend.
<b>Battery-Electric Trolley</b> Applications: Trolley Drivetrain type: Pure electric APU fuel type: N/A Battery type: Lead acid, nickel cadmium Battery voltage: N/A Battery capacity: N/A Battery weight: N/A Traction motor peak power: N/A Traction motor continuous power: N/A APU peak power:	Emission certification: EPA Heavy- Duty Regenerative braking: Yes Type of charger: Conductive Charge time: 8 h Discharge rate: N/A Maximum speed: 40 mph GVW: 19,500 lb Seating capacity: 22 Driving range: 90 mi	Available chassis: N/A Model Description: Low-floor, Altoona- tested, ADA-compliant trolley; quiet ride. Warranty information: 1 ye/12,000 mi is standard; option to extend.
Hybrid-Electric Trolley Applications: Trolley Drivetrain type: Series (hybrid) APU fuel type: CNG, LNG, LPG, diesel Battery type: Lead acid, nickel cadmium Battery voltage: N/A Battery capacity: N/A Battery weight: N/A Traction motor peak power: N/A Traction motor continuous power: N/A APU peak power: N/A	Emission certification: CARB Low NO <sub>x</sub> (1.0), EPA Heavy-Duty Regenerative braking: Yes Type of charger: Conductive Charge time: N/A Discharge rate: N/A Maximum speed: 40 mph GVW: 19,500 lb Seating capacity: 22 Driving range: 250 mi	Available chassis: N/A Model Description: Driven by Capstone MicroTurbine. Warranty information: 1 yr/12,000 mi is standard; option to extend.

Hybrid-Electric Transit Bus Applications: Transit bus, shuttle bus Drivetrain type: Series (hybrid) APU fuel type: CNG, LNG, LPG, diesel Battery type: Lead acid, nickel cadmium Battery voltage: N/A Battery capacity: N/A Battery weight: N/A Traction motor peak power: N/A Traction motor continuous power: N/A APU peak power: N/A	<b>Emission certification:</b> CARB Low NO <sub>x</sub> (1.0), EPA Heavy-Duty <b>Regenerative braking:</b> Yes <b>Type of charger:</b> Conductive <b>Charge time:</b> N/A <b>Discharge rate:</b> N/A <b>Maximum speed:</b> 40 mph <b>GVW:</b> 19,500 lb <b>Seating capacity:</b> 22 <b>Driving range:</b> 250 mi	Available chassis: N/A Model Description: Low-floor, 22-ft, Altoona-tested bus. ADA-compliant. Driven by Capstone MicroTurbine. Warranty information: 1 yr/12,000 mi is standard; option to extend. Four years on battery.
Electric Vehicles International	Phone: 765-643	
Web site: <u>http://www.evi-usa.com/</u>	Dealer locator Dealer locator	
	Emission certification: CARB Low	Available chassis: N/A
Eltram Applications: Tram Drivetrain type: Pure electric APU fuel type: N/A Battery type: Lead acid Battery voltage: 324 V Battery capacity: 68 kWh Battery weight: N/A Traction motor peak power: N/A Traction motor continuous power: N/A APU peak power: N/A	NO <sub>x</sub> (0) <b>Regenerative braking:</b> Yes <b>Type of charger:</b> N/A <b>Charge time:</b> 6.5 h <b>Discharge rate:</b> N/A <b>Maximum speed:</b> 25 mph <b>GVW:</b> N/A <b>Seating capacity:</b> 16 <b>Driving range:</b> 75 mi	Model Description: Pure electric 19.5-ft tram with optional hybrid-electric range- extension package. Range reaches 125 mi. Also available is 24-passenger trailer. Warranty information: N/A
<b>Elk</b> Applications: Utility vehicle Drivetrain type: Pure electric APU fuel type: N/A Battery type: Lead acid Battery voltage: 120 V Battery capacity: 26 kWh Battery weight: N/A Traction motor peak power: N/A Traction motor continuous power: N/A APU peak power: N/A	Emission certification: N/A Regenerative braking: Yes Type of charger: N/A Charge time: 8 h Discharge rate: N/A Maximum speed: 25 mph GVW: N/A Seating capacity: 2 Driving range: 60 mi	Available chassis: N/A Model Description: Pure electric utility vehicle with hybrid range-extension option. Cargo and utility box trailable Capacity of 3,000 lb. Warranty information: N/A
Sherpa Applications: Truck Drivetrain type: Pure electric APU fuel type: N/A Battery type: Lead acid Battery voltage: 324 V Battery capacity: 215 amp-h Battery weight: N/A Traction motor peak power: N/A Traction motor continuous power: N/A APU peak power: N/A	Emission certification: N/A Regenerative braking: Yes Type of charger: N/A Charge time: 6 h Discharge rate: N/A Maximum speed: 30 mph GVW: N/A Seating capacity: 3 Driving range: 100 mi	Available chassis: N/A Model Description: Small truck 16 1/4-ft length, can be specified with hybrid- electric range-extension package. 5,000-lb cargo capacity. Warranty information: N/A

<b>EL-25</b> Applications: Shuttle bus Drivetrain type: Series (hybrid) APU fuel type: Gasoline, LPG Battery type: Lead acid Battery voltage: 324 V Battery capacity: 215 amp-h Battery weight: 5,200 lb Traction motor peak power: 84 kW Traction motor continuous power: 30 kW APU peak power: 10 kW	Emission certification: N/A Regenerative braking: Yes Type of charger: Inductive Charge time: 6 h Discharge rate: N/A Maximum speed: 25 mph GVW: 18,700 lb Seating capacity: 25 Driving range: 60 mi	Available chassis: Shuttle bus. Model Description: Low-floor hybrid- electric shuttle bus designed for inner city use, airport parking, college campuses, etc. 27.5-ft length. Warranty information: N/A
ISE Research—ThunderVolt Web site: <u>http://www.iseresearch.com/</u>	Phone: 619-287 Dealer locator V	Web site: N/A
<b>701 AT</b> Applications: Aircraft towing Drivetrain type: Pure electric APU fuel type: N/A Battery type: Nickel sodium chloride Battery voltage: 600 V Battery capacity: 89 amp-h Battery weight: 2,145 lb Traction motor peak power: 300 kW Traction motor continuous power: 170 kW APU peak power: N/A	Dealer locator J Emission certification: N/A Regenerative braking: Yes Type of charger: Conductive Charge time: N/A Discharge rate: 212 amp Maximum speed: 18 mph GVW: 60,000 lb Seating capacity: N/A Driving range: 20 mi	Available chassis: N/A Model Description: N/A Warranty information: N/A
601/701 All Electric Applications: Truck Drivetrain type: Pure electric APU fuel type: N/A Battery type: Nickel sodium chloride Battery voltage: 600 V Battery capacity: 89 amp-h Battery weight: 2,145 lb Traction motor peak power: 300 kW Traction motor continuous power: 170 kW APU peak power: N/A	Emission certification: N/A Regenerative braking: Yes Type of charger: Conductive Charge time: N/A Discharge rate: 212 amp Maximum speed: 70 mph GVW: 40,000 lb Seating capacity: N/A Driving range: 0 mi	Available chassis: Various Model Description: N/A Warranty information: N/A
<b>TB40-HD</b> Applications: Transit bus Drivetrain type: Series (hybrid) APU fuel type: Diesel Battery type: Nickel sodium chloride Battery voltage: 600 V Battery capacity: 17.8 amp-h Battery weight: 429 lb Traction motor peak power: 300 kW Traction motor continuous power: 170 kW APU peak power: 230 hp	Emission certification: EPA Heavy- Duty Regenerative braking: Yes Type of charger: Conductive Charge time: N/A Discharge rate: 170 amp Maximum speed: 70 mph GVW: 40,000 lb Seating capacity: 35 Driving range: 300 mi	Available chassis: New Flyer 40-ft Low Floor. Model Description: N/A Warranty information: N/A

<b>TB30-HG</b> Applications: Transit bus Drivetrain type: Series (hybrid) APU fuel type: Gasoline Battery type: Nickel sodium chloride Battery voltage: 600 V Battery capacity: 17.8 amp-h Battery weight: 429 lb Traction motor peak power: 300 kW Traction motor continuous power: 170 kW APU peak power: 205 hp	Emission certification: N/A Regenerative braking: Yes Type of charger: Conductive Charge time: N/A Discharge rate: 170 amp Maximum speed: 70 mph GVW: 35,000 lb Seating capacity: 28 Driving range: 400 mi	Available chassis: Eldorado EasyRider Low Floor. Model Description: N/A Warranty information: N/A
801-H Applications: Yard or urban trailer towing Drivetrain type: Series (hybrid) APU fuel type: CNG, diesel, gasoline, LNG, LPG Battery type: Nickel sodium chloride Battery voltage: 600 V Battery capacity: 17.8 amp-h Battery weight: 429 lb Traction motor peak power: 300 kW Traction motor continuous power: 170 kW APU peak power: N/A	Emission certification: N/A Regenerative braking: Yes Type of charger: Conductive Charge time: N/A Discharge rate: 170 amp Maximum speed: N/A GVW: 40,000-80,000 lb Seating capacity: N/A Driving range: N/A	Available chassis: Various Model Description: N/A Warranty information: N/A
<b>TB40-HG</b> Applications: Transit bus Drivetrain type: Series (hybrid) APU fuel type: Gasoline Battery type: Nickel sodium chloride Battery voltage: 600 V Battery capacity: 17.8 amp-h Battery weight: 429 lb Traction motor peak power: 300 kW Traction motor continuous power: 170 kW APU peak power: 305 hp	Emission certification: N/A Regenerative braking: Yes Type of charger: Conductive Charge time: N/A Discharge rate: 170 amp Maximum speed: 70 mph GVW: 40,000 lb Seating capacity: 35 Driving range: 300 mi	Available chassis: New Flyer 40-ft Low Floor. Model Description: N/A Warranty information: N/A
New Flyer of America Web site: http://www.newflyer.com/		Web site: <u>http://www.newflyer.com/</u>
	Dealer locator p	
DEGOLF Applications: Transit bus Drivetrain type: Dual-mode (hybrid) APU fuel type: Diesel Battery type: Nickel-metal-hydride Battery voltage: 600 V Battery capacity: 19.5 amp-h Battery weight: 1,100 lb Traction motor peak power: 300 kW Traction motor continuous power: 200 kW APU peak power: 246 hp	Emission certification: EPA Heavy- Duty Regenerative braking: Yes Type of charger: N/A Charge time: 1 h Discharge rate: 300 amp Maximum speed: 65 mph GVW: 66,000 lb Seating capacity: 64 Driving range: 400 mi	<ul> <li>Available chassis: Stainless or carbon steel.</li> <li>Model Description: 60-ft articulated, low-floor, heavy-duty transit vehicle, using a diesel engine and parallel electric drive.</li> <li>Warranty information: Standard warranties apply with option for purchasing extended warranty.</li> </ul>

<b>DE40LF</b> Applications: Transit bus Drivetrain type: Dual-mode (hybrid) APU fuel type: Diesel Battery type: Nickel-metal-hydride Battery voltage: 600 V Battery capacity: 19.5 amp-h Battery weight: 1,100 lb Traction motor peak power: 260 kW Traction motor continuous power: 200 kW APU peak power: 207 hp	<b>Emission certification:</b> CARB Low NO <sub>x</sub> (2.5), EPA Heavy-Duty <b>Regenerative braking:</b> Yes <b>Type of charger:</b> N/A <b>Charge time:</b> 1 h <b>Discharge rate:</b> 300 amp <b>Maximum speed:</b> 65 mph <b>GVW:</b> 40,000 lb <b>Seating capacity:</b> 40 <b>Driving range:</b> 400 mi	Available chassis: Stainless or carbon steel.Model Description: 40-ft, low-floor, heavy-duty transit vehicle.Warranty information: Standard warranties apply with option for purchasing extended warranty.
	Phone: 905-403-1111	
Orion Bus Industries Web site: <u>http://www.orionbus.com/</u>		nbus.com/orion/0,,0-11-9894-1-10756-1-0-0- 0-0-0-0-0-0,00.html
Orion VII Hybrid Low-Floor Applications: Transit bus Drivetrain type: Series (hybrid) APU fuel type: Diesel Battery type: Lead acid Battery voltage: 550 V Battery capacity: N/A Battery weight: N/A Traction motor peak power: N/A Traction motor continuous power: 180 kW APU peak power: N/A	Emission certification: EPA Heavy- Duty Regenerative braking: Yes Type of charger: N/A Charge time: N/A Discharge rate: N/A Maximum speed: 65 mph GVW: 42,000 lb Seating capacity: 44 Driving range: 400 mi	Available chassis: N/A Model Description: Features HybriDrive series propulsion system from BAE Systems. 100% stainless steel chassis. Warranty information: N/A
Solectria Corporation	Phone: 781-932 Dealer locator V	
Web site: http://www.solectria.com/ Hybrid Citivan Applications: Truck Drivetrain type: Series (hybrid) APU fuel type: Diesel Battery type: Lead acid Battery voltage: 312 V Battery capacity: 15 kWh Battery weight: 1,544 lb Traction motor peak power: 125 kW Traction motor continuous power: 45 kW APU peak power: 17 Kw	Dealer locator jEmission certification: N/ARegenerative braking: YesType of charger: ConductiveCharge time: 4 hDischarge rate: 400 ampMaximum speed: 65 mphGVW: 12,000 lbSeating capacity: 2Driving range: 20 mi	<ul> <li>phone: N/A</li> <li>Available chassis: Workhorse chassis, UCBC body.</li> <li>Model Description: N/A</li> <li>Warranty information: Contact Solectria for warranty information.</li> </ul>
<b>Electric Citivan</b> Applications: Truck Drivetrain type: Pure electric APU fuel type: N/A Battery type: Lead acid Battery voltage: 312 V Battery capacity: 30 kWh Battery weight: 3,087 lb Traction motor peak power: 125 kW Traction motor continuous power: 45 kW APU peak power: N/A	Emission certification: N/A Regenerative braking: Yes Type of charger: Conductive Charge time: 8 h Discharge rate: 400 amp Maximum speed: 65 mph GVW: 12,000 lb Seating capacity: 2 Driving range: 40 mi	Available chassis: Workhorse chassis, UCBC body. Model Description: N/A Warranty information: Contact Solectria for warranty information.

Super 7 Applications: Truck Drivetrain type: Series (hybrid) APU fuel type: Diesel Battery type: N/A Battery voltage: N/A Battery capacity: N/A Battery weight: N/A Traction motor peak power: N/A Traction motor continuous power: N/A APU peak power: N/A	Emission certification: N/A Regenerative braking: Yes Type of charger: N/A Charge time: N/A Discharge rate: N/A Maximum speed: 65 mph GVW: 50,000 lb Seating capacity: N/A Driving range: 100 mi	<ul> <li>Available chassis: Baseline is Kenworth Class 7 T300.</li> <li>Model Description: Class 7 truck with Eaton 6-speed manual transmission; APU is 8.3-L Cummins ISC diesel; uses combined parallel-series hybrid configuration.</li> <li>Warranty information: Manufacturer has yet to finalize.</li> </ul>
TransTeq	Phone: 303-382 Dealer locator	
Web site: http://www.transteq.com/	Dealer locator	
FAST Applications: Shuttle bus Drivetrain type: Series (hybrid) APU fuel type: LPG Battery type: Nickel-metal-hydride Battery voltage: 370 V Battery capacity: 18 amp-h Battery weight: 500 lb Traction motor peak power: 120 kW Traction motor continuous power: N/A APU peak power: 80 kW	Emission certification: N/A Regenerative braking: Yes Type of charger: N/A Charge time: N/A Discharge rate: N/A Maximum speed: 75 mph GVW: 13,500 lb Seating capacity: 15 Driving range: N/A	Available chassis: Ford E-350/E-450 Cutaway chassis. Model Description: Available with zero- emission drive capability, electric heating and air conditioning, and a variety of body configurations, including passenger, delivery, and paratransit. Warranty information: Contact Paul Szilagyi.
<b>Ecomark</b> Applications: Shuttle bus Drivetrain type: Series (hybrid) APU fuel type: CNG Battery type: Lead acid Battery voltage: 336 V Battery capacity: 85 amp-h Battery weight: 2,000 lb Traction motor peak power: 328 kW Traction motor continuous power: N/A APU peak power: 67 kW	Emission certification: N/A Regenerative braking: Yes Type of charger: Conductive Charge time: N/A Discharge rate: N/A Maximum speed: 40 mph GVW: 41,200 lb Seating capacity: 118 Driving range: N/A	Available chassis: 45-ft, stainless steel/fiberglass composite. Model Description: High-capacity "BRT" design with four-passenger entry doors, highly efficient electric drive and superior emissions performance. Stainless steel spaceframe for extended service life. Warranty information: Contact Paul Szilagyi.
	Phone: 800-3	03-1493
Trolley Enterprises Web site: http://www.trolleyenterprises.com	Dealer locato	r Web site: N/A
<b>Replica Trolley (hybrid)</b> <b>Applications:</b> Trolley <b>Drivetrain type:</b> Dual-mode (hybrid) <b>APU fuel type:</b> Diesel <b>Battery type:</b> Lead acid <b>Battery voltage:</b> 336 V <b>Battery capacity:</b> N/A <b>Battery weight:</b> N/A <b>Traction motor peak power:</b> 300 hp <b>Traction motor continuous power:</b> 50 hp <b>APU peak power:</b> 55 hp	Emission certification: N/A Regenerative braking: Yes Type of charger: N/A Charge time: N/A Discharge rate: N/A Maximum speed: N/A GVW: 33,000 lb Seating capacity: 50 Driving range: N/A	r phone: N/A Available chassis: Freightliner, Spartan. Model Description: 28-ft, Altoona-tested trolley, open or closed roof. Warranty information: N/A

#### A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. By investing in technology breakthroughs today, our nation can look forward to a more resilient economy and secure future.

Far-reaching technology changes will be essential to America's energy future. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a portfolio of energy technologies that will:

- Conserve energy in the residential, commercial, industrial, government, and transportation sectors
- Increase and diversify energy supply, with a focus on renewable domestic sources
- Upgrade our national energy infrastructure
- Facilitate the emergence of hydrogen technologies as vital new "energy carrier's."

#### **The Opportunities**

#### **Biomass Program**

Using domestic, plant-derived resources to meet our fuel, power, and chemical needs

Building Technologies Program

Homes, schools, and businesses that use less energy, cost less to operate, and ultimately, generate as much power as they use

Distributed Energy & Electric Reliability Program

A more reliable energy infrastructure and reduced need for new power plants

Federal Energy Management Program

Leading by example, saving energy and taxpayer dollars in federal facilities

#### FreedomCAR & Vehicle Technologies Program

Less dependence on foreign oil, and eventual transition to an emissions-free, petroleum-free vehicle

#### Geothermal Technologies Program

Tapping the Earth's energy to meet our heat and power needs

#### Hydrogen, Fuel Cells & Infrastructure Technologies Program

Paving the way toward a hydrogen economy and net-zero carbon energy future

#### Industrial Technologies Program

Boosting the productivity and competitiveness of U.S. industry through improvements in energy and environmental performance

#### Solar Energy Technology Program

Utilizing the sun's natural energy to generate electricity and provide water and space heating

#### Weatherization & Intergovernmental Program

Accelerating the use of today's best energy-efficient and renewable technologies in homes, communities, and businesses

#### Wind & Hydropower Technologies Program

Harnessing America's abundant natural resources for clean power generation

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