GREET 1.5 — Transportation Fuel-Cycle Model

Volume 2: Appendices of Data and Results

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GREET — *G*reenhouse Gases, *R*egulated *E*missions, and *E*nergy Use in *T*ransportation

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Volume 2: Appendices of Data and Results

Introduction

Volume 1 of this report documents development and use of the GREET (*G*reenhouse Gases, *R*egulated *E*missions, and *E*nergy Use in *T*ransportation) model. The GREET model was developed to estimate fuel-cycle energy use and emissions of various transportation fuels and advanced vehicle technologies applied to three light-duty vehicle types: passenger cars, light-duty trucks 1 (LDT1), and light-duty trucks 2 (LDT2). On the basis of the default assumptions documented in Volume 1, per-mile energy use and emissions and resultant energy and emissions changes were calculated for each of the three vehicle types. In Volume 1, changes in per-mile energy use and emissions for passenger cars were presented in charts. In Volume 2, changes for LDT1 and LDT2 are presented in charts. In addition, numerical results from GREET calculations are presented for all three vehicle types.

Appendix A
Emission Factors of Fuel Combustion

Emission factors of fuel combustion were primarily based on EPA's AP-42 document. They are used in GREET to calculate fuel combustion emissions for upstream activities.

Acronyms, initialisms, and abbreviations are defined on pages xv–xviii of Volume 1.

Table A.1 Emission Factors of Fuel Combustion (g/10^6 Btu of fuel input)

Technology	VOC	CO	NO_x	PM_{10}	SO_x	CH_4	N_2O	CO_2
Natural-Gas-Fired Technologies								
Utility/industrial boiler: current	2.700	41.100	92.900	3.700	0.309	1.100	1.100	59,863
Utility/industrial boiler: future	2.700	41.100	39.100	3.700	0.309	1.100	1.100	59,863
Small industrial boiler: current	2.700	41.100	48.900	3.700	0.309	1.100	1.100	59,863
Small industrial boiler: future	2.700	41.100	15.600	3.700	0.309	1.100	1.100	59,863
Large gas turbine: current	1.400	3.700	78.200	3.600	0.309	2.500	1.100	59.922
Large gas turbine: future	1.400	2.500	39.600	3.600	0.309	2.500	1.100	59,924
Combined-cycle gas turbine: current	1.400	3.700	78.200	3.600	0.309	2.500	1.100	59.922
Combined-cycle gas turbine: future	1.400	2.500	39.600	3.600	0.309	2.500	1.100	59,924
Pipeline turbine	0.908	77.180	154.360	11.607	0.309	23.154	2.000	59,751
Stationary reciprocating engine: current	560.690	379.847	1074.467	11.607	0.309	328.393	2.000	56,691
Stationary reciprocating engine: future	61.290	331.420	871.680	11.607	0.309	289.047	2.000	58,432
NG flaring in oil field	50.200	17.610	31.710	1.320	0.309	0.130	0.210	59,754
LNG-Fired Technologies								
Locomotive: current	175.000	140.000	300.000	0.824	0.000	20.000	2.000	58,322
HD truck	63.000	200.000	90.000	0.435	0.000	20.000	2.000	58,577
Residual-Oil-Fired Technologies								
Utility boiler: current	2.460	16.200	103.700	6.150	129.642	0.910	0.360	82,677
Utility boiler: future	2.460	16.200	84.200	6.150	51.857	0.910	0.360	82,677
Industrial boiler: current	0.910	16.200	178.200	6.150	129.642	3.240	0.360	82,675
Industrial boiler: future	0.910	16.200	144.691	6.150	51.857	3.240	0.360	82,675
Commercial boiler: current	1.103	16.214	19.457	14.083	129.643	0.700	0.357	82,681
Commercial boiler: future	1.103	16.214	13.620	14.083	51.857	0.700	0.357	82,681
Barge: current	162.143	324.286	908.000	14.083	129.643	0.700	0.357	81,695
Barge: future	1.103	16.214	19.457	14.083	51.857	0.700	0.357	82,681
Diesel-Fired Technologies								
Industrial boiler: current	0.710	17.700	84.700	3.530	12.607	0.180	0.390	80,402
Industrial boiler: future	0.710	17.700	35.300	3.530	12.607	0.180	0.390	80,402
Commercial boiler: current	1.200	17.700	70.600	3.810	12.607	0.760	0.390	80,399
Commercial boiler: future	1.200	17.700	35.300	3.810	12.607	0.760	0.390	80,399
Locomotive: current	250.000	350.000	1000.000	82.400	12.607	0.760	2.000	79,101
Stationary reciprocating engine: current	40.860	459.600	2133.600	150.000	12.607	4.540	2.000	79,715
Turbine controlled	1.335	8.714	131.660	16.989	12.607	0.844	2.000	80,413
HDE truck	90.000	500.000	300.000	43.520	12.607	4.410	2.000	79,354
Farming tractor	90.000	334.000	939.000	43.520	12.607	4.410	2.000	79,615

Continued

Table A.1 Emission Factors of Fuel Combustion (g/10^6 Btu of fuel input) (Cont.)

Technology	VOC	CO	NO_x	PM_{10}	SO_x	CH_4	N_2O	CO_2
Gasoline-Fired Technologies								
Stationary reciprocating engine: current	1169.050	30754.400	799.500	49.100	9.666	33.810	2.000	23,691
HDE trucks	210.000	1200.000	200.000	7.810	9.666	33.810	2.000	73,123
Farming tractor	210.000	1200.000	662.000	7.810	9.666	33.810	2.000	78,123
Crude-Fired Technologies								
Industrial boiler	0.820	23.740	181.600	29.712	393.846	0.360	2.000	76,677
LPG-Fired Technologies								
Industrial boiler: current	1.890	18.400	108.000	3.243	0.000	1.080	4.860	71,550
Commercial boiler: current	1.890	10.800	78.000	2.430	0.000	1.080	4.860	71,561
Coal-Fired Technologies								
Utility boiler: current	1.501	12.567	285.020	12.661	600.230	0.750	0.298	97,180
Utility boiler: future	1.436	12.617	209.360	12.617	228.650	0.943	0.347	97,180
Gasification/turbine	1.477	12.309	44.068	6.524	44.068	5.098	5.098	97,169
Industrial boiler: current	1.501	12.567	285.020	12.661	600.230	0.750	0.298	97,180
Industrial boiler: future	1.436	12.617	209.360	12.617	228.650	0.943	0.347	97,180
Wood-Fired Technologies								
FBC boiler	5.341	37.388	53.412	6.944	2.003	3.834	4.000	105,933

Appendix B
Per-Mile Fuel-Cycle Energy Use and Emissions

This appendix presents per-mile fuel-cycle energy use (in Btu/mi) and emissions (in g/mi) for all the fuel and vehicle technology options evaluated. The results are presented for vehicle types in the following order: near-term passenger cars, near-term LDT1, near-term LDT2, long-term passenger cars, long-term LDT1, and long-term LDT2.

Per-mile results for each technology are presented separately for each of the three stages of a fuel cycle: feedstock, fuel, and vehicle operations. The feedstock stage includes activities from feedstock recovery to feedstock delivered at fuel production plants. The fuel stage includes activities from feedstock at fuel production plants to fuel at refueling stations. The vehicle operations stage includes activities from fuel at refueling stations to completion of on-board fuel combustion.

Acronyms, initialisms, and abbreviations are defined on pages xv–xviii of Volume 1.

B-I Near-Term Technologies

B-I.1 Passenger Cars

	Baseline Conv. GV: CG			Conv. GV: FRFG2, MTBE			Conv. GV: CARFG2, ETBE		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	192	1,144	5,156	192	1,142	5,156	192	1,198	5,156
Fossil fuels	175	1,106	5,156	175	1,105	5,156	175	1,161	4,902
Petroleum	49	543	5,073	49	468	4,525	49	472	4,571
VOC: Total	0.023	0.073	0.207	0.023	0.074	0.161	0.023	0.103	0.161
VOC: Urban	0.000	0.025	0.207	0.000	0.025	0.161	0.000	0.026	0.161
CO: Total	0.080	0.059	5.517	0.080	0.084	4.414	0.080	0.095	4.414
CO: Urban	0.000	0.007	5.517	0.000	0.009	4.414	0.000	0.010	4.414
NOx: Total	0.050	0.148	0.275	0.050	0.163	0.261	0.050	0.231	0.261
NOx: Urban	0.000	0.012	0.275	0.000	0.014	0.261	0.000	0.018	0.261
PM10: Total	0.003	0.016	0.033	0.003	0.016	0.032	0.003	0.057	0.032
PM10: Urban	0.000	0.001	0.033	0.000	0.001	0.032	0.000	0.001	0.032
SOx: Total	0.015	0.100	0.050	0.015	0.094	0.008	0.015	0.141	0.008
SOx: Urban	0.000	0.001	0.050	0.000	0.001	0.008	0.000	0.001	0.008
CH4	0.467	0.116	0.084	0.466	0.244	0.077	0.466	0.248	0.077
N2O	0.000	0.001	0.028	0.000	0.001	0.028	0.000	0.019	0.028
CO2	18	82	390	18	88	390	18	107	361
GHGs	28	85	401	28	94	401	28	118	372

	Conv. GV: CARFG2, EtOH			CIDI Vehicle: CD			CNGV: bi-fueled, CNG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	192	1,167	5,156	142	604	3,819	551	646	5,729
Fossil fuels	175	1,132	4,961	129	584	3,819	544	529	5,729
Petroleum	49	511	4,961	36	294	3,819	26	8	0
VOC: Total	0.023	0.087	0.220	0.017	0.022	0.080	0.028	0.016	0.112
VOC: Urban	0.000	0.025	0.220	0.000	0.006	0.080	0.002	0.012	0.112
CO: Total	0.080	0.064	4.414	0.059	0.032	1.070	0.117	0.039	3.531
CO: Urban	0.000	0.008	4.414	0.000	0.005	1.070	0.004	0.026	3.531
NOx: Total	0.050	0.174	0.261	0.037	0.081	0.600	0.179	0.145	0.275
NOx: Urban	0.000	0.014	0.261	0.000	0.008	0.600	0.011	0.074	0.275
PM10: Total	0.003	0.037	0.032	0.002	0.009	0.121	0.005	0.006	0.022
PM10: Urban	0.000	0.001	0.032	0.000	0.001	0.121	0.000	0.001	0.022
SOx: Total	0.015	0.115	0.008	0.011	0.054	0.048	0.019	0.082	0.002
SOx: Urban	0.000	0.001	0.008	0.000	0.001	0.048	0.000	0.000	0.002
CH4	0.466	0.106	0.077	0.345	0.052	0.011	1.131	0.102	0.840
N2O	0.000	0.011	0.028	0.000	0.001	0.016	0.001	0.001	0.017
CO2	18	85	362	14	43	307	39	43	341
GHGs	28	91	372	21	45	312	63	45	364

B-I Near-Term Technologies

B-I.1 Passenger Cars (Cont.)

	CNGV: dedicated			LPGV: dedicated, crude			LPGV: dedicated, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	533	625	5,544	192	584	5,156	322	390	5,156
Fossil fuels	527	511	5,544	175	551	5,156	318	365	5,156
Petroleum	25	8	0	49	267	5,156	23	78	0
VOC: Total	0.027	0.016	0.045	0.023	0.027	0.077	0.008	0.024	0.077
VOC: Urban	0.002	0.012	0.045	0.000	0.009	0.077	0.000	0.015	0.077
CO: Total	0.114	0.038	3.090	0.080	0.041	3.310	0.065	0.033	3.310
CO: Urban	0.004	0.026	3.090	0.000	0.009	3.310	0.000	0.009	3.310
NOx: Total	0.173	0.141	0.248	0.050	0.091	0.248	0.058	0.062	0.248
NOx: Urban	0.011	0.072	0.248	0.000	0.014	0.248	0.000	0.013	0.248
PM10: Total	0.005	0.006	0.022	0.003	0.009	0.022	0.003	0.005	0.022
PM10: Urban	0.000	0.001	0.022	0.000	0.001	0.022	0.000	0.001	0.022
SOx: Total	0.019	0.079	0.002	0.015	0.055	0.000	0.016	0.021	0.000
SOx: Urban	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.001	0.000
CH4	1.094	0.098	0.840	0.466	0.053	0.109	0.535	0.041	0.109
N2O	0.001	0.000	0.022	0.000	0.001	0.028	0.000	0.000	0.028
CO2	38	41	330	18	42	369	26	26	369
GHGs	61	43	355	28	43	380	37	27	380

	MeOH FFV: M85, NG			MeOH FFV: M85, flare gas			MeOH FFV: M85, LF-gas		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	274	2,245	4,911	274	2,385	4,911	48	1,707	4,911
Fossil fuels	267	2,225	4,911	267	2,366	1,293	44	1,698	1,293
Petroleum	28	249	1,273	28	250	1,273	12	238	1,273
VOC: Total	0.011	0.056	0.176	0.011	-0.249	0.176	0.006	0.014	0.176
VOC: Urban	0.000	0.009	0.176	0.000	0.009	0.176	0.000	0.003	0.176
CO: Total	0.066	0.164	3.310	0.066	0.069	3.310	0.020	-0.303	3.310
CO: Urban	0.000	0.003	3.310	0.000	0.003	3.310	0.000	-0.152	3.310
NOx: Total	0.053	0.175	0.248	0.053	0.001	0.248	0.013	0.170	0.248
NOx: Urban	0.000	0.005	0.248	0.000	0.005	0.248	0.000	-0.010	0.248
PM10: Total	0.002	0.010	0.026	0.002	0.003	0.026	0.001	-0.107	0.026
PM10: Urban	0.000	0.000	0.026	0.000	0.000	0.026	0.000	-0.060	0.026
SOx: Total	0.015	0.041	0.013	0.015	0.039	0.013	0.004	0.222	0.013
SOx: Urban	0.000	0.001	0.013	0.000	0.001	0.013	0.000	-0.012	0.013
CH4	0.492	0.139	0.042	0.492	0.047	0.042	0.117	-2.386	0.042
N2O	0.000	0.001	0.028	0.000	0.000	0.028	0.000	0.001	0.028
CO2	23	89	356	23	-229	356	5	-531	356
GHGs	33	92	366	33	-228	366	7	-580	366

B-I Near-Term Technologies

B-I.1 Passenger Cars (Cont.)

	GV: E10, corn			EtOH FFV: E85, corn			EtOH FFV: E85, W. Biomass		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	225	1,244	5,156	548	2,195	4,911	532	6,915	4,911
Fossil fuels	207	1,209	4,805	524	2,184	1,038	516	-386	1,038
Petroleum	66	516	4,727	237	224	1,022	400	210	1,022
VOC: Total	0.013	0.101	0.232	-0.088	0.378	0.176	0.037	0.103	0.176
VOC: Urban	0.000	0.025	0.232	0.001	0.019	0.176	0.001	0.018	0.176
CO: Total	0.084	0.064	3.531	0.121	0.111	3.310	0.172	0.459	3.310
CO: Urban	0.000	0.008	3.531	0.001	0.017	3.310	0.001	0.016	3.310
NOx: Total	0.070	0.175	0.275	0.262	0.445	0.248	0.230	0.590	0.248
NOx: Urban	0.000	0.015	0.275	0.001	0.036	0.248	0.001	0.032	0.248
PM10: Total	0.030	0.018	0.033	0.310	0.034	0.026	0.018	0.080	0.026
PM10: Urban	0.000	0.001	0.033	0.000	0.003	0.026	0.000	0.003	0.026
SOx: Total	0.015	0.128	0.046	0.023	0.409	0.010	0.021	-0.116	0.010
SOx: Urban	0.000	0.001	0.046	0.000	0.001	0.010	0.000	0.000	0.010
CH4	0.440	0.132	0.084	0.156	0.289	0.126	0.141	-0.020	0.126
N2O	0.013	0.001	0.028	0.146	0.002	0.028	0.011	0.045	0.028
CO2	21	92	364	44	185	83	-109	-38	83
GHGs	34	95	375	93	191	94	-103	-25	94

	EtOH FFV: E85, H. Biomass			EV: US mix			EV: US NE mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	788	5,928	4,911	256	5,280	0	399	5,184	0
Fossil fuels	749	-28	1,038	227	3,974	0	345	3,130	0
Petroleum	285	209	1,022	45	44	0	39	137	0
VOC: Total	0.030	0.099	0.176	0.030	0.006	0.000	0.023	0.005	0.000
VOC: Urban	0.001	0.018	0.176	0.000	0.000	0.000	0.001	0.001	0.000
CO: Total	0.138	0.414	3.310	0.057	0.056	0.000	0.065	0.049	0.000
CO: Urban	0.001	0.016	3.310	0.001	0.004	0.000	0.001	0.007	0.000
NOx: Total	0.304	0.583	0.248	0.071	0.707	0.000	0.094	0.434	0.000
NOx: Urban	0.002	0.034	0.248	0.002	0.013	0.000	0.003	0.023	0.000
PM10: Total	0.015	0.075	0.026	0.015	0.041	0.021	0.011	0.026	0.021
PM10: Urban	0.000	0.003	0.026	0.000	0.001	0.021	0.000	0.002	0.021
SOx: Total	0.035	-0.038	0.010	0.041	0.884	0.000	0.052	0.469	0.000
SOx: Urban	0.000	0.001	0.010	0.000	0.002	0.000	0.000	0.005	0.000
CH4	0.192	0.023	0.126	0.558	0.005	0.000	0.505	0.005	0.000
N2O	0.139	0.040	0.028	0.000	0.003	0.000	0.000	0.003	0.000
CO2	-6	-6	83	18	353	0	28	253	0
GHGs	41	7	94	30	354	0	39	254	0

B-I Near-Term Technologies

B-I.1 Passenger Cars (Cont.)

	EV: CA mix			Grid-connected SIDI HEVs: CARFG2, ETBE, CA mix			Grid-connected SIDI HEVs: CARFG2, EtOH, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	259	5,137	0	152	2,007	2,005	152	1,995	2,005
Fossil fuels	230	1,794	0	137	990	1,906	137	979	1,929
Petroleum	16	11	0	24	187	1,777	24	202	1,929
VOC: Total	0.011	0.003	0.000	0.012	0.041	0.104	0.012	0.035	0.145
VOC: Urban	0.000	0.001	0.000	0.000	0.010	0.104	0.000	0.010	0.145
CO: Total	0.043	0.031	0.000	0.044	0.046	2.472	0.044	0.034	2.472
CO: Urban	0.001	0.005	0.000	0.000	0.006	2.472	0.000	0.005	2.472
NOx: Total	0.065	0.165	0.000	0.039	0.139	0.193	0.039	0.117	0.193
NOx: Urban	0.003	0.017	0.000	0.001	0.012	0.193	0.001	0.010	0.193
PM10: Total	0.004	0.010	0.021	0.002	0.025	0.031	0.002	0.017	0.031
PM10: Urban	0.000	0.001	0.021	0.000	0.001	0.031	0.000	0.001	0.031
SOx: Total	0.026	0.115	0.000	0.014	0.090	0.003	0.014	0.079	0.003
SOx: Urban	0.000	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.003
CH4	0.335	0.003	0.000	0.282	0.097	0.059	0.282	0.042	0.059
N2O	0.000	0.002	0.000	0.000	0.008	0.020	0.000	0.005	0.020
CO2	18	126	0	13	79	152	13	71	152
GHGs	25	127	0	18	84	159	18	73	160

	Grid-independent SIDI HEVs: FRFG2, MTBE			Grid-independent CIDI HEVs: CD		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	101	601	2,714	96	408	2,578
Fossil fuels	92	582	2,714	87	394	2,578
Petroleum	26	246	2,382	24	198	2,578
VOC: Total	0.012	0.039	0.148	0.011	0.015	0.080
VOC: Urban	0.000	0.013	0.148	0.000	0.004	0.080
CO: Total	0.042	0.044	3.531	0.040	0.021	1.070
CO: Urban	0.000	0.005	3.531	0.000	0.003	1.070
NOx: Total	0.027	0.086	0.275	0.025	0.055	0.600
NOx: Urban	0.000	0.007	0.275	0.000	0.005	0.600
PM10: Total	0.001	0.008	0.035	0.001	0.006	0.121
PM10: Urban	0.000	0.001	0.035	0.000	0.000	0.121
SOx: Total	0.008	0.050	0.004	0.007	0.036	0.033
SOx: Urban	0.000	0.001	0.004	0.000	0.000	0.033
CH4	0.246	0.128	0.084	0.233	0.035	0.011
N2O	0.000	0.001	0.028	0.000	0.000	0.016
CO2	10	46	205	9	29	207
GHGs	15	49	216	14	30	213

B-I Near-Term Technologies

B-I.2 Light-Duty Truck 1

	Baseline Conv. GV: CG			Conv. GV: FRFG2, MTBE			Conv. GV: CARFG2, ETBE		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	256	1,525	6,875	256	1,522	6,875	256	1,598	6,875
Fossil fuels	233	1,475	6,875	233	1,474	6,875	233	1,549	6,536
Petroleum	65	724	6,764	65	623	6,033	65	630	6,094
VOC: Total	0.030	0.098	0.198	0.030	0.099	0.157	0.030	0.137	0.157
VOC: Urban	0.000	0.033	0.198	0.000	0.034	0.157	0.000	0.035	0.157
CO: Total	0.107	0.079	8.247	0.107	0.113	6.598	0.107	0.127	6.598
CO: Urban	0.000	0.010	8.247	0.000	0.011	6.598	0.000	0.014	6.598
NOx: Total	0.067	0.197	0.381	0.067	0.218	0.362	0.067	0.308	0.362
NOx: Urban	0.000	0.017	0.381	0.000	0.019	0.362	0.000	0.024	0.362
PM10: Total	0.003	0.022	0.036	0.003	0.021	0.035	0.003	0.076	0.035
PM10: Urban	0.000	0.001	0.036	0.000	0.001	0.035	0.000	0.002	0.035
SOx: Total	0.020	0.133	0.066	0.020	0.126	0.010	0.020	0.188	0.010
SOx: Urban	0.000	0.001	0.066	0.000	0.001	0.010	0.000	0.001	0.010
CH4	0.622	0.154	0.090	0.622	0.325	0.083	0.622	0.330	0.083
N2O	0.000	0.001	0.033	0.000	0.002	0.033	0.000	0.026	0.033
CO2	24	109	521	24	117	520	24	142	482
GHGs	38	113	533	38	125	532	38	157	494

	Conv. GV: CARFG2, EtOH			CIDI Vehicle: CD			CNGV: bi-fueled, CNG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	256	1,556	6,875	189	805	5,093	735	861	7,639
Fossil fuels	233	1,510	6,615	172	778	5,093	726	705	7,639
Petroleum	65	681	6,615	48	392	5,093	35	11	0
VOC: Total	0.030	0.116	0.209	0.022	0.029	0.091	0.037	0.022	0.108
VOC: Urban	0.000	0.033	0.209	0.000	0.009	0.091	0.003	0.017	0.108
CO: Total	0.107	0.085	6.598	0.079	0.042	1.139	0.157	0.052	5.278
CO: Urban	0.000	0.011	6.598	0.000	0.007	1.139	0.006	0.035	5.278
NOx: Total	0.067	0.232	0.362	0.050	0.108	0.600	0.239	0.194	0.381
NOx: Urban	0.000	0.019	0.362	0.000	0.011	0.600	0.015	0.099	0.381
PM10: Total	0.003	0.049	0.035	0.003	0.012	0.121	0.006	0.008	0.023
PM10: Urban	0.000	0.001	0.035	0.000	0.001	0.121	0.000	0.002	0.023
SOx: Total	0.020	0.154	0.010	0.015	0.072	0.064	0.026	0.109	0.002
SOx: Urban	0.000	0.001	0.010	0.000	0.001	0.064	0.000	0.000	0.002
CH4	0.622	0.142	0.083	0.461	0.069	0.014	1.508	0.136	0.900
N2O	0.000	0.014	0.033	0.000	0.001	0.024	0.001	0.001	0.020
CO2	24	114	483	18	58	410	52	57	455
GHGs	38	121	495	28	59	417	84	60	480

B-I Near-Term Technologies

B-I.2 Light-Duty Truck 1 (Cont.)

	CNGV: dedicated			LPGV: dedicated, crude			LPGV: dedicated, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	711	833	7,392	255	779	6,875	430	521	6,875
Fossil fuels	703	682	7,392	233	734	6,875	424	486	6,875
Petroleum	34	11	0	65	356	6,875	31	104	0
VOC: Total	0.036	0.021	0.047	0.030	0.037	0.084	0.011	0.032	0.084
VOC: Urban	0.002	0.016	0.047	0.000	0.012	0.084	0.000	0.021	0.084
CO: Total	0.152	0.050	4.618	0.106	0.054	4.948	0.087	0.044	4.948
CO: Urban	0.006	0.034	4.618	0.000	0.013	4.948	0.000	0.012	4.948
NOx: Total	0.231	0.188	0.343	0.067	0.122	0.343	0.077	0.082	0.343
NOx: Urban	0.015	0.095	0.343	0.000	0.018	0.343	0.000	0.018	0.343
PM10: Total	0.006	0.008	0.022	0.003	0.012	0.023	0.003	0.006	0.023
PM10: Urban	0.000	0.002	0.022	0.000	0.001	0.023	0.000	0.001	0.023
SOx: Total	0.025	0.105	0.002	0.020	0.074	0.000	0.021	0.029	0.000
SOx: Urban	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.001	0.000
CH4	1.459	0.131	0.900	0.622	0.070	0.117	0.713	0.055	0.117
N2O	0.001	0.001	0.026	0.000	0.001	0.033	0.000	0.001	0.033
CO2	50	55	441	24	56	492	34	35	492
GHGs	81	58	468	38	58	505	49	36	505

	MeOH FFV: M85, NG			MeOH FFV: M85, flare gas			MeOH FFV: M85, LF gas		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	366	2,993	6,548	366	3,180	6,548	64	2,277	6,548
Fossil fuels	356	2,966	6,548	356	3,155	1,725	58	2,264	1,725
Petroleum	38	332	1,697	38	333	1,697	16	317	1,697
VOC: Total	0.015	0.074	0.168	0.015	-0.332	0.168	0.008	0.019	0.168
VOC: Urban	0.000	0.012	0.168	0.000	0.012	0.168	0.000	0.004	0.168
CO: Total	0.088	0.219	4.948	0.088	0.092	4.948	0.027	-0.404	4.948
CO: Urban	0.000	0.004	4.948	0.000	0.004	4.948	0.000	-0.203	4.948
NOx: Total	0.071	0.233	0.343	0.071	0.001	0.343	0.017	0.227	0.343
NOx: Urban	0.000	0.007	0.343	0.000	0.007	0.343	0.000	-0.013	0.343
PM10: Total	0.003	0.013	0.027	0.003	0.004	0.027	0.001	-0.143	0.027
PM10: Urban	0.000	0.001	0.027	0.000	0.001	0.027	0.000	-0.080	0.027
SOx: Total	0.020	0.054	0.017	0.020	0.052	0.017	0.005	0.297	0.017
SOx: Urban	0.000	0.001	0.017	0.000	0.001	0.017	0.000	-0.016	0.017
CH4	0.656	0.185	0.045	0.656	0.063	0.045	0.156	-3.182	0.045
N2O	0.000	0.002	0.033	0.000	0.000	0.033	0.000	0.002	0.033
CO2	30	118	475	30	-305	475	6	-707	475
GHGs	44	123	486	44	-304	486	9	-774	486

B-I Near-Term Technologies

B-I.2 Light-Duty Truck 1 (Cont.)

	GV: E10, corn			EtOH FFV: E85, corn			EtOH FFV: E85, W. Biomass		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	300	1,659	6,875	731	2,927	6,548	710	9,220	6,548
Fossil fuels	276	1,612	6,407	699	2,912	1,385	688	-514	1,385
Petroleum	88	688	6,303	316	298	1,362	534	280	1,362
VOC: Total	0.017	0.135	0.219	-0.117	0.505	0.168	0.050	0.138	0.168
VOC: Urban	0.000	0.033	0.219	0.001	0.025	0.168	0.001	0.024	0.168
CO: Total	0.112	0.086	5.278	0.162	0.148	4.948	0.230	0.611	4.948
CO: Urban	0.000	0.011	5.278	0.001	0.022	4.948	0.001	0.021	4.948
NOx: Total	0.093	0.234	0.381	0.350	0.594	0.343	0.307	0.787	0.343
NOx: Urban	0.001	0.019	0.381	0.001	0.048	0.343	0.001	0.043	0.343
PM10: Total	0.041	0.024	0.036	0.414	0.045	0.027	0.024	0.107	0.027
PM10: Urban	0.000	0.001	0.036	0.000	0.004	0.027	0.000	0.004	0.027
SOx: Total	0.021	0.171	0.062	0.030	0.545	0.013	0.027	-0.154	0.013
SOx: Urban	0.000	0.001	0.062	0.000	0.001	0.013	0.000	0.001	0.013
CH4	0.587	0.176	0.090	0.208	0.386	0.135	0.188	-0.027	0.135
N2O	0.018	0.002	0.033	0.195	0.002	0.033	0.014	0.061	0.033
CO2	28	122	486	59	246	111	-145	-51	111
GHGs	46	126	498	124	255	124	-137	-33	124

	EtOH FFV: E85, H. Biomass			EV: US mix			EV: US NE mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	1,050	7,904	6,548	341	7,040	0	532	6,911	0
Fossil fuels	998	-37	1,385	302	5,298	0	459	4,173	0
Petroleum	380	279	1,362	60	58	0	52	182	0
VOC: Total	0.040	0.131	0.168	0.040	0.008	0.000	0.031	0.007	0.000
VOC: Urban	0.001	0.024	0.168	0.001	0.001	0.000	0.001	0.001	0.000
CO: Total	0.184	0.552	4.948	0.075	0.075	0.000	0.087	0.065	0.000
CO: Urban	0.001	0.021	4.948	0.001	0.005	0.000	0.002	0.009	0.000
NOx: Total	0.406	0.778	0.343	0.095	0.943	0.000	0.126	0.578	0.000
NOx: Urban	0.002	0.045	0.343	0.003	0.017	0.000	0.005	0.030	0.000
PM10: Total	0.020	0.100	0.027	0.020	0.054	0.021	0.014	0.034	0.021
PM10: Urban	0.000	0.004	0.027	0.000	0.001	0.021	0.000	0.002	0.021
SOx: Total	0.046	-0.050	0.013	0.054	1.178	0.000	0.069	0.626	0.000
SOx: Urban	0.000	0.001	0.013	0.000	0.002	0.000	0.000	0.006	0.000
CH4	0.255	0.030	0.135	0.744	0.007	0.000	0.674	0.006	0.000
N2O	0.186	0.053	0.033	0.000	0.004	0.000	0.000	0.003	0.000
CO2	-8	-8	111	24	471	0	37	337	0
GHGs	55	9	124	40	472	0	52	338	0

B-I Near-Term Technologies

B-I.2 Light-Duty Truck 1 (Cont.)

	EV: CA mix			Grid-connected SIDI HEVs: CARFG2, ETBE, CA mix			Grid-connected SIDI HEVs: CARFG2, EtOH, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	345	6,849	0	203	2,676	2,674	203	2,660	2,674
Fossil fuels	306	2,393	0	182	1,320	2,542	182	1,305	2,572
Petroleum	21	15	0	32	249	2,370	32	269	2,572
VOC: Total	0.015	0.005	0.000	0.016	0.055	0.102	0.016	0.046	0.139
VOC: Urban	0.001	0.001	0.000	0.000	0.014	0.102	0.000	0.013	0.139
CO: Total	0.057	0.042	0.000	0.058	0.062	3.695	0.058	0.046	3.695
CO: Urban	0.002	0.007	0.000	0.001	0.007	3.695	0.001	0.006	3.695
NOx: Total	0.087	0.221	0.000	0.052	0.186	0.267	0.052	0.156	0.267
NOx: Urban	0.004	0.022	0.000	0.001	0.016	0.267	0.001	0.014	0.267
PM10: Total	0.006	0.014	0.021	0.003	0.034	0.034	0.003	0.023	0.034
PM10: Urban	0.000	0.001	0.021	0.000	0.001	0.034	0.000	0.001	0.034
SOx: Total	0.035	0.154	0.000	0.018	0.119	0.004	0.018	0.106	0.004
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.004	0.000	0.001	0.004
CH4	0.447	0.004	0.000	0.376	0.130	0.063	0.376	0.056	0.063
N2O	0.000	0.002	0.000	0.000	0.011	0.023	0.000	0.006	0.023
CO2	24	168	0	17	106	202	17	95	203
GHGs	34	169	0	25	112	211	25	98	212

	Grid-independent SIDI HEVs: FRFG2, MTBE			Grid-independent CIDI HEVs: CD		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	134	801	3,618	128	544	3,438
Fossil fuels	123	776	3,618	116	525	3,438
Petroleum	34	328	3,175	32	265	3,438
VOC: Total	0.016	0.052	0.146	0.015	0.020	0.091
VOC: Urban	0.000	0.018	0.146	0.000	0.006	0.091
CO: Total	0.056	0.059	5.278	0.053	0.029	1.139
CO: Urban	0.000	0.006	5.278	0.000	0.004	1.139
NOx: Total	0.035	0.115	0.381	0.034	0.073	0.600
NOx: Urban	0.000	0.010	0.381	0.000	0.007	0.600
PM10: Total	0.002	0.011	0.039	0.002	0.008	0.121
PM10: Urban	0.000	0.001	0.039	0.000	0.001	0.121
SOx: Total	0.010	0.066	0.005	0.010	0.048	0.043
SOx: Urban	0.000	0.001	0.005	0.000	0.001	0.043
CH4	0.327	0.171	0.090	0.311	0.046	0.014
N2O	0.000	0.001	0.033	0.000	0.001	0.024
CO2	13	62	274	12	39	276
GHGs	20	66	286	19	40	284

B-I Near-Term Technologies

B-I.3 Light-Duty Truck 2

	Baseline Conv. GV: CG			Conv. GV: FRFG2, MTBE			Conv. GV: CARFG2, ETBE		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	298	1,779	8,021	298	1,776	8,021	298	1,864	8,021
Fossil fuels	272	1,721	8,021	272	1,720	8,021	272	1,807	7,625
Petroleum	76	845	7,891	76	727	7,039	76	735	7,110
VOC: Total	0.035	0.114	0.785	0.035	0.115	0.675	0.035	0.160	0.675
VOC: Urban	0.000	0.039	0.785	0.000	0.040	0.675	0.000	0.041	0.675
CO: Total	0.124	0.092	16.846	0.124	0.131	13.477	0.124	0.148	13.477
CO: Urban	0.000	0.012	16.846	0.000	0.013	13.477	0.000	0.016	13.477
NOx: Total	0.079	0.230	1.173	0.079	0.254	1.114	0.079	0.359	1.114
NOx: Urban	0.001	0.019	1.173	0.001	0.022	1.114	0.001	0.028	1.114
PM10: Total	0.004	0.025	0.036	0.004	0.025	0.035	0.004	0.089	0.035
PM10: Urban	0.000	0.001	0.036	0.000	0.002	0.035	0.000	0.002	0.035
SOx: Total	0.023	0.155	0.078	0.023	0.147	0.012	0.023	0.220	0.012
SOx: Urban	0.000	0.001	0.078	0.000	0.002	0.012	0.000	0.002	0.012
CH4	0.726	0.180	0.090	0.726	0.379	0.083	0.726	0.385	0.083
N2O	0.000	0.002	0.040	0.000	0.002	0.040	0.000	0.030	0.040
CO2	28	128	607	28	137	607	28	166	562
GHGs	44	132	622	44	145	621	44	183	576

	Conv. GV: CARFG2, EtOH			CIDI Vehicle: CD			CNGV: bi-fueled, CNG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	298	1,815	8,021	221	940	5,941	857	1,004	8,912
Fossil fuels	272	1,761	7,717	201	908	5,941	847	822	8,912
Petroleum	76	794	7,717	56	457	5,941	41	13	0
VOC: Total	0.035	0.135	0.801	0.026	0.034	0.540	0.043	0.025	0.393
VOC: Urban	0.000	0.039	0.801	0.000	0.010	0.540	0.003	0.019	0.393
CO: Total	0.124	0.099	13.477	0.092	0.049	1.208	0.183	0.061	9.434
CO: Urban	0.000	0.013	13.477	0.000	0.008	1.208	0.007	0.041	9.434
NOx: Total	0.079	0.270	1.114	0.058	0.126	1.224	0.278	0.226	1.173
NOx: Urban	0.001	0.022	1.114	0.000	0.013	1.224	0.018	0.115	1.173
PM10: Total	0.004	0.057	0.035	0.003	0.014	0.130	0.007	0.010	0.023
PM10: Urban	0.000	0.002	0.035	0.000	0.001	0.130	0.000	0.002	0.023
SOx: Total	0.023	0.179	0.012	0.017	0.084	0.075	0.030	0.127	0.003
SOx: Urban	0.000	0.001	0.012	0.000	0.001	0.075	0.000	0.000	0.003
CH4	0.726	0.166	0.083	0.537	0.080	0.017	1.759	0.158	0.900
N2O	0.000	0.016	0.040	0.000	0.001	0.032	0.001	0.001	0.024
CO2	28	133	563	21	67	478	61	66	532
GHGs	44	141	577	32	69	488	98	70	558

B-I.3 Light-Duty Truck 2 (Cont.)

	CNGV: dedicated			LPGV: dedicated, crude			LPGV: dedicated, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	830	972	8,625	298	909	8,021	502	607	8,021
Fossil fuels	820	796	8,625	271	857	8,021	495	567	8,021
Petroleum	40	13	0	76	416	8,021	36	121	0
VOC: Total	0.042	0.024	0.204	0.035	0.043	0.456	0.012	0.037	0.456
VOC: Urban	0.003	0.019	0.204	0.000	0.014	0.456	0.000	0.024	0.456
CO: Total	0.177	0.059	8.086	0.124	0.063	10.108	0.102	0.052	10.108
CO: Urban	0.006	0.040	8.086	0.000	0.015	10.108	0.000	0.014	10.108
NOx: Total	0.269	0.219	1.173	0.079	0.142	0.997	0.090	0.096	0.997
NOx: Urban	0.017	0.111	1.173	0.001	0.021	0.997	0.000	0.021	0.997
PM10: Total	0.007	0.009	0.022	0.004	0.015	0.023	0.004	0.007	0.023
PM10: Urban	0.000	0.002	0.022	0.000	0.002	0.023	0.000	0.002	0.023
SOx: Total	0.029	0.123	0.003	0.023	0.086	0.000	0.024	0.033	0.000
SOx: Urban	0.000	0.000	0.003	0.000	0.002	0.000	0.000	0.002	0.000
CH4	1.702	0.153	0.900	0.725	0.082	0.117	0.832	0.064	0.117
N2O	0.001	0.001	0.032	0.000	0.001	0.040	0.001	0.001	0.040
CO2	59	64	514	28	65	574	40	41	574
GHGs	95	68	543	44	67	589	57	42	589

	MeOH FFV: M85, NG			MeOH FFV: M85, flare gas			MeOH FFV: M85, LF gas		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	448	3,666	8,021	448	3,896	8,021	79	2,789	8,021
Fossil fuels	436	3,634	8,021	436	3,865	2,113	72	2,774	2,113
Petroleum	46	406	2,078	46	408	2,078	20	388	2,078
VOC: Total	0.018	0.091	0.589	0.018	-0.406	0.589	0.009	0.023	0.589
VOC: Urban	0.000	0.015	0.589	0.000	0.015	0.589	0.000	0.005	0.589
CO: Total	0.108	0.268	10.108	0.108	0.112	10.108	0.033	-0.495	10.108
CO: Urban	0.000	0.005	10.108	0.000	0.005	10.108	0.000	-0.248	10.108
NOx: Total	0.087	0.285	0.997	0.087	0.002	0.997	0.021	0.278	0.997
NOx: Urban	0.000	0.009	0.997	0.000	0.009	0.997	0.000	-0.016	0.997
PM10: Total	0.004	0.016	0.027	0.004	0.004	0.027	0.001	-0.175	0.027
PM10: Urban	0.000	0.001	0.027	0.000	0.001	0.027	0.000	-0.099	0.027
SOx: Total	0.024	0.066	0.020	0.024	0.064	0.020	0.006	0.363	0.020
SOx: Urban	0.000	0.001	0.020	0.000	0.001	0.020	0.000	-0.019	0.020
CH4	0.804	0.227	0.045	0.804	0.077	0.045	0.191	-3.898	0.045
N2O	0.000	0.002	0.040	0.000	0.001	0.040	0.000	0.002	0.040
CO2	37	145	582	37	-374	582	8	-867	582
GHGs	54	150	595	54	-372	595	12	-948	595

B-I.3 Light-Duty Truck 2 (Cont.)

	GV: E10, corn			EtOH FFV: E85, corn			EtOH FFV: E85, W. Biomass		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	350	1,935	8,021	895	3,585	8,021	869	11,294	8,021
Fossil fuels	322	1,881	7,474	856	3,568	1,696	842	-630	1,696
Petroleum	103	803	7,353	388	365	1,669	654	343	1,669
VOC: Total	0.020	0.158	0.816	-0.143	0.618	0.589	0.061	0.169	0.589
VOC: Urban	0.000	0.038	0.816	0.001	0.030	0.589	0.001	0.030	0.589
CO: Total	0.131	0.100	10.781	0.198	0.182	10.108	0.282	0.749	10.108
CO: Urban	0.000	0.013	10.781	0.001	0.027	10.108	0.001	0.025	10.108
NOx: Total	0.109	0.273	1.173	0.429	0.727	0.997	0.376	0.964	0.997
NOx: Urban	0.001	0.023	1.173	0.002	0.059	0.997	0.002	0.053	0.997
PM10: Total	0.047	0.028	0.036	0.507	0.056	0.027	0.030	0.131	0.027
PM10: Urban	0.000	0.002	0.036	0.000	0.005	0.027	0.000	0.005	0.027
SOx: Total	0.024	0.199	0.072	0.037	0.667	0.016	0.034	-0.189	0.016
SOx: Urban	0.000	0.001	0.072	0.000	0.001	0.016	0.000	0.001	0.016
CH4	0.685	0.205	0.090	0.255	0.472	0.135	0.231	-0.033	0.135
N2O	0.021	0.002	0.040	0.239	0.002	0.040	0.017	0.074	0.040
CO2	32	143	567	72	301	142	-178	-63	142
GHGs	53	148	582	152	312	158	-168	-40	158

	EtOH FFV: E85, H. Biomass			EV: US mix			EV: US NE mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	1,287	9,682	8,021	397	8,213	0	620	8,063	0
Fossil fuels	1,223	-45	1,696	352	6,182	0	536	4,869	0
Petroleum	466	341	1,669	70	68	0	61	212	0
VOC: Total	0.049	0.161	0.589	0.047	0.010	0.000	0.036	0.009	0.000
VOC: Urban	0.001	0.030	0.589	0.001	0.001	0.000	0.001	0.001	0.000
CO: Total	0.225	0.677	10.108	0.088	0.088	0.000	0.102	0.076	0.000
CO: Urban	0.001	0.026	10.108	0.001	0.006	0.000	0.002	0.010	0.000
NOx: Total	0.497	0.953	0.997	0.110	1.101	0.000	0.146	0.675	0.000
NOx: Urban	0.003	0.055	0.997	0.004	0.020	0.000	0.005	0.035	0.000
PM10: Total	0.025	0.123	0.027	0.023	0.063	0.021	0.017	0.040	0.021
PM10: Urban	0.000	0.005	0.027	0.000	0.001	0.021	0.000	0.002	0.021
SOx: Total	0.057	-0.062	0.016	0.063	1.375	0.000	0.080	0.730	0.000
SOx: Urban	0.000	0.001	0.016	0.000	0.002	0.000	0.000	0.007	0.000
CH4	0.313	0.037	0.135	0.868	0.008	0.000	0.786	0.007	0.000
N2O	0.228	0.065	0.040	0.000	0.004	0.000	0.001	0.004	0.000
CO2	-10	-9	142	28	549	0	43	393	0
GHGs	67	12	158	47	551	0	60	395	0

B-I Near-Term Technologies

B-I.3 Light-Duty Truck 2 (Cont.)

	EV: CA mix			Grid-connected SIDI HEVs: CARFG2, ETBE, CA mix			Grid-connected SIDI HEVs: CARFG2, EtOH, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	402	7,990	0	152	2,007	2,005	152	1,995	2,005
Fossil fuels	357	2,791	0	137	990	1,906	137	979	1,929
Petroleum	24	17	0	24	187	1,777	24	202	1,929
VOC: Total	0.018	0.005	0.000	0.012	0.041	0.104	0.012	0.035	0.104
VOC: Urban	0.001	0.001	0.000	0.000	0.010	0.104	0.000	0.010	0.104
CO: Total	0.066	0.049	0.000	0.044	0.046	2.472	0.044	0.034	2.472
CO: Urban	0.002	0.008	0.000	0.000	0.006	2.472	0.000	0.005	2.472
NOx: Total	0.101	0.257	0.000	0.039	0.139	0.193	0.039	0.117	0.193
NOx: Urban	0.005	0.026	0.000	0.001	0.012	0.193	0.001	0.010	0.193
PM10: Total	0.006	0.016	0.021	0.002	0.025	0.031	0.002	0.017	0.031
PM10: Urban	0.000	0.002	0.021	0.000	0.001	0.031	0.000	0.001	0.031
SOx: Total	0.040	0.179	0.000	0.014	0.090	0.003	0.014	0.079	0.003
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.003	0.000	0.000	0.003
CH4	0.521	0.005	0.000	0.282	0.097	0.059	0.282	0.042	0.059
N2O	0.000	0.003	0.000	0.000	0.008	0.020	0.000	0.005	0.020
CO2	28	196	0	13	79	152	13	71	152
GHGs	39	197	0	18	84	159	18	73	160

	Grid-independent SIDI HEVs: FRFG2, MTBE			Grid-independent CIDI HEVs: CD		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	157	935	4,221	149	634	4,010
Fossil fuels	143	905	4,221	136	613	4,010
Petroleum	40	383	3,705	38	309	4,010
VOC: Total	0.018	0.061	0.565	0.018	0.023	0.540
VOC: Urban	0.000	0.021	0.565	0.000	0.007	0.540
CO: Total	0.065	0.069	10.108	0.062	0.033	1.208
CO: Urban	0.000	0.007	10.108	0.000	0.005	1.208
NOx: Total	0.041	0.134	0.997	0.039	0.085	1.224
NOx: Urban	0.000	0.011	0.997	0.000	0.009	1.224
PM10: Total	0.002	0.013	0.039	0.002	0.009	0.130
PM10: Urban	0.000	0.001	0.039	0.000	0.001	0.130
SOx: Total	0.012	0.077	0.006	0.011	0.056	0.051
SOx: Urban	0.000	0.001	0.006	0.000	0.001	0.051
CH4	0.382	0.199	0.090	0.363	0.054	0.017
N2O	0.000	0.001	0.040	0.000	0.001	0.032
CO2	15	72	319	14	45	323
GHGs	23	77	334	22	47	333

B-II Long-Term Technologies

B-II.1 Passenger Car

	Baseline Conv. GV: FRFG2, MTBE			CNGV: dedicated			LNGV: dedicated		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	171	1,026	4,678	428	488	4,455	279	807	4,455
Fossil fuels	156	993	4,678	423	396	4,455	275	798	4,455
Petroleum	44	424	4,105	20	6	0	20	165	0
VOC: Total	0.019	0.065	0.125	0.010	0.006	0.062	0.004	0.026	0.062
VOC: Urban	0.000	0.023	0.125	0.001	0.004	0.062	0.000	0.002	0.062
CO: Total	0.072	0.075	2.759	0.090	0.029	2.207	0.056	0.114	2.207
CO: Urban	0.000	0.008	2.759	0.003	0.020	2.207	0.000	0.004	2.207
NOx: Total	0.043	0.133	0.036	0.132	0.100	0.036	0.047	0.273	0.036
NOx: Urban	0.000	0.012	0.036	0.008	0.055	0.036	0.000	0.007	0.036
PM10: Total	0.002	0.014	0.031	0.004	0.004	0.023	0.002	0.008	0.023
PM10: Urban	0.000	0.001	0.031	0.000	0.001	0.023	0.000	0.001	0.023
SOx: Total	0.009	0.069	0.007	0.014	0.041	0.001	0.013	0.007	0.000
SOx: Urban	0.000	0.001	0.007	0.000	0.000	0.001	0.000	0.000	0.000
CH4	0.423	0.217	0.071	0.879	0.077	0.355	0.464	0.490	0.355
N2O	0.000	0.001	0.028	0.001	0.001	0.014	0.000	0.001	0.014
CO2	16	79	354	30	32	266	22	43	263
GHGs	25	84	364	49	34	278	32	54	274

	LPGV: dedicated, crude			LPGV: dedicated, NG			Dedi. MeOH Vehicle: M90, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	156	477	4,252	265	319	4,252	246	1,895	4,252
Fossil fuels	142	450	4,252	262	297	4,252	240	1,879	4,252
Petroleum	40	220	4,252	19	64	0	23	177	800
VOC: Total	0.017	0.022	0.068	0.004	0.019	0.068	0.006	0.044	0.125
VOC: Urban	0.000	0.007	0.068	0.000	0.013	0.068	0.000	0.006	0.125
CO: Total	0.066	0.033	2.207	0.054	0.027	2.207	0.056	0.136	2.759
CO: Urban	0.000	0.008	2.207	0.000	0.008	2.207	0.000	0.002	2.759
NOx: Total	0.039	0.069	0.036	0.045	0.047	0.036	0.044	0.122	0.036
NOx: Urban	0.000	0.011	0.036	0.000	0.011	0.036	0.000	0.004	0.036
PM10: Total	0.002	0.008	0.023	0.002	0.004	0.023	0.002	0.006	0.027
PM10: Urban	0.000	0.001	0.023	0.000	0.001	0.023	0.000	0.000	0.027
SOx: Total	0.008	0.036	0.000	0.012	0.012	0.000	0.011	0.022	0.001
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.001
CH4	0.385	0.043	0.078	0.441	0.033	0.078	0.431	0.087	0.036
N2O	0.000	0.000	0.028	0.000	0.000	0.028	0.000	0.001	0.028
CO2	15	34	304	21	21	304	20	67	310
GHGs	23	35	315	30	22	315	29	69	319

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	Dedi. MeOH Vehicle: M90, flare gas			Dedi. MeOH Vehicle: M90, LF-gas			Dedi. EtOH Vehicle: E90, corn		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	246	2,190	4,252	28	1,488	4,252	370	1,852	4,252
Fossil fuels	240	2,175	764	25	1,482	764	356	1,845	600
Petroleum	23	179	800	7	167	800	181	135	600
VOC: Total	0.006	-0.248	0.125	0.003	0.006	0.125	-0.085	0.345	0.125
VOC: Urban	0.000	0.006	0.125	0.000	0.001	0.125	0.000	0.008	0.125
CO: Total	0.056	0.064	2.759	0.012	-0.297	2.759	0.088	0.100	2.759
CO: Urban	0.000	0.002	2.759	0.000	-0.147	2.759	0.000	0.007	2.759
NOx: Total	0.044	-0.025	0.036	0.007	0.117	0.036	0.196	0.302	0.036
NOx: Urban	0.000	0.004	0.036	0.000	-0.011	0.036	0.001	0.016	0.036
PM10: Total	0.002	0.001	0.027	0.000	-0.106	0.027	0.280	0.025	0.027
PM10: Urban	0.000	0.000	0.027	0.000	-0.058	0.027	0.000	0.001	0.027
SOx: Total	0.011	0.021	0.001	0.001	0.126	0.001	0.011	0.195	0.001
SOx: Urban	0.000	0.001	0.001	0.000	-0.012	0.001	0.000	0.000	0.001
CH4	0.431	0.053	0.036	0.069	-2.301	0.036	0.094	0.275	0.107
N2O	0.000	0.000	0.028	0.000	0.001	0.028	0.119	0.002	0.028
CO2	20	-228	310	3	-523	310	31	145	50
GHGs	29	-227	319	4	-571	319	70	151	61

	Dedi. EtOH Vehicle: E90, W. Biomass			Dedi. EtOH Vehicle: E90, H. Biomass			SIDI Vehicle: FRFG2, MTBE		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	377	4,651	4,252	521	3,725	4,252	137	820	3,742
Fossil fuels	366	32	600	496	129	600	125	794	3,742
Petroleum	291	136	600	207	130	600	35	339	3,284
VOC: Total	0.026	0.080	0.125	0.020	0.076	0.125	0.015	0.052	0.119
VOC: Urban	0.000	0.008	0.125	0.000	0.008	0.125	0.000	0.018	0.119
CO: Total	0.123	0.343	2.759	0.096	0.307	2.759	0.058	0.060	2.759
CO: Urban	0.000	0.006	2.759	0.000	0.006	2.759	0.000	0.006	2.759
NOx: Total	0.164	0.498	0.036	0.212	0.461	0.036	0.034	0.107	0.036
NOx: Urban	0.001	0.013	0.036	0.001	0.014	0.036	0.000	0.010	0.036
PM10: Total	0.013	0.064	0.027	0.011	0.058	0.027	0.002	0.011	0.035
PM10: Urban	0.000	0.001	0.027	0.000	0.001	0.027	0.000	0.001	0.035
SOx: Total	0.011	-0.003	0.001	0.016	0.011	0.001	0.007	0.055	0.006
SOx: Urban	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.006
CH4	0.088	0.036	0.107	0.118	0.045	0.107	0.339	0.173	0.071
N2O	0.008	0.034	0.028	0.102	0.030	0.028	0.000	0.001	0.028
CO2	-81	-1	50	-8	9	50	13	63	283
GHGs	-76	11	61	26	19	61	20	67	293

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	SIDI Vehicle: FRFG2, ETBE			SIDI Vehicle: FRFG2, EtOH			SIDI Vehicle: CARFG2, ETBE		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	137	854	3,742	137	830	3,742	137	854	3,742
Fossil fuels	125	827	3,503	125	805	3,559	125	827	3,558
Petroleum	35	341	3,192	35	368	3,559	35	341	3,317
VOC: Total	0.015	0.073	0.119	0.015	0.062	0.125	0.015	0.073	0.119
VOC: Urban	0.000	0.019	0.119	0.000	0.018	0.125	0.000	0.019	0.119
CO: Total	0.058	0.067	2.759	0.058	0.045	2.759	0.058	0.067	2.759
CO: Urban	0.000	0.007	2.759	0.000	0.006	2.759	0.000	0.007	2.759
NOx: Total	0.034	0.144	0.036	0.034	0.110	0.036	0.034	0.144	0.036
NOx: Urban	0.000	0.013	0.036	0.000	0.010	0.036	0.000	0.013	0.036
PM10: Total	0.002	0.040	0.035	0.002	0.026	0.035	0.002	0.040	0.035
PM10: Urban	0.000	0.001	0.035	0.000	0.001	0.035	0.000	0.001	0.035
SOx: Total	0.007	0.072	0.006	0.007	0.062	0.006	0.007	0.072	0.006
SOx: Urban	0.000	0.001	0.006	0.000	0.001	0.006	0.000	0.001	0.006
CH4	0.339	0.177	0.071	0.339	0.076	0.071	0.339	0.177	0.071
N2O	0.000	0.012	0.028	0.000	0.007	0.028	0.000	0.012	0.028
CO2	13	74	283	13	60	285	13	74	283
GHGs	20	82	293	20	64	295	20	82	293

	SIDI Vehicle: CARFG2, EtOH			SIDI Dedi. MeOH Vehicle: M90, NG			SIDI Dedi. MeOH Vehicle: M90, flare gas		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	137	830	3,742	216	1,521	3,742	216	1,780	3,742
Fossil fuels	125	805	3,600	211	1,511	3,742	211	1,772	672
Petroleum	35	368	3,600	20	95	704	20	96	704
VOC: Total	0.015	0.062	0.125	0.006	0.033	0.119	0.006	-0.224	0.119
VOC: Urban	0.000	0.018	0.125	0.000	0.006	0.119	0.000	0.006	0.119
CO: Total	0.058	0.045	2.759	0.049	0.110	2.759	0.049	0.046	2.759
CO: Urban	0.000	0.006	2.759	0.000	0.002	2.759	0.000	0.002	2.759
NOx: Total	0.034	0.110	0.036	0.039	0.090	0.036	0.039	-0.040	0.036
NOx: Urban	0.000	0.010	0.036	0.000	0.004	0.036	0.000	0.004	0.036
PM10: Total	0.002	0.026	0.035	0.002	0.004	0.031	0.002	-0.001	0.031
PM10: Urban	0.000	0.001	0.035	0.000	0.000	0.031	0.000	0.000	0.031
SOx: Total	0.007	0.062	0.006	0.010	0.009	0.001	0.010	0.009	0.001
SOx: Urban	0.000	0.001	0.006	0.000	0.001	0.001	0.000	0.001	0.001
CH4	0.339	0.076	0.071	0.379	0.045	0.036	0.379	0.015	0.036
N2O	0.000	0.007	0.028	0.000	0.001	0.028	0.000	0.000	0.028
CO2	13	60	284	18	48	273	18	-212	273
GHGs	20	64	295	26	49	282	26	-211	282

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	SIDI Dedi. MeOH Vehicle: M90, LF gas			SIDI Dedi. EtOH Vehicle: E90, corn			SIDI Dedi. EtOH Vehicle: E90, W. Biomass		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	25	1,162	3,742	326	1,630	3,742	332	4,092	3,742
Fossil fuels	22	1,162	672	313	1,624	528	322	28	528
Petroleum	6	86	704	159	119	528	256	119	528
VOC: Total	0.003	-0.001	0.119	-0.075	0.303	0.119	0.023	0.071	0.119
VOC: Urban	0.000	0.001	0.119	0.000	0.007	0.119	0.000	0.007	0.119
CO: Total	0.010	-0.271	2.759	0.078	0.088	2.759	0.109	0.302	2.759
CO: Urban	0.000	-0.130	2.759	0.000	0.006	2.759	0.000	0.005	2.759
NOx: Total	0.006	0.085	0.036	0.172	0.265	0.036	0.145	0.438	0.036
NOx: Urban	0.000	-0.010	0.036	0.001	0.014	0.036	0.001	0.012	0.036
PM10: Total	0.000	-0.095	0.031	0.246	0.022	0.031	0.012	0.056	0.031
PM10: Urban	0.000	-0.051	0.031	0.000	0.001	0.031	0.000	0.001	0.031
SOx: Total	0.001	0.101	0.001	0.009	0.172	0.001	0.010	-0.003	0.001
SOx: Urban	0.000	-0.010	0.001	0.000	0.000	0.001	0.000	0.000	0.001
CH4	0.061	-2.056	0.036	0.083	0.242	0.107	0.077	0.032	0.107
N2O	0.000	0.001	0.028	0.105	0.002	0.028	0.007	0.030	0.028
CO2	2	-471	273	28	127	44	-71	-1	44
GHGs	4	-514	282	62	133	55	-67	9	55

	SIDI Dedi. EtOH Vehicle: E90, H. Biomass			CIDI Vehicle: RFD			CIDI Vehicle: DME, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	458	3,278	3,742	114	581	3,118	195	1,521	3,118
Fossil fuels	436	114	528	104	562	3,118	192	1,513	3,118
Petroleum	182	114	528	29	283	3,118	14	82	0
VOC: Total	0.018	0.067	0.119	0.012	0.018	0.049	0.003	0.016	0.034
VOC: Urban	0.000	0.007	0.119	0.000	0.005	0.049	0.000	0.001	0.034
CO: Total	0.085	0.270	2.759	0.048	0.029	2.759	0.039	0.093	2.759
CO: Urban	0.000	0.005	2.759	0.000	0.004	2.759	0.000	0.001	2.759
NOx: Total	0.187	0.406	0.036	0.029	0.069	0.063	0.033	0.067	0.063
NOx: Urban	0.001	0.012	0.036	0.000	0.007	0.063	0.000	0.002	0.063
PM10: Total	0.009	0.051	0.031	0.001	0.008	0.031	0.002	0.001	0.028
PM10: Urban	0.000	0.001	0.031	0.000	0.000	0.031	0.000	0.000	0.028
SOx: Total	0.014	0.010	0.001	0.006	0.042	0.008	0.009	0.006	0.000
SOx: Urban	0.000	0.000	0.001	0.000	0.000	0.008	0.000	0.000	0.000
CH4	0.104	0.040	0.107	0.282	0.049	0.011	0.323	0.010	0.022
N2O	0.090	0.027	0.028	0.000	0.001	0.016	0.000	0.000	0.016
CO2	-7	8	44	11	42	252	15	54	219
GHGs	23	17	55	17	43	257	22	55	224

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	CIDI Vehicle: DME, flare gas			CIDI Vehicle: FT50, NG			CIDI Vehicle: FT50, flare gas		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	195	1,715	3,118	153	1,351	3,118	153	1,829	3,118
Fossil fuels	192	1,708	0	146	1,337	3,115	146	1,815	1,617
Petroleum	14	83	0	22	194	1,617	22	196	1,617
VOC: Total	0.003	-0.230	0.034	0.008	0.011	0.049	0.008	-0.132	0.049
VOC: Urban	0.000	0.001	0.034	0.000	0.003	0.049	0.000	0.003	0.049
CO: Total	0.039	0.018	2.759	0.044	0.041	2.759	0.044	0.013	2.759
CO: Urban	0.000	0.001	2.759	0.000	0.002	2.759	0.000	0.002	2.759
NOx: Total	0.033	-0.075	0.063	0.031	0.049	0.063	0.031	-0.019	0.063
NOx: Urban	0.000	0.002	0.063	0.000	0.004	0.063	0.000	0.004	0.063
PM10: Total	0.002	-0.005	0.028	0.002	0.003	0.029	0.002	0.001	0.029
PM10: Urban	0.000	0.000	0.028	0.000	0.000	0.029	0.000	0.000	0.029
SOx: Total	0.009	0.005	0.000	0.007	0.024	0.004	0.007	0.024	0.004
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.004
CH4	0.323	0.010	0.022	0.302	0.028	0.011	0.302	0.031	0.011
N2O	0.000	-0.001	0.016	0.000	0.000	0.016	0.000	0.000	0.016
CO2	15	-210	219	13	47	247	13	-86	247
GHGs	22	-210	224	19	48	252	19	-85	252

	CIDI Vehicle: BD20			Grid-independent SIDI HEVs: FRFG2, MTBE			Grid-independent SIDI HEVs: FRFG2, ETBE		
	Feedstock	Fuel	Operation	Feedstock	Fuel	Operation	Feedstock	Fuel	Operation
Total energy	153	756	3,118	90	540	2,462	90	562	2,462
Fossil fuels	141	723	3,118	82	522	2,462	82	544	2,305
Petroleum	61	298	2,538	23	223	2,161	23	224	2,100
VOC: Total	0.014	0.067	0.049	0.010	0.034	0.106	0.010	0.048	0.106
VOC: Urban	0.000	0.008	0.049	0.000	0.012	0.088	0.000	0.012	0.088
CO: Total	0.056	0.085	2.759	0.038	0.039	2.759	0.038	0.044	2.759
CO: Urban	0.000	0.022	2.759	0.000	0.004	2.759	0.000	0.005	2.759
NOx: Total	0.051	0.136	0.063	0.023	0.070	0.036	0.023	0.095	0.036
NOx: Urban	0.000	0.024	0.063	0.000	0.007	0.036	0.000	0.008	0.036
PM10: Total	0.003	0.011	0.030	0.001	0.007	0.033	0.001	0.026	0.033
PM10: Urban	0.000	0.002	0.030	0.000	0.000	0.033	0.000	0.001	0.033
SOx: Total	0.007	0.044	0.006	0.005	0.036	0.004	0.005	0.047	0.004
SOx: Urban	0.000	0.001	0.006	0.000	0.000	0.004	0.000	0.000	0.004
CH4	0.236	0.080	0.011	0.223	0.114	0.071	0.223	0.117	0.071
N2O	0.002	0.001	0.016	0.000	0.001	0.028	0.000	0.008	0.028
CO2	13	50	206	9	41	186	9	49	186
GHGs	19	52	211	13	44	196	13	54	196

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	Grid-independent SIDI HEVs: FRFG2, EtOH			Grid-independent SI HEVs: CNG			Grid-independent SI HEVs: LNG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	90	546	2,462	264	301	2,752	172	498	2,752
Fossil fuels	82	530	2,341	261	245	2,752	170	493	2,752
Petroleum	23	242	2,341	13	4	0	12	102	0
VOC: Total	0.010	0.041	0.112	0.006	0.004	0.062	0.003	0.016	0.062
VOC: Urban	0.000	0.012	0.101	0.000	0.002	0.062	0.000	0.001	0.062
CO: Total	0.038	0.030	2.759	0.056	0.018	2.207	0.035	0.071	2.207
CO: Urban	0.000	0.004	2.759	0.002	0.012	2.207	0.000	0.003	2.207
NOx: Total	0.023	0.073	0.036	0.082	0.062	0.036	0.029	0.168	0.036
NOx: Urban	0.000	0.007	0.036	0.005	0.034	0.036	0.000	0.004	0.036
PM10: Total	0.001	0.017	0.033	0.002	0.003	0.026	0.001	0.005	0.026
PM10: Urban	0.000	0.001	0.033	0.000	0.001	0.026	0.000	0.000	0.026
SOx: Total	0.005	0.041	0.004	0.008	0.026	0.001	0.008	0.004	0.000
SOx: Urban	0.000	0.000	0.004	0.000	0.000	0.001	0.000	0.000	0.000
CH4	0.223	0.050	0.071	0.543	0.047	0.355	0.286	0.303	0.355
N2O	0.000	0.004	0.028	0.000	0.000	0.014	0.000	0.001	0.014
CO2	9	40	187	19	20	164	14	27	162
GHGs	13	42	197	30	21	176	20	33	174

	Grid-independent SI HEVs: LPG, crude			Grid-independent SI HEVs: LPG, NG			Grid-independent SIDI HEVs: M90, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	101	309	2,752	172	206	2,752	142	1,097	2,462
Fossil fuels	92	291	2,752	169	192	2,752	139	1,088	2,462
Petroleum	26	143	2,752	12	42	0	13	103	463
VOC: Total	0.011	0.014	0.068	0.003	0.012	0.068	0.004	0.026	0.106
VOC: Urban	0.000	0.005	0.068	0.000	0.008	0.068	0.000	0.004	0.106
CO: Total	0.042	0.022	2.207	0.035	0.018	2.207	0.032	0.079	2.759
CO: Urban	0.000	0.005	2.207	0.000	0.005	2.207	0.000	0.001	2.759
NOx: Total	0.025	0.045	0.036	0.029	0.030	0.036	0.025	0.071	0.036
NOx: Urban	0.000	0.007	0.036	0.000	0.007	0.036	0.000	0.002	0.036
PM10: Total	0.001	0.005	0.026	0.001	0.002	0.026	0.001	0.004	0.030
PM10: Urban	0.000	0.001	0.026	0.000	0.001	0.026	0.000	0.000	0.030
SOx: Total	0.005	0.023	0.000	0.008	0.008	0.000	0.007	0.013	0.001
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
CH4	0.249	0.028	0.078	0.285	0.022	0.078	0.250	0.050	0.036
N2O	0.000	0.000	0.028	0.000	0.000	0.028	0.000	0.001	0.028
CO2	10	22	197	14	14	197	12	39	179
GHGs	15	23	207	20	14	207	17	40	189

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	Grid-independent SIDI HEVs: M90, flare gas			Grid-independent SIDI HEVs: M90, LF gas			Grid-independent SIDI HEVs: E90, corn		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	142	1,268	2,462	16	861	2,462	214	1,072	2,462
Fossil fuels	139	1,259	442	15	858	442	206	1,068	347
Petroleum	13	104	463	4	97	463	105	78	347
VOC: Total	0.004	-0.144	0.106	0.002	0.003	0.106	-0.049	0.200	0.106
VOC: Urban	0.000	0.004	0.106	0.000	0.000	0.106	0.000	0.005	0.106
CO: Total	0.032	0.037	2.759	0.007	-0.172	2.759	0.051	0.058	2.759
CO: Urban	0.000	0.001	2.759	0.000	-0.085	2.759	0.000	0.004	2.759
NOx: Total	0.025	-0.015	0.036	0.004	0.068	0.036	0.113	0.175	0.036
NOx: Urban	0.000	0.002	0.036	0.000	-0.006	0.036	0.000	0.009	0.036
PM10: Total	0.001	0.001	0.030	0.000	-0.061	0.030	0.162	0.014	0.030
PM10: Urban	0.000	0.000	0.030	0.000	-0.034	0.030	0.000	0.001	0.030
SOx: Total	0.007	0.012	0.001	0.001	0.073	0.001	0.006	0.113	0.001
SOx: Urban	0.000	0.000	0.001	0.000	-0.007	0.001	0.000	0.000	0.001
CH4	0.250	0.030	0.036	0.040	-1.332	0.036	0.055	0.159	0.107
N2O	0.000	0.000	0.028	0.000	0.001	0.028	0.069	0.001	0.028
CO2	12	-132	179	2	-303	179	18	84	30
GHGs	17	-131	189	2	-330	189	41	88	41

	Grid-independent SIDI HEVs: E90, W. Biomass			Grid-independent SIDI HEVs: E90, H. Biomass			Grid-connected SIDI HEVs: FRFG2, MTBE, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	218	2,692	2,462	302	2,157	2,462	114	1,425	1,770
Fossil fuels	212	18	347	287	75	347	102	1,146	1,770
Petroleum	168	79	347	120	75	347	25	169	1,603
VOC: Total	0.015	0.047	0.106	0.012	0.044	0.106	0.012	0.026	0.074
VOC: Urban	0.000	0.005	0.106	0.000	0.005	0.106	0.000	0.009	0.074
CO: Total	0.071	0.199	2.759	0.056	0.178	2.759	0.038	0.039	1.931
CO: Urban	0.000	0.004	2.759	0.000	0.004	2.759	0.000	0.004	1.931
NOx: Total	0.095	0.288	0.036	0.123	0.267	0.036	0.029	0.167	0.025
NOx: Urban	0.000	0.008	0.036	0.001	0.008	0.036	0.001	0.007	0.025
PM10: Total	0.008	0.037	0.030	0.006	0.034	0.030	0.004	0.013	0.029
PM10: Urban	0.000	0.000	0.030	0.000	0.001	0.030	0.000	0.001	0.029
SOx: Total	0.006	-0.002	0.001	0.009	0.006	0.001	0.010	0.142	0.003
SOx: Urban	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.003
CH4	0.051	0.021	0.107	0.068	0.026	0.107	0.268	0.083	0.050
N2O	0.004	0.020	0.028	0.059	0.018	0.028	0.000	0.001	0.020
CO2	-47	0	30	-5	5	30	10	99	134
GHGs	-44	6	41	15	11	41	15	101	141

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	Grid-connected SIDI HEVs: FRFG2, ETBE, US mix			Grid-connected SIDI HEVs: FRFG2, EtOH, US mix			Grid-connected SIDI HEVs: FRFG2, MTBE, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	114	1,441	1,770	114	1,429	1,770	115	1,413	1,770
Fossil fuels	102	1,161	1,683	102	1,151	1,703	103	718	1,770
Petroleum	25	170	1,569	25	183	1,703	20	163	1,603
VOC: Total	0.012	0.036	0.074	0.012	0.030	0.079	0.009	0.025	0.074
VOC: Urban	0.000	0.009	0.074	0.000	0.008	0.079	0.000	0.009	0.074
CO: Total	0.038	0.042	1.931	0.038	0.032	1.931	0.035	0.034	1.931
CO: Urban	0.000	0.004	1.931	0.000	0.003	1.931	0.000	0.004	1.931
NOx: Total	0.029	0.185	0.025	0.029	0.169	0.025	0.028	0.079	0.025
NOx: Urban	0.001	0.008	0.025	0.001	0.007	0.025	0.001	0.008	0.025
PM10: Total	0.004	0.026	0.029	0.004	0.020	0.029	0.002	0.007	0.029
PM10: Urban	0.000	0.001	0.029	0.000	0.001	0.029	0.000	0.001	0.029
SOx: Total	0.010	0.150	0.003	0.010	0.145	0.003	0.007	0.041	0.003
SOx: Urban	0.000	0.001	0.003	0.000	0.001	0.003	0.000	0.000	0.003
CH4	0.268	0.085	0.050	0.268	0.037	0.050	0.224	0.083	0.050
N2O	0.000	0.007	0.020	0.000	0.004	0.020	0.000	0.001	0.020
CO2	10	104	134	10	97	134	10	54	134
GHGs	15	108	141	15	99	142	14	56	141

	Grid-connected SIDI HEVs: FRFG2, ETBE, CA mix			Grid-connected SIDI HEVs: FRFG2, EtOH, CA mix			Grid-connected SI HEVs: CNG, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	115	1,428	1,770	115	1,417	1,770	240	1,254	1,984
Fossil fuels	103	734	1,683	103	723	1,703	232	947	1,984
Petroleum	20	164	1,569	20	177	1,703	18	12	0
VOC: Total	0.009	0.035	0.074	0.009	0.030	0.079	0.010	0.004	0.043
VOC: Urban	0.000	0.009	0.074	0.000	0.009	0.079	0.000	0.002	0.043
CO: Total	0.035	0.037	1.931	0.035	0.027	1.931	0.051	0.023	1.545
CO: Urban	0.000	0.004	1.931	0.000	0.004	1.931	0.002	0.010	1.545
NOx: Total	0.028	0.097	0.025	0.028	0.081	0.025	0.072	0.161	0.025
NOx: Urban	0.001	0.009	0.025	0.001	0.008	0.025	0.004	0.027	0.025
PM10: Total	0.002	0.021	0.029	0.002	0.014	0.029	0.005	0.010	0.025
PM10: Urban	0.000	0.001	0.029	0.000	0.001	0.029	0.000	0.001	0.025
SOx: Total	0.007	0.049	0.003	0.007	0.045	0.003	0.013	0.134	0.001
SOx: Urban	0.000	0.000	0.003	0.000	0.000	0.003	0.000	0.000	0.001
CH4	0.224	0.085	0.050	0.224	0.037	0.050	0.500	0.036	0.249
N2O	0.000	0.006	0.020	0.000	0.004	0.020	0.000	0.001	0.010
CO2	10	59	134	10	53	134	17	83	118
GHGs	14	63	141	14	55	142	28	84	127

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

Grid-connected SI HEVs: CNG, CA mix

	Feedstock	Fuel	Vehicle Operation
Total energy	240	1,242	1,984
Fossil fuels	232	519	1,984
Petroleum	12	5	0
VOC: Total	0.006	0.003	0.043
VOC: Urban	0.000	0.002	0.043
CO: Total	0.048	0.018	1.545
CO: Urban	0.002	0.010	1.545
NOx: Total	0.070	0.073	0.025
NOx: Urban	0.004	0.027	0.025
PM10: Total	0.002	0.004	0.025
PM10: Urban	0.000	0.001	0.025
SOx: Total	0.010	0.034	0.001
SOx: Urban	0.000	0.000	0.001
CH4	0.456	0.035	0.249
N2O	0.000	0.001	0.010
CO2	17	38	118
GHGs	27	39	127

Grid-connected SI HEVs: LNG, US mix

	Feedstock	Fuel	Vehicle Operation
Total energy	174	1,396	1,984
Fossil fuels	166	1,126	1,984
Petroleum	18	82	0
VOC: Total	0.007	0.013	0.043
VOC: Urban	0.000	0.001	0.043
CO: Total	0.036	0.061	1.545
CO: Urban	0.000	0.003	1.545
NOx: Total	0.034	0.238	0.025
NOx: Urban	0.000	0.006	0.025
PM10: Total	0.004	0.011	0.025
PM10: Urban	0.000	0.000	0.025
SOx: Total	0.012	0.119	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.314	0.220	0.249
N2O	0.000	0.001	0.010
CO2	13	88	117
GHGs	20	93	125

Grid-connected SI HEVs: LNG, CA mix

	Feedstock	Fuel	Vehicle Operation
Total energy	174	1,384	1,984
Fossil fuels	167	698	1,984
Petroleum	12	76	0
VOC: Total	0.003	0.012	0.043
VOC: Urban	0.000	0.001	0.043
CO: Total	0.033	0.056	1.545
CO: Urban	0.000	0.003	1.545
NOx: Total	0.033	0.150	0.025
NOx: Urban	0.001	0.006	0.025
PM10: Total	0.002	0.005	0.025
PM10: Urban	0.000	0.001	0.025
SOx: Total	0.009	0.018	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.270	0.219	0.249
N2O	0.000	0.001	0.010
CO2	13	44	117
GHGs	19	48	125

Grid-connected SI HEVs: LPG, crude, US mix

	Feedstock	Fuel	Vehicle Operation
Total energy	163	1,679	2,646
Fossil fuels	146	1,307	2,646
Petroleum	37	149	2,646
VOC: Total	0.018	0.015	0.048
VOC: Urban	0.000	0.005	0.048
CO: Total	0.055	0.035	1.545
CO: Urban	0.000	0.006	1.545
NOx: Total	0.041	0.199	0.025
NOx: Urban	0.001	0.010	0.025
PM10: Total	0.005	0.015	0.025
PM10: Urban	0.000	0.001	0.025
SOx: Total	0.014	0.176	0.000
SOx: Urban	0.000	0.001	0.000
CH4	0.383	0.029	0.055
N2O	0.000	0.001	0.020
CO2	14	113	189
GHGs	22	114	196

Grid-connected SI HEVs: LPG, NG, US mix

	Feedstock	Fuel	Vehicle Operation
Total energy	173	1,185	1,984
Fossil fuels	166	909	1,984
Petroleum	18	39	0
VOC: Total	0.007	0.010	0.048
VOC: Urban	0.000	0.006	0.048
CO: Total	0.036	0.023	1.545
CO: Urban	0.000	0.004	1.545
NOx: Total	0.034	0.138	0.025
NOx: Urban	0.000	0.007	0.025
PM10: Total	0.004	0.009	0.025
PM10: Urban	0.000	0.001	0.025
SOx: Total	0.012	0.121	0.000
SOx: Urban	0.000	0.001	0.000
CH4	0.314	0.017	0.055
N2O	0.000	0.001	0.020
CO2	13	79	142
GHGs	20	80	149

Grid-connected SI HEVs: LPG, crude, CA mix

	Feedstock	Fuel	Vehicle Operation
Total energy	123	1,247	1,984
Fossil fuels	110	552	1,984
Petroleum	22	105	0
VOC: Total	0.009	0.011	0.048
VOC: Urban	0.000	0.003	0.048
CO: Total	0.039	0.021	1.545
CO: Urban	0.000	0.004	1.545
NOx: Total	0.030	0.061	0.025
NOx: Urban	0.001	0.008	0.025
PM10: Total	0.002	0.005	0.025
PM10: Urban	0.000	0.001	0.025
SOx: Total	0.008	0.032	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.243	0.021	0.055
N2O	0.000	0.001	0.020
CO2	10	40	142
GHGs	16	41	149

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	Grid-connected SI HEVs: LPG, NG, CA mix			Grid-connected SIDI HEVs: M90, NG, US mix			Grid-connected SIDI HEVs: M90, flare gas, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	174	1,173	1,984	152	1,826	1,770	152	1,948	1,770
Fossil fuels	166	481	1,984	143	1,552	1,770	143	1,676	318
Petroleum	12	32	0	18	83	333	18	83	333
VOC: Total	0.003	0.010	0.048	0.008	0.020	0.074	0.008	-0.102	0.074
VOC: Urban	0.000	0.006	0.048	0.000	0.003	0.074	0.000	0.003	0.074
CO: Total	0.033	0.018	1.545	0.034	0.067	1.931	0.034	0.037	1.931
CO: Urban	0.000	0.004	1.545	0.000	0.002	1.931	0.000	0.002	1.931
NOx: Total	0.033	0.050	0.025	0.031	0.167	0.025	0.031	0.106	0.025
NOx: Urban	0.001	0.008	0.025	0.000	0.004	0.025	0.000	0.004	0.025
PM10: Total	0.002	0.004	0.025	0.004	0.010	0.027	0.004	0.008	0.027
PM10: Urban	0.000	0.001	0.025	0.000	0.000	0.027	0.000	0.000	0.027
SOx: Total	0.009	0.021	0.000	0.012	0.125	0.000	0.012	0.124	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.270	0.016	0.055	0.287	0.037	0.025	0.287	0.023	0.025
N2O	0.000	0.001	0.020	0.000	0.001	0.020	0.000	0.001	0.020
CO2	13	34	142	12	97	129	12	-26	129
GHGs	19	35	149	18	98	136	18	-25	136

	Grid-connected SIDI HEVs: M90, LF gas, US mix			Grid-connected SIDI HEVs: M90, NG, CA mix			Grid-connected SIDI HEVs: M90, flare gas, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	61	1,656	1,770	152	1,813	1,770	152	1,936	1,770
Fossil fuels	54	1,387	318	144	1,125	1,770	144	1,248	318
Petroleum	12	78	333	13	76	333	13	77	333
VOC: Total	0.007	0.004	0.074	0.004	0.019	0.074	0.004	-0.103	0.074
VOC: Urban	0.000	0.000	0.074	0.000	0.003	0.074	0.000	0.003	0.074
CO: Total	0.016	-0.113	1.931	0.031	0.062	1.931	0.031	0.032	1.931
CO: Urban	0.000	-0.061	1.931	0.000	0.002	1.931	0.000	0.002	1.931
NOx: Total	0.016	0.165	0.025	0.030	0.079	0.025	0.030	0.018	0.025
NOx: Urban	0.000	-0.002	0.025	0.001	0.005	0.025	0.001	0.005	0.025
PM10: Total	0.003	-0.037	0.027	0.002	0.005	0.027	0.002	0.002	0.027
PM10: Urban	0.000	-0.024	0.027	0.000	0.000	0.027	0.000	0.000	0.027
SOx: Total	0.007	0.168	0.000	0.009	0.024	0.000	0.009	0.024	0.000
SOx: Urban	0.000	-0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.137	-0.956	0.025	0.243	0.037	0.025	0.243	0.023	0.025
N2O	0.000	0.001	0.020	0.000	0.001	0.020	0.000	0.000	0.020
CO2	5	-149	129	12	52	129	12	-71	129
GHGs	8	-168	136	17	53	136	17	-70	136

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	Grid-connected SIDI HEVs: M90, LF gas, CA mix			Grid-connected SIDI HEVs: E90, corn, US mix			Grid-connected SIDI HEVs: E90, W. Biomass, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	61	1,644	1,770	204	1,808	1,770	206	2,972	1,770
Fossil fuels	55	959	318	192	1,538	250	196	783	250
Petroleum	6	72	333	84	65	250	130	65	250
VOC: Total	0.003	0.003	0.074	-0.030	0.145	0.074	0.016	0.035	0.074
VOC: Urban	0.000	0.000	0.074	0.000	0.004	0.074	0.000	0.004	0.074
CO: Total	0.013	-0.118	1.931	0.048	0.052	1.931	0.062	0.153	1.931
CO: Urban	0.000	-0.060	1.931	0.000	0.004	1.931	0.000	0.003	1.931
NOx: Total	0.015	0.077	0.025	0.094	0.242	0.025	0.081	0.324	0.025
NOx: Urban	0.001	-0.002	0.025	0.001	0.009	0.025	0.001	0.008	0.025
PM10: Total	0.001	-0.042	0.027	0.119	0.018	0.027	0.008	0.034	0.027
PM10: Urban	0.000	-0.024	0.027	0.000	0.001	0.027	0.000	0.001	0.027
SOx: Total	0.004	0.068	0.000	0.011	0.197	0.000	0.011	0.114	0.000
SOx: Urban	0.000	-0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.093	-0.957	0.025	0.147	0.116	0.075	0.144	0.016	0.075
N2O	0.000	0.001	0.020	0.050	0.002	0.000	0.003	0.015	0.000
CO2	5	-193	129	17	129	22	-30	69	22
GHGs	7	-213	136	35	132	23	-26	74	23

	Grid-connected SIDI HEVs: E90, H. Biomass, US mix			Grid-connected SIDI HEVs: E90, corn, CA mix			Grid-connected SIDI HEVs: E90, W. Biomass, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	266	2,587	1,770	204	1,795	1,770	207	2,960	1,770
Fossil fuels	250	824	250	192	1,110	250	196	356	250
Petroleum	95	63	250	79	58	250	124	59	250
VOC: Total	0.014	0.033	0.074	-0.034	0.144	0.074	0.012	0.034	0.074
VOC: Urban	0.000	0.004	0.074	0.000	0.004	0.074	0.000	0.004	0.074
CO: Total	0.051	0.138	1.931	0.045	0.047	1.931	0.059	0.148	1.931
CO: Urban	0.000	0.003	1.931	0.000	0.004	1.931	0.000	0.003	1.931
NOx: Total	0.101	0.309	0.025	0.093	0.154	0.025	0.080	0.236	0.025
NOx: Urban	0.001	0.008	0.025	0.001	0.010	0.025	0.001	0.009	0.025
PM10: Total	0.007	0.032	0.027	0.117	0.012	0.027	0.006	0.028	0.027
PM10: Urban	0.000	0.001	0.027	0.000	0.001	0.027	0.000	0.001	0.027
SOx: Total	0.014	0.120	0.000	0.008	0.096	0.000	0.008	0.014	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.157	0.020	0.075	0.103	0.115	0.075	0.100	0.016	0.075
N2O	0.043	0.013	0.000	0.050	0.001	0.000	0.003	0.015	0.000
CO2	0	73	22	17	84	22	-30	24	22
GHGs	17	77	23	34	87	23	-27	29	23

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	Grid-connected SIDI HEVs: E90, H. Biomass, CA mix			Grid-independent CIDI HEVs: RFD			Grid-independent CIDI HEVs: DME, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	267	2,575	1,770	74	379	2,034	127	992	2,034
Fossil fuels	250	396	250	68	367	2,034	125	987	2,034
Petroleum	89	56	250	19	185	2,034	9	53	0
VOC: Total	0.010	0.032	0.074	0.008	0.012	0.049	0.002	0.011	0.034
VOC: Urban	0.000	0.004	0.074	0.000	0.003	0.049	0.000	0.001	0.034
CO: Total	0.048	0.133	1.931	0.031	0.019	2.759	0.026	0.060	2.759
CO: Urban	0.000	0.003	1.931	0.000	0.003	2.759	0.000	0.001	2.759
NOx: Total	0.100	0.220	0.025	0.019	0.045	0.063	0.021	0.044	0.063
NOx: Urban	0.001	0.009	0.025	0.000	0.004	0.063	0.000	0.001	0.063
PM10: Total	0.005	0.026	0.027	0.001	0.005	0.031	0.001	0.001	0.028
PM10: Urban	0.000	0.001	0.027	0.000	0.000	0.031	0.000	0.000	0.028
SOx: Total	0.011	0.020	0.000	0.004	0.028	0.005	0.006	0.004	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000
CH4	0.113	0.020	0.075	0.184	0.032	0.011	0.211	0.006	0.022
N2O	0.043	0.013	0.000	0.000	0.000	0.016	0.000	0.000	0.016
CO2	0	28	22	7	27	164	10	36	143
GHGs	16	32	23	11	28	169	15	36	148

	Grid-independent CIDI HEVs: DME, flare gas			Grid-independent CIDI HEVs: FT50, NG			Grid-independent CIDI HEVs: FT50, flare gas		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	127	1,118	2,034	100	882	2,034	100	1,195	2,034
Fossil fuels	125	1,114	0	95	873	2,032	95	1,185	1,055
Petroleum	9	54	0	14	127	1,055	14	128	1,055
VOC: Total	0.002	-0.150	0.034	0.005	0.007	0.049	0.005	-0.086	0.049
VOC: Urban	0.000	0.001	0.034	0.000	0.002	0.049	0	0.002	0.049
CO: Total	0.026	0.011	2.759	0.029	0.027	2.759	0.029	0.009	2.759
CO: Urban	0.000	0.001	2.759	0.000	0.002	2.759	0	0.002	2.759
NOx: Total	0.021	-0.049	0.063	0.020	0.032	0.063	0.02	-0.012	0.063
NOx: Urban	0.000	0.001	0.063	0.000	0.003	0.063	0	0.003	0.063
PM10: Total	0.001	-0.003	0.028	0.001	0.002	0.029	0.001	0.001	0.029
PM10: Urban	0.000	0.000	0.028	0.000	0.000	0.029	0	0	0.029
SOx: Total	0.006	0.004	0.000	0.005	0.016	0.003	0.005	0.016	0.003
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.003	0	0	0.003
CH4	0.211	0.007	0.022	0.197	0.018	0.011	0.197	0.02	0.011
N2O	0.000	-0.001	0.016	0.000	0.000	0.016	0	0	0.016
CO2	10	-137	143	9	31	161	9	-56	161
GHGs	15	-137	148	13	31	166	13	-56	166

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	Grid-independent CIDI HEVs: BD20			Grid-connected CIDI HEVs: RFD, US mix			Grid-connected CIDI HEVs: RFD, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	100	493	2,034	99	1,289	1,353	99	1,277	1,353
Fossil fuels	92	472	2,034	89	1,014	1,353	89	586	1,353
Petroleum	40	194	1,655	22	132	1,353	16	125	1,353
VOC: Total	0.009	0.043	0.049	0.011	0.009	0.034	0.007	0.008	0.034
VOC: Urban	0.000	0.005	0.049	0.000	0.002	0.034	0.000	0.002	0.034
CO: Total	0.037	0.055	2.759	0.032	0.023	1.931	0.029	0.018	1.931
CO: Urban	0.000	0.014	2.759	0.000	0.001	1.931	0.000	0.001	1.931
NOx: Total	0.033	0.089	0.063	0.025	0.146	0.044	0.024	0.058	0.044
NOx: Urban	0.000	0.016	0.063	0.001	0.002	0.044	0.001	0.003	0.044
PM10: Total	0.002	0.007	0.030	0.004	0.011	0.028	0.001	0.006	0.028
PM10: Urban	0.000	0.001	0.030	0.000	0.000	0.028	0.000	0.000	0.028
SOx: Total	0.005	0.029	0.004	0.009	0.134	0.003	0.006	0.033	0.003
SOx: Urban	0.000	0.000	0.004	0.000	0.000	0.003	0.000	0.000	0.003
CH4	0.154	0.052	0.011	0.230	0.023	0.008	0.186	0.022	0.008
N2O	0.001	0.001	0.016	0.000	0.001	0.011	0.000	0.001	0.011
CO2	9	33	134	8	87	109	8	42	109
GHGs	12	34	140	13	88	113	12	43	113

	Grid-connected CIDI HEVs: DME, NG, US mix			Grid-connected CIDI HEVs: DME, flare gas, US mix			Grid-connected CIDI HEVs: DME, NT, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	142	1,763	1,488	142	1,855	1,488	143	1,751	1,488
Fossil fuels	135	1,492	1,488	135	1,585	0	136	1,064	1,488
Petroleum	15	48	0	15	49	0	10	41	0
VOC: Total	0.007	0.009	0.024	0.007	-0.109	0.024	0.003	0.008	0.024
VOC: Urban	0.000	0.001	0.024	0.000	0.001	0.024	0.000	0.001	0.024
CO: Total	0.030	0.055	1.931	0.030	0.019	1.931	0.027	0.050	1.931
CO: Urban	0.000	0.001	1.931	0.000	0.001	1.931	0.000	0.001	1.931
NOx: Total	0.029	0.149	0.044	0.029	0.081	0.044	0.027	0.061	0.044
NOx: Urban	0.000	0.003	0.044	0.000	0.003	0.044	0.001	0.004	0.044
PM10: Total	0.004	0.008	0.026	0.004	0.005	0.026	0.002	0.002	0.026
PM10: Urban	0.000	0.000	0.026	0.000	0.000	0.026	0.000	0.000	0.026
SOx: Total	0.011	0.119	0.000	0.011	0.118	0.000	0.008	0.018	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.262	0.006	0.015	0.262	0.006	0.015	0.218	0.005	0.015
N2O	0.000	0.001	0.011	0.000	0.000	0.011	0.000	0.000	0.011
CO2	11	95	104	11	-31	104	11	50	104
GHGs	16	95	108	16	-31	108	15	50	108

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

Grid-connected CIDI HEVs: DME, flare gas, CA mix

	Feedstock	Fuel	Vehicle Operation
Total energy	143	1,843	1,488
Fossil fuels	136	1,157	0
Petroleum	10	42	0
VOC: Total	0.003	-0.109	0.024
VOC: Urban	0.000	0.001	0.024
CO: Total	0.027	0.014	1.931
CO: Urban	0.000	0.001	1.931
NOx: Total	0.027	-0.007	0.044
NOx: Urban	0.001	0.004	0.044
PM10: Total	0.002	0.000	0.026
PM10: Urban	0.000	0.000	0.026
SOx: Total	0.008	0.018	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.218	0.006	0.015
N2O	0.000	0.000	0.011
CO2	11	-76	104
GHGs	15	-76	108

Grid-connected CIDI HEVs: FT50, NG, US mix

	Feedstock	Fuel	Vehicle Operation
Total energy	122	1,682	1,488
Fossil fuels	113	1,409	1,487
Petroleum	19	102	772
VOC: Total	0.009	0.006	0.034
VOC: Urban	0.000	0.001	0.034
CO: Total	0.032	0.030	1.931
CO: Urban	0.000	0.002	1.931
NOx: Total	0.028	0.140	0.044
NOx: Urban	0.000	0.004	0.044
PM10: Total	0.004	0.009	0.027
PM10: Urban	0.000	0.000	0.027
SOx: Total	0.010	0.127	0.002
SOx: Urban	0.000	0.000	0.002
CH4	0.252	0.015	0.008
N2O	0.000	0.001	0.011
CO2	10	92	118
GHGs	15	92	121

Grid-connected CIDI HEVs: FT50, flare gas, US mix

	Feedstock	Fuel	Vehicle Operation
Total energy	122	1,911	1,488
Fossil fuels	113	1,638	772
Petroleum	19	103	772
VOC: Total	0.009	-0.062	0.034
VOC: Urban	0.000	0.001	0.034
CO: Total	0.032	0.017	1.931
CO: Urban	0.000	0.002	1.931
NOx: Total	0.028	0.108	0.044
NOx: Urban	0.000	0.004	0.044
PM10: Total	0.004	0.008	0.027
PM10: Urban	0.000	0.000	0.027
SOx: Total	0.010	0.127	0.002
SOx: Urban	0.000	0.000	0.002
CH4	0.252	0.016	0.008
N2O	0.000	0.001	0.011
CO2	10	28	118
GHGs	15	29	121

Grid-connected CIDI HEVs: FT50, NG, CA mix

	Feedstock	Fuel	Vehicle Operation
Total energy	123	1,670	1,488
Fossil fuels	114	982	1,487
Petroleum	14	95	772
VOC: Total	0.005	0.006	0.034
VOC: Urban	0.000	0.001	0.034
CO: Total	0.029	0.025	1.931
CO: Urban	0.000	0.002	1.931
NOx: Total	0.026	0.052	0.044
NOx: Urban	0.001	0.005	0.044
PM10: Total	0.002	0.003	0.027
PM10: Urban	0.000	0.000	0.027
SOx: Total	0.007	0.027	0.002
SOx: Urban	0.000	0.000	0.002
CH4	0.208	0.014	0.008
N2O	0.000	0.000	0.011
CO2	10	47	118
GHGs	14	47	121

Grid-connected CIDI HEVs: FT50, flare gas, CA mix

	Feedstock	Fuel	Vehicle Operation
Total energy	123	1,899	1,488
Fossil fuels	114	1,210	772
Petroleum	14	96	772
VOC: Total	0.005	-0.062	0.034
VOC: Urban	0.000	0.001	0.034
CO: Total	0.029	0.012	1.931
CO: Urban	0.000	0.002	1.931
NOx: Total	0.026	0.020	0.044
NOx: Urban	0.001	0.005	0.044
PM10: Total	0.002	0.003	0.027
PM10: Urban	0.000	0.000	0.027
SOx: Total	0.007	0.027	0.002
SOx: Urban	0.000	0.000	0.002
CH4	0.208	0.015	0.008
N2O	0.000	0.000	0.011
CO2	10	-17	118
GHGs	14	-16	121

Grid-connected CIDI HEVs: BD20, US mix

	Feedstock	Fuel	Vehicle Operation
Total energy	122	1,398	1,488
Fossil fuels	111	1,116	1,488
Petroleum	38	151	1,211
VOC: Total	0.012	0.033	0.034
VOC: Urban	0.000	0.004	0.034
CO: Total	0.038	0.051	1.931
CO: Urban	0.000	0.011	1.931
NOx: Total	0.037	0.181	0.044
NOx: Urban	0.001	0.014	0.044
PM10: Total	0.004	0.013	0.027
PM10: Urban	0.000	0.001	0.027
SOx: Total	0.010	0.137	0.003
SOx: Urban	0.000	0.001	0.003
CH4	0.220	0.040	0.008
N2O	0.001	0.001	0.011
CO2	10	93	98
GHGs	15	94	102

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

	Grid-Connected CIDI HEVs: BD20, CA mix			EV: US mix			EV: US NE mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	123	1,386	1,488	165	3,456	0	238	3,306	0
Fossil fuels	111	688	1,488	145	2,568	0	214	2,282	0
Petroleum	32	144	1,211	29	30	0	23	60	0
VOC: Total	0.008	0.032	0.034	0.018	0.004	0.000	0.012	0.004	0.000
VOC: Urban	0.000	0.004	0.034	0.000	0.000	0.000	0.000	0.001	0.000
CO: Total	0.035	0.046	1.931	0.036	0.035	0.000	0.044	0.034	0.000
CO: Urban	0.000	0.011	1.931	0.001	0.002	0.000	0.001	0.005	0.000
NOx: Total	0.036	0.093	0.044	0.043	0.389	0.000	0.059	0.248	0.000
NOx: Urban	0.001	0.014	0.044	0.001	0.008	0.000	0.003	0.017	0.000
PM10: Total	0.002	0.007	0.027	0.010	0.025	0.021	0.006	0.016	0.021
PM10: Urban	0.000	0.001	0.027	0.000	0.001	0.021	0.000	0.001	0.021
SOx: Total	0.007	0.036	0.003	0.023	0.385	0.000	0.021	0.190	0.000
SOx: Urban	0.000	0.000	0.003	0.000	0.001	0.000	0.000	0.002	0.000
CH4	0.176	0.039	0.008	0.359	0.005	0.000	0.380	0.004	0.000
N2O	0.001	0.001	0.011	0.000	0.003	0.000	0.000	0.003	0.000
CO2	10	48	98	12	230	0	17	178	0
GHGs	14	49	102	19	231	0	25	179	0

	EV: CA mix			H2 FCVs: NG, gas, central			H2 FCVs: NG, gas refueling station		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	166	3,415	0	98	711	1,559	150	1,039	1,559
Fossil fuels	147	1,141	0	96	656	1,559	148	1,037	1,559
Petroleum	10	7	0	7	6	0	7	4	0
VOC: Total	0.005	0.002	0.000	0.001	0.007	0.000	0.003	0.008	0.000
VOC: Urban	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.007	0.000
CO: Total	0.027	0.018	0.000	0.020	0.065	0.000	0.032	0.087	0.000
CO: Urban	0.001	0.003	0.000	0.000	0.014	0.000	0.001	0.078	0.000
NOx: Total	0.039	0.095	0.000	0.016	0.108	0.000	0.046	0.101	0.000
NOx: Urban	0.002	0.010	0.000	0.000	0.037	0.000	0.003	0.091	0.000
PM10: Total	0.003	0.006	0.021	0.001	0.003	0.021	0.001	0.003	0.021
PM10: Urban	0.000	0.001	0.021	0.000	0.001	0.021	0.000	0.003	0.021
SOx: Total	0.013	0.050	0.000	0.004	0.025	0.000	0.005	0.002	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.213	0.002	0.000	0.162	0.103	0.000	0.308	0.068	0.000
N2O	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000
CO2	12	81	0	8	133	0	11	153	0
GHGs	16	81	0	11	136	0	17	154	0

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

H2 FCVs: Solar, gas

	Feedstock	Fuel	Vehicle Operation
Total energy	0	468	1,559
Fossil fuels	0	399	0
Petroleum	0	5	0
VOC: Total	0.000	0.009	0.000
VOC: Urban	0.000	0.004	0.000
CO: Total	0.000	0.046	0.000
CO: Urban	0.000	0.019	0.000
NOx: Total	0.000	0.136	0.000
NOx: Urban	0.000	0.052	0.000
PM10: Total	0.000	0.004	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.000	0.031	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.000	0.093	0.000
N2O	0.000	0.001	0.000
CO2	0	30	0
GHGs	0	32	0

H2 FCVs: NG, liquid

	Feedstock	Fuel	Vehicle Operation
Total energy	97	765	1,559
Fossil fuels	96	762	1,559
Petroleum	7	92	0
VOC: Total	0.001	0.020	0.000
VOC: Urban	0.000	0.003	0.000
CO: Total	0.020	0.075	0.000
CO: Urban	0.000	0.007	0.000
NOx: Total	0.016	0.101	0.000
NOx: Urban	0.000	0.013	0.000
PM10: Total	0.001	0.007	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.004	0.004	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.162	0.099	0.000
N2O	0.000	0.001	0.000
CO2	8	137	0
GHGs	11	140	0

H2 FCVs: solar, liquid

	Feedstock	Fuel	Vehicle Operation
Total energy	0	98	1,559
Fossil fuels	0	97	1,559
Petroleum	0	89	0
VOC: Total	0.000	0.016	0.000
VOC: Urban	0.000	0.003	0.000
CO: Total	0.000	0.036	0.000
CO: Urban	0.000	0.007	0.000
NOx: Total	0.000	0.061	0.000
NOx: Urban	0.000	0.012	0.000
PM10: Total	0.000	0.006	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.000	0.002	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.000	0.009	0.000
N2O	0.000	0.000	0.000
CO2	0	8	0
GHGs	0	8	0

FCVs: MeOH, NG

	Feedstock	Fuel	Vehicle Operation
Total energy	112	891	1,799
Fossil fuels	111	886	1,799
Petroleum	8	56	0
VOC: Total	0.002	0.017	0.038
VOC: Urban	0.000	0.001	0.038
CO: Total	0.023	0.064	0.552
CO: Urban	0.000	0.001	0.552
NOx: Total	0.019	0.052	0.007
NOx: Urban	0.000	0.001	0.007
PM10: Total	0.001	0.002	0.021
PM10: Urban	0.000	0.000	0.021
SOx: Total	0.005	0.005	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.187	0.026	0.014
N2O	0.000	0.000	0.006
CO2	9	28	130
GHGs	13	29	132

FCVs: MeOH, flare gas

	Feedstock	Fuel	Vehicle Operation
Total energy	112	1,043	1,799
Fossil fuels	111	1,038	0
Petroleum	8	57	0
VOC: Total	0.002	-0.133	0.038
VOC: Urban	0.000	0.001	0.038
CO: Total	0.023	0.027	0.552
CO: Urban	0.000	0.001	0.552
NOx: Total	0.019	-0.024	0.007
NOx: Urban	0.000	0.001	0.007
PM10: Total	0.001	-0.001	0.021
PM10: Urban	0.000	0.000	0.021
SOx: Total	0.005	0.005	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.187	0.009	0.014
N2O	0.000	0.000	0.006
CO2	9	-124	130
GHGs	13	-124	132

FCVs: MeOH, LF-gas

	Feedstock	Fuel	Vehicle Operation
Total energy	0	681	1,799
Fossil fuels	0	681	0
Petroleum	0	50	0
VOC: Total	0.000	-0.003	0.038
VOC: Urban	0.000	-0.002	0.038
CO: Total	0.000	-0.159	0.552
CO: Urban	0.000	-0.077	0.552
NOx: Total	0.000	0.049	0.007
NOx: Urban	0.000	-0.007	0.007
PM10: Total	0.000	-0.056	0.021
PM10: Urban	0.000	-0.030	0.021
SOx: Total	0.000	0.059	0.000
SOx: Urban	0.000	-0.006	0.000
CH4	0.000	-1.205	0.014
N2O	0.000	0.001	0.006
CO2	0	-276	130
GHGs	0	-301	132

B-II Long-Term Technologies

B-II.1 Passenger Car (Cont.)

FCVs: RFG

	Feedstock	Fuel	Vehicle Operation
Total energy	86	513	2,339
Fossil fuels	78	496	2,339
Petroleum	22	212	2,052
VOC: Total	0.009	0.032	0.057
VOC: Urban	0.000	0.011	0.057
CO: Total	0.036	0.037	0.552
CO: Urban	0.000	0.004	0.552
NOx: Total	0.021	0.067	0.007
NOx: Urban	0.000	0.006	0.007
PM10: Total	0.001	0.007	0.021
PM10: Urban	0.000	0.000	0.021
SOx: Total	0.005	0.035	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.212	0.108	0.014
N2O	0.000	0.001	0.006
CO2	8	39	177
GHGs	13	42	179

EtOH FCVs: Corn

	Feedstock	Fuel	Vehicle Operation
Total energy	223	1,101	2,339
Fossil fuels	215	1,099	0
Petroleum	112	49	0
VOC: Total	-0.056	0.214	0.038
VOC: Urban	0.000	0.004	0.038
CO: Total	0.051	0.059	0.552
CO: Urban	0.000	0.006	0.552
NOx: Total	0.122	0.182	0.007
NOx: Urban	0.001	0.014	0.007
PM10: Total	0.179	0.013	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.006	0.119	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.026	0.168	0.014
N2O	0.076	0.001	0.006
CO2	19	86	1
GHGs	43	90	3

EtOH FCVs: W. Biomass

	Feedstock	Fuel	Vehicle Operation
Total energy	227	2,892	2,339
Fossil fuels	222	-62	0
Petroleum	183	49	0
VOC: Total	0.015	0.045	0.038
VOC: Urban	0.000	0.004	0.038
CO: Total	0.073	0.215	0.552
CO: Urban	0.000	0.005	0.552
NOx: Total	0.102	0.308	0.007
NOx: Urban	0.001	0.012	0.007
PM10: Total	0.008	0.038	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.006	-0.008	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.022	0.015	0.014
N2O	0.005	0.021	0.006
CO2	-53	-7	1
GHGs	-51	0	3

EtOH FCVs: H. Biomass

	Feedstock	Fuel	Vehicle Operation
Total energy	319	2,300	2,339
Fossil fuels	305	0	0
Petroleum	129	45	0
VOC: Total	0.011	0.042	0.038
VOC: Urban	0.000	0.004	0.038
CO: Total	0.056	0.192	0.552
CO: Urban	0.000	0.005	0.552
NOx: Total	0.132	0.284	0.007
NOx: Urban	0.001	0.012	0.007
PM10: Total	0.007	0.034	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.010	0.001	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.041	0.021	0.014
N2O	0.065	0.019	0.006
CO2	-7	-1	1
GHGs	15	6	3

FCVs: CNG

	Feedstock	Fuel	Vehicle Operation
Total energy	225	256	2,339
Fossil fuels	222	208	2,339
Petroleum	11	3	0
VOC: Total	0.005	0.003	0.016
VOC: Urban	0.000	0.002	0.016
CO: Total	0.047	0.015	0.552
CO: Urban	0.002	0.010	0.552
NOx: Total	0.069	0.053	0.007
NOx: Urban	0.004	0.029	0.007
PM10: Total	0.002	0.002	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.007	0.022	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.462	0.040	0.142
N2O	0.000	0.000	0.006
CO2	16	17	140
GHGs	26	18	145

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1

	Baseline Conv. GV: FRFG2, MTBE			CNGV: dedicated			LNGV: dedicated		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	229	1,367	6,237	570	650	5,940	372	y	5,940
Fossil fuels	208	1,323	6,237	563	529	5,940	367	1,063	5,940
Petroleum	59	565	5,473	27	9	0	26	219	0
VOC: Total	0.025	0.086	0.125	0.013	0.008	0.062	0.005	0.035	0.062
VOC: Urban	0.000	0.030	0.125	0.001	0.005	0.062	0.000	0.002	0.062
CO: Total	0.096	0.100	2.759	0.120	0.039	2.207	0.075	0.152	2.207
CO: Urban	0.000	0.010	2.759	0.004	0.027	2.207	0.000	0.006	2.207
NOx: Total	0.057	0.178	0.036	0.176	0.134	0.036	0.063	0.363	0.036
NOx: Urban	0.000	0.017	0.036	0.011	0.073	0.036	0.000	0.009	0.036
PM10: Total	0.003	0.019	0.031	0.005	0.006	0.023	0.003	0.010	0.023
PM10: Urban	0.000	0.001	0.031	0.000	0.001	0.023	0.000	0.001	0.023
SOx: Total	0.012	0.092	0.009	0.018	0.055	0.002	0.017	0.010	0.000
SOx: Urban	0.000	0.001	0.009	0.000	0.000	0.002	0.000	0.000	0.000
CH4	0.564	0.289	0.071	1.172	0.102	0.355	0.618	0.654	0.355
N2O	0.000	0.001	0.028	0.001	0.001	0.014	0.000	0.001	0.014
CO2	22	105	472	40	43	355	29	58	350
GHGs	34	111	482	65	45	367	43	72	362

	LPGV: dedicated, crude			LPGV: dedicated, NG			Dedi. MeOH Vehicle: M90, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	208	636	5,670	354	425	5,670	328	2,527	5,670
Fossil fuels	189	600	5,670	349	396	5,670	320	2,506	5,670
Petroleum	54	294	5,670	25	86	0	30	236	1,067
VOC: Total	0.023	0.029	0.068	0.005	0.025	0.068	0.008	0.059	0.125
VOC: Urban	0.000	0.009	0.068	0.000	0.017	0.068	0.000	0.009	0.125
CO: Total	0.087	0.044	2.207	0.071	0.036	2.207	0.074	0.182	2.759
CO: Urban	0.000	0.010	2.207	0.000	0.010	2.207	0.000	0.003	2.759
NOx: Total	0.052	0.092	0.036	0.060	0.062	0.036	0.058	0.163	0.036
NOx: Urban	0.000	0.015	0.036	0.000	0.015	0.036	0.000	0.006	0.036
PM10: Total	0.003	0.010	0.023	0.003	0.005	0.023	0.003	0.008	0.027
PM10: Urban	0.000	0.001	0.023	0.000	0.001	0.023	0.000	0.000	0.027
SOx: Total	0.011	0.048	0.000	0.016	0.016	0.000	0.015	0.029	0.002
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.002
CH4	0.513	0.057	0.078	0.588	0.045	0.078	0.575	0.116	0.036
N2O	0.000	0.001	0.028	0.000	0.000	0.028	0.000	0.001	0.028
CO2	20	46	406	28	28	406	27	90	413
GHGs	31	47	416	41	29	416	39	92	423

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	Dedi. MeOH Vehicle: M90, flare gas			Dedi. MeOH Vehicle: M90, LF gas			Dedi. EtOH Vehicle: E90, corn		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	328	2,920	5,670	37	1,984	5,670	494	2,455	5,670
Fossil fuels	320	2,900	1,018	34	1,977	1,018	475	2,446	799
Petroleum	30	238	1,067	10	222	1,067	242	174	799
VOC: Total	0.008	-0.331	0.125	0.004	0.007	0.125	-0.113	0.457	0.125
VOC: Urban	0.000	0.009	0.125	0.000	0.001	0.125	0.001	0.011	0.125
CO: Total	0.074	0.085	2.759	0.016	-0.395	2.759	0.118	0.132	2.759
CO: Urban	0.000	0.003	2.759	0.000	-0.196	2.759	0.000	0.009	2.759
NOx: Total	0.058	-0.034	0.036	0.009	0.156	0.036	0.261	0.391	0.036
NOx: Urban	0.000	0.006	0.036	0.000	-0.015	0.036	0.001	0.019	0.036
PM10: Total	0.003	0.001	0.027	0.000	-0.141	0.027	0.373	0.030	0.027
PM10: Urban	0.000	0.000	0.027	0.000	-0.078	0.027	0.000	0.001	0.027
SOx: Total	0.015	0.028	0.002	0.002	0.168	0.002	0.014	0.259	0.001
SOx: Urban	0.000	0.001	0.002	0.000	-0.015	0.002	0.000	0.001	0.001
CH4	0.575	0.070	0.036	0.092	-3.068	0.036	0.126	0.382	0.107
N2O	0.000	0.000	0.028	0.000	0.002	0.028	0.159	0.002	0.028
CO2	27	-304	413	4	-697	413	42	193	65
GHGs	39	-302	423	6	-761	423	94	201	75

	Dedi. EtOH Vehicle: E90, W. Biomass			Dedi. EtOH Vehicle: E90, H. Biomass			SIDI Vehicle: FRFG2, MTBE		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	503	6,186	5,670	694	4,953	5,670	183	1,094	4,990
Fossil fuels	488	28	799	661	158	799	166	1,059	4,990
Petroleum	388	175	799	276	167	799	47	452	4,379
VOC: Total	0.035	0.105	0.125	0.027	0.098	0.125	0.020	0.069	0.119
VOC: Urban	0.001	0.011	0.125	0.000	0.011	0.125	0.000	0.024	0.119
CO: Total	0.164	0.457	2.759	0.128	0.409	2.759	0.077	0.080	2.759
CO: Urban	0.001	0.008	2.759	0.001	0.008	2.759	0.000	0.008	2.759
NOx: Total	0.219	0.653	0.036	0.283	0.604	0.036	0.046	0.142	0.036
NOx: Urban	0.001	0.016	0.036	0.001	0.017	0.036	0.000	0.013	0.036
PM10: Total	0.018	0.082	0.027	0.014	0.074	0.027	0.002	0.015	0.035
PM10: Urban	0.000	0.001	0.027	0.000	0.001	0.027	0.000	0.001	0.035
SOx: Total	0.015	-0.005	0.001	0.022	0.013	0.001	0.010	0.074	0.007
SOx: Urban	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.007
CH4	0.117	0.063	0.107	0.157	0.076	0.107	0.451	0.231	0.071
N2O	0.010	0.045	0.028	0.136	0.039	0.028	0.000	0.001	0.028
CO2	-107	-1	65	-11	12	65	18	84	378
GHGs	-102	14	75	35	25	75	27	89	388

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	SIDI Vehicle: FRFG2, ETBE			SIDI Vehicle: FRFG2, EtOH			SIDI Vehicle: CARFG2, ETBE		
	Feedstock	Fuel	Operation	Feedstock	Fuel	Operation	Feedstock	Fuel	Operation
Total energy	183	1,106	4,990	183	1,138	4,990	183	1,138	4,990
Fossil fuels	166	1,073	4,745	166	1,103	4,671	166	1,103	4,743
Petroleum	47	491	4,745	47	455	4,256	47	455	4,423
VOC: Total	0.020	0.082	0.125	0.020	0.097	0.119	0.020	0.097	0.119
VOC: Urban	0.000	0.024	0.125	0.000	0.025	0.119	0.000	0.025	0.119
CO: Total	0.077	0.060	2.759	0.077	0.090	2.759	0.077	0.090	2.759
CO: Urban	0.000	0.008	2.759	0.000	0.010	2.759	0.000	0.010	2.759
NOx: Total	0.046	0.147	0.036	0.046	0.192	0.036	0.046	0.192	0.036
NOx: Urban	0.000	0.013	0.036	0.000	0.017	0.036	0.000	0.017	0.036
PM10: Total	0.002	0.034	0.035	0.002	0.053	0.035	0.002	0.053	0.035
PM10: Urban	0.000	0.001	0.035	0.000	0.001	0.035	0.000	0.001	0.035
SOx: Total	0.010	0.083	0.007	0.010	0.096	0.007	0.010	0.096	0.007
SOx: Urban	0.000	0.001	0.007	0.000	0.001	0.007	0.000	0.001	0.007
CH4	0.451	0.101	0.071	0.451	0.237	0.071	0.451	0.237	0.071
N2O	0.000	0.009	0.028	0.000	0.016	0.028	0.000	0.016	0.028
CO2	18	80	380	18	99	378	18	99	378
GHGs	27	85	390	27	109	388	27	109	388

	SIDI Vehicle: CARFG2, EtOH			SIDI Dedi. MeOH Vehicle: M90, NG			SIDI Dedi. MeOH Vehicle: M90, flare gas		
	Feedstock	Fuel	Operation	Feedstock	Fuel	Operation	Feedstock	Fuel	Operation
Total energy	183	1,106	4,990	288	2,027	4,990	288	2,373	4,990
Fossil fuels	166	1,073	4,801	282	2,015	4,990	282	2,362	896
Petroleum	47	491	4,801	27	127	939	27	129	939
VOC: Total	0.020	0.082	0.119	0.007	0.044	0.119	0.007	-0.299	0.119
VOC: Urban	0.000	0.024	0.119	0.000	0.008	0.119	0.000	0.008	0.119
CO: Total	0.077	0.060	2.759	0.065	0.147	2.759	0.065	0.062	2.759
CO: Urban	0.000	0.008	2.759	0.000	0.003	2.759	0.000	0.003	2.759
NOx: Total	0.046	0.147	0.036	0.051	0.120	0.036	0.051	-0.053	0.036
NOx: Urban	0.000	0.013	0.036	0.000	0.005	0.036	0.000	0.005	0.036
PM10: Total	0.002	0.034	0.035	0.002	0.005	0.031	0.002	-0.001	0.031
PM10: Urban	0.000	0.001	0.035	0.000	0.000	0.031	0.000	0.000	0.031
SOx: Total	0.010	0.083	0.007	0.013	0.012	0.001	0.013	0.012	0.001
SOx: Urban	0.000	0.001	0.007	0.000	0.001	0.001	0.000	0.001	0.001
CH4	0.451	0.101	0.071	0.506	0.060	0.036	0.506	0.020	0.036
N2O	0.000	0.009	0.028	0.000	0.001	0.028	0.000	0.000	0.028
CO2	18	80	379	23	64	364	23	-282	364
GHGs	27	85	389	34	65	373	34	-282	373

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	SIDI Dedi. MeOH Vehicle: M90, LF gas			SIDI Dedi. EtOH Vehicle: E90, corn			SIDI Dedi. EtOH Vehicle: E90, W. Biomass		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	33	1,549	4,990	435	2,160	4,990	443	5,444	4,990
Fossil fuels	30	1,549	896	418	2,152	703	429	24	703
Petroleum	8	114	939	213	153	703	341	154	703
VOC: Total	0.004	-0.002	0.119	-0.099	0.402	0.119	0.031	0.092	0.119
VOC: Urban	0.000	0.001	0.119	0.000	0.010	0.119	0.001	0.010	0.119
CO: Total	0.014	-0.361	2.759	0.104	0.116	2.759	0.145	0.402	2.759
CO: Urban	0.000	-0.173	2.759	0.000	0.008	2.759	0.000	0.007	2.759
NOx: Total	0.008	0.114	0.036	0.230	0.344	0.036	0.193	0.575	0.036
NOx: Urban	0.000	-0.013	0.036	0.001	0.017	0.036	0.001	0.014	0.036
PM10: Total	0.000	-0.127	0.031	0.328	0.026	0.031	0.015	0.072	0.031
PM10: Urban	0.000	-0.068	0.031	0.000	0.001	0.031	0.000	0.001	0.031
SOx: Total	0.002	0.135	0.001	0.012	0.228	0.001	0.013	-0.005	0.001
SOx: Urban	0.000	-0.014	0.001	0.000	0.000	0.001	0.000	0.000	0.001
CH4	0.081	-2.741	0.036	0.111	0.336	0.107	0.103	0.055	0.107
N2O	0.000	0.001	0.028	0.140	0.002	0.028	0.009	0.039	0.028
CO2	3	-628	364	37	170	57	-95	-1	57
GHGs	5	-685	373	82	177	68	-90	12	68

	SIDI Dedi. EtOH Vehicle: E90, H. Biomass			CIDI Vehicle: RFD			CIDI Vehicle: DME, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	611	4,359	4,990	152	775	4,158	259	2,028	4,158
Fossil fuels	581	139	703	139	749	4,158	256	2,017	4,158
Petroleum	243	147	703	39	378	4,158	18	109	0
VOC: Total	0.023	0.086	0.119	0.017	0.024	0.080	0.004	0.022	0.056
VOC: Urban	0.000	0.010	0.119	0.000	0.007	0.080	0.000	0.002	0.056
CO: Total	0.113	0.360	2.759	0.064	0.039	5.518	0.052	0.124	5.518
CO: Urban	0.001	0.007	2.759	0.000	0.005	5.518	0.000	0.001	5.518
NOx: Total	0.249	0.531	0.036	0.038	0.092	0.135	0.044	0.089	0.135
NOx: Urban	0.001	0.015	0.036	0.000	0.009	0.135	0.000	0.002	0.135
PM10: Total	0.013	0.065	0.031	0.002	0.011	0.041	0.002	0.001	0.035
PM10: Urban	0.000	0.001	0.031	0.000	0.001	0.041	0.000	0.000	0.035
SOx: Total	0.019	0.012	0.001	0.008	0.056	0.011	0.012	0.008	0.000
SOx: Urban	0.000	0.000	0.001	0.000	0.001	0.011	0.000	0.000	0.000
CH4	0.138	0.067	0.107	0.376	0.065	0.014	0.431	0.013	0.028
N2O	0.120	0.034	0.028	0.000	0.001	0.024	0.000	0.000	0.024
CO2	-10	10	57	15	55	336	21	73	292
GHGs	30	22	68	23	57	343	30	73	300

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	CIDI Vehicle: DME, flare gas			CIDI Vehicle: FT50, NG			CIDI Vehicle: FT50, flare gas		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	259	2,287	4,158	204	1,801	4,158	204	2,438	4,158
Fossil fuels	256	2,277	0	195	1,783	4,154	195	2,419	2,156
Petroleum	18	110	0	29	259	2,156	29	262	2,156
VOC: Total	0.004	-0.307	0.056	0.010	0.015	0.080	0.010	-0.176	0.080
VOC: Urban	0.000	0.002	0.056	0.000	0.004	0.080	0.000	0.004	0.080
CO: Total	0.052	0.023	5.518	0.059	0.055	5.518	0.059	0.018	5.518
CO: Urban	0.000	0.001	5.518	0.000	0.003	5.518	0.000	0.003	5.518
NOx: Total	0.044	-0.099	0.135	0.041	0.065	0.135	0.041	-0.025	0.135
NOx: Urban	0.000	0.002	0.135	0.000	0.006	0.135	0.000	0.006	0.135
PM10: Total	0.002	-0.006	0.035	0.002	0.004	0.037	0.002	0.002	0.037
PM10: Urban	0.000	0.000	0.035	0.000	0.000	0.037	0.000	0.000	0.037
SOx: Total	0.012	0.007	0.000	0.010	0.032	0.005	0.010	0.033	0.005
SOx: Urban	0.000	0.000	0.000	0.000	0.001	0.005	0.000	0.001	0.005
CH4	0.431	0.014	0.028	0.403	0.037	0.014	0.403	0.041	0.014
N2O	0.000	-0.001	0.024	0.000	0.000	0.024	0.000	0.000	0.024
CO2	21	-280	292	17	63	329	17	-114	329
GHGs	30	-280	300	26	64	337	26	-113	337

	CIDI Vehicle: BD20			Grid-independent SIDI HEVs: FRFG2, MTBE			Grid-independent SIDI HEVs: FRFG2, ETBE		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	204	1,008	4,158	120	720	3,283	120	749	3,283
Fossil fuels	189	965	4,158	109	697	3,283	109	726	3,073
Petroleum	81	397	3,384	31	298	2,881	31	299	2,800
VOC: Total	0.018	0.089	0.080	0.013	0.045	0.106	0.013	0.064	0.106
VOC: Urban	0.000	0.011	0.080	0.000	0.016	0.088	0.000	0.017	0.088
CO: Total	0.075	0.113	5.518	0.051	0.052	2.759	0.051	0.059	2.759
CO: Urban	0.000	0.029	5.518	0.000	0.005	2.759	0.000	0.007	2.759
NOx: Total	0.068	0.181	0.135	0.030	0.093	0.036	0.030	0.126	0.036
NOx: Urban	0.000	0.032	0.135	0.000	0.009	0.036	0.000	0.011	0.036
PM10: Total	0.004	0.015	0.039	0.002	0.010	0.033	0.002	0.035	0.033
PM10: Urban	0.000	0.002	0.039	0.000	0.001	0.033	0.000	0.001	0.033
SOx: Total	0.010	0.058	0.009	0.006	0.049	0.005	0.006	0.063	0.005
SOx: Urban	0.000	0.001	0.009	0.000	0.001	0.005	0.000	0.001	0.005
CH4	0.315	0.107	0.014	0.297	0.152	0.071	0.297	0.156	0.071
N2O	0.003	0.001	0.024	0.000	0.001	0.028	0.000	0.011	0.028
CO2	18	66	275	12	55	248	12	65	249
GHGs	25	69	283	18	59	259	18	72	259

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	Grid-independent SIDI HEVs: FRFG2, EtOH			Grid-independent SI HEVs: CNG			Grid-independent SI HEVs: LNG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	120	728	3,283	352	401	3,669	230	664	3,669
Fossil fuels	109	706	3,122	348	326	3,669	227	657	3,669
Petroleum	31	323	3,122	17	5	0	16	136	0
VOC: Total	0.013	0.054	0.112	0.008	0.005	0.062	0.003	0.021	0.062
VOC: Urban	0.000	0.016	0.101	0.000	0.003	0.062	0.000	0.001	0.062
CO: Total	0.051	0.040	2.759	0.074	0.024	2.207	0.046	0.094	2.207
CO: Urban	0.000	0.005	2.759	0.003	0.016	2.207	0.000	0.004	2.207
NOx: Total	0.030	0.097	0.036	0.109	0.082	0.036	0.039	0.224	0.036
NOx: Urban	0.000	0.009	0.036	0.007	0.045	0.036	0.000	0.006	0.036
PM10: Total	0.002	0.022	0.033	0.003	0.004	0.026	0.002	0.006	0.026
PM10: Urban	0.000	0.001	0.033	0.000	0.001	0.026	0.000	0.001	0.026
SOx: Total	0.006	0.055	0.005	0.011	0.034	0.001	0.010	0.006	0.000
SOx: Urban	0.000	0.000	0.005	0.000	0.000	0.001	0.000	0.000	0.000
CH4	0.297	0.067	0.071	0.724	0.063	0.355	0.382	0.404	0.355
N2O	0.000	0.006	0.028	0.000	0.000	0.014	0.000	0.001	0.014
CO2	12	53	250	25	26	219	18	36	216
GHGs	18	56	260	40	28	231	26	45	228

	Grid-independent SI HEVs: LPG, crude			Grid-independent SI HEVs: LPG, NG			Grid-independent SIDI HEVs: M90, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	134	412	3,669	229	275	3,669	190	1,463	3,283
Fossil fuels	122	388	3,669	226	256	3,669	185	1,451	3,283
Petroleum	35	190	3,669	16	56	0	18	137	618
VOC: Total	0.015	0.019	0.068	0.003	0.016	0.068	0.005	0.034	0.106
VOC: Urban	0.000	0.006	0.068	0.000	0.011	0.068	0.000	0.005	0.106
CO: Total	0.057	0.029	2.207	0.046	0.024	2.207	0.043	0.105	2.759
CO: Urban	0.000	0.007	2.207	0.000	0.007	2.207	0.000	0.002	2.759
NOx: Total	0.034	0.060	0.036	0.039	0.040	0.036	0.034	0.094	0.036
NOx: Urban	0.000	0.010	0.036	0.000	0.009	0.036	0.000	0.003	0.036
PM10: Total	0.002	0.007	0.026	0.002	0.003	0.026	0.002	0.005	0.030
PM10: Urban	0.000	0.001	0.026	0.000	0.001	0.026	0.000	0.000	0.030
SOx: Total	0.007	0.031	0.000	0.010	0.010	0.000	0.009	0.017	0.001
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001
CH4	0.332	0.037	0.078	0.381	0.029	0.078	0.333	0.067	0.036
N2O	0.000	0.000	0.028	0.000	0.000	0.028	0.000	0.001	0.028
CO2	13	30	262	18	18	262	15	52	239
GHGs	20	30	273	26	19	273	23	53	249

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	Grid-independent SIDI HEVs: M90, flare gas			Grid-independent SIDI HEVs: M90, LF gas			Grid-independent SIDI HEVs: E90, corn		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	190	1,690	3,283	22	1,149	3,283	286	1,421	3,283
Fossil fuels	185	1,679	589	20	1,144	589	275	1,416	463
Petroleum	18	138	618	6	129	618	140	101	463
VOC: Total	0.005	-0.191	0.106	0.002	0.004	0.106	-0.065	0.265	0.106
VOC: Urban	0.000	0.005	0.106	0.000	0.000	0.106	0.000	0.006	0.106
CO: Total	0.043	0.049	2.759	0.009	-0.229	2.759	0.068	0.076	2.759
CO: Urban	0.000	0.002	2.759	0.000	-0.114	2.759	0.000	0.005	2.759
NOx: Total	0.034	-0.019	0.036	0.005	0.090	0.036	0.151	0.227	0.036
NOx: Urban	0.000	0.003	0.036	0.000	-0.008	0.036	0.001	0.011	0.036
PM10: Total	0.002	0.001	0.030	0.000	-0.082	0.030	0.216	0.017	0.030
PM10: Urban	0.000	0.000	0.030	0.000	-0.045	0.030	0.000	0.001	0.030
SOx: Total	0.009	0.016	0.001	0.001	0.097	0.001	0.008	0.150	0.001
SOx: Urban	0.000	0.000	0.001	0.000	-0.009	0.001	0.000	0.000	0.001
CH4	0.333	0.041	0.036	0.053	-1.776	0.036	0.073	0.221	0.107
N2O	0.000	0.000	0.028	0.000	0.001	0.028	0.092	0.001	0.028
CO2	15	-176	239	2	-403	239	24	112	39
GHGs	22	-175	249	3	-440	249	54	117	50

	Grid-independent SIDI HEVs: E90, W. Biomass			Grid-independent SIDI HEVs: E90, H. Biomass			Grid-connected SIDI HEVs: FRFG2, MTBE, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	291	3,582	3,283	402	2,868	3,283	152	1,900	2,360
Fossil fuels	283	16	463	383	91	463	137	1,528	2,360
Petroleum	225	101	463	160	97	463	34	226	2,137
VOC: Total	0.020	0.061	0.106	0.015	0.057	0.106	0.017	0.034	0.074
VOC: Urban	0.000	0.006	0.106	0.000	0.006	0.106	0.000	0.012	0.074
CO: Total	0.095	0.265	2.759	0.074	0.237	2.759	0.051	0.052	1.931
CO: Urban	0.000	0.004	2.759	0.000	0.004	2.759	0.000	0.005	1.931
NOx: Total	0.127	0.378	0.036	0.164	0.350	0.036	0.039	0.223	0.025
NOx: Urban	0.001	0.009	0.036	0.001	0.010	0.036	0.001	0.010	0.025
PM10: Total	0.010	0.047	0.030	0.008	0.043	0.030	0.005	0.017	0.029
PM10: Urban	0.000	0.001	0.030	0.000	0.001	0.030	0.000	0.001	0.029
SOx: Total	0.009	-0.003	0.001	0.013	0.008	0.001	0.014	0.189	0.004
SOx: Urban	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.004
CH4	0.068	0.036	0.107	0.091	0.044	0.107	0.357	0.111	0.050
N2O	0.006	0.026	0.028	0.079	0.023	0.028	0.000	0.002	0.020
CO2	-62	-1	39	-6	7	39	13	132	179
GHGs	-59	8	50	20	15	50	21	134	186

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	Grid-connected SIDI HEVs: FRFG2, ETBE, US mix			Grid-connected SIDI HEVs: FRFG2, EtOH, US mix			Grid-connected SIDI HEVs: FRFG2, MTBE, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	152	1,921	2,360	152	1,906	2,360	153	1,884	2,360
Fossil fuels	137	1,549	2,244	137	1,535	2,271	137	957	2,360
Petroleum	34	227	2,092	34	244	2,271	26	217	2,137
VOC: Total	0.017	0.047	0.074	0.017	0.041	0.079	0.011	0.033	0.074
VOC: Urban	0.000	0.012	0.074	0.000	0.011	0.079	0.000	0.012	0.074
CO: Total	0.051	0.056	1.931	0.051	0.043	1.931	0.047	0.045	1.931
CO: Urban	0.000	0.006	1.931	0.000	0.005	1.931	0.000	0.005	1.931
NOx: Total	0.039	0.246	0.025	0.039	0.225	0.025	0.037	0.105	0.025
NOx: Urban	0.001	0.011	0.025	0.001	0.010	0.025	0.001	0.010	0.025
PM10: Total	0.005	0.035	0.029	0.005	0.026	0.029	0.002	0.010	0.029
PM10: Urban	0.000	0.001	0.029	0.000	0.001	0.029	0.000	0.001	0.029
SOx: Total	0.014	0.199	0.004	0.014	0.193	0.004	0.010	0.055	0.004
SOx: Urban	0.000	0.001	0.004	0.000	0.001	0.004	0.000	0.000	0.004
CH4	0.357	0.114	0.050	0.357	0.050	0.050	0.299	0.110	0.050
N2O	0.000	0.009	0.020	0.000	0.005	0.020	0.000	0.001	0.020
CO2	13	139	179	13	130	179	13	72	179
GHGs	21	144	186	21	132	186	19	75	186

	Grid-connected SIDI HEVs: FRFG2, ETBE, CA mix			Grid-connected SIDI HEVs: FRFG2, EtOH, CA mix			Grid-connected SI HEVs: CNG, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	153	1,904	2,360	153	1,889	2,360	320	1,672	2,646
Fossil fuels	137	978	2,244	137	964	2,271	309	1,262	2,646
Petroleum	26	218	2,092	26	235	2,271	24	16	0
VOC: Total	0.011	0.047	0.074	0.011	0.040	0.079	0.013	0.005	0.043
VOC: Urban	0.000	0.012	0.074	0.000	0.011	0.079	0.000	0.002	0.043
CO: Total	0.047	0.050	1.931	0.047	0.036	1.931	0.068	0.031	1.545
CO: Urban	0.000	0.006	1.931	0.000	0.005	1.931	0.002	0.013	1.545
NOx: Total	0.037	0.129	0.025	0.037	0.108	0.025	0.096	0.215	0.025
NOx: Urban	0.001	0.012	0.025	0.001	0.010	0.025	0.006	0.036	0.025
PM10: Total	0.002	0.028	0.029	0.002	0.019	0.029	0.006	0.013	0.025
PM10: Urban	0.000	0.001	0.029	0.000	0.001	0.029	0.000	0.001	0.025
SOx: Total	0.010	0.065	0.004	0.010	0.059	0.004	0.017	0.179	0.001
SOx: Urban	0.000	0.001	0.004	0.000	0.000	0.004	0.000	0.000	0.001
CH4	0.299	0.113	0.050	0.299	0.049	0.050	0.666	0.047	0.249
N2O	0.000	0.008	0.020	0.000	0.005	0.020	0.000	0.001	0.010
CO2	13	79	179	13	70	179	23	111	158
GHGs	19	84	186	19	73	186	37	112	166

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	Grid-connected SI HEVs: CNG, CA mix			Grid-connected SI HEVs: LNG, US mix			Grid-connected SI HEVs: LNG, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	320	1,656	2,646	231	1,862	2,646	232	1,845	2,646
Fossil fuels	310	692	2,646	221	1,501	2,646	222	930	2,646
Petroleum	16	7	0	23	110	0	16	101	0
VOC: Total	0.008	0.004	0.043	0.010	0.017	0.043	0.004	0.016	0.043
VOC: Urban	0.000	0.002	0.043	0.000	0.001	0.043	0.000	0.001	0.043
CO: Total	0.064	0.024	1.545	0.048	0.082	1.545	0.044	0.075	1.545
CO: Urban	0.002	0.013	1.545	0.000	0.003	1.545	0.000	0.004	1.545
NOx: Total	0.094	0.098	0.025	0.045	0.317	0.025	0.043	0.200	0.025
NOx: Urban	0.006	0.036	0.025	0.001	0.007	0.025	0.001	0.008	0.025
PM10: Total	0.003	0.005	0.025	0.005	0.015	0.025	0.002	0.007	0.025
PM10: Urban	0.000	0.001	0.025	0.000	0.001	0.025	0.000	0.001	0.025
SOx: Total	0.013	0.045	0.001	0.017	0.158	0.000	0.013	0.024	0.000
SOx: Urban	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.607	0.046	0.249	0.419	0.293	0.249	0.361	0.292	0.249
N2O	0.000	0.001	0.010	0.000	0.002	0.010	0.000	0.001	0.010
CO2	23	51	158	18	118	156	18	58	156
GHGs	35	53	166	27	124	164	25	65	164

	Grid-connected SI HEVs: LPG, crude, US mix			Grid-connected SI HEVs: LPG, NG, US mix			Grid-connected SI HEVs: LPG, crude, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	163	1,679	2,646	231	1,581	2,646	163	1,663	2,646
Fossil fuels	146	1,307	2,646	221	1,212	2,646	147	737	2,646
Petroleum	37	149	2,646	23	52	0	29	140	2,646
VOC: Total	0.018	0.015	0.048	0.010	0.013	0.048	0.013	0.014	0.048
VOC: Urban	0.000	0.005	0.048	0.000	0.008	0.048	0.000	0.005	0.048
CO: Total	0.055	0.035	1.545	0.048	0.031	1.545	0.052	0.028	1.545
CO: Urban	0.000	0.006	1.545	0.000	0.006	1.545	0.000	0.006	1.545
NOx: Total	0.041	0.199	0.025	0.045	0.185	0.025	0.040	0.081	0.025
NOx: Urban	0.001	0.010	0.025	0.001	0.010	0.025	0.001	0.011	0.025
PM10: Total	0.005	0.015	0.025	0.005	0.012	0.025	0.002	0.007	0.025
PM10: Urban	0.000	0.001	0.025	0.000	0.001	0.025	0.000	0.001	0.025
SOx: Total	0.014	0.176	0.000	0.017	0.162	0.000	0.010	0.042	0.000
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000
CH4	0.383	0.029	0.055	0.418	0.023	0.055	0.324	0.028	0.055
N2O	0.000	0.001	0.020	0.000	0.001	0.020	0.000	0.001	0.020
CO2	14	113	189	18	105	189	14	54	189
GHGs	22	114	196	27	106	196	21	54	196

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	Grid-connected SI HEVs: LPG, NG, CA mix			Grid-connected SIDI HEVs: M90, NG, US mix			Grid-connected SIDI HEVs: M90, flare gas, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	232	1,564	2,646	202	2,434	2,360	202	2,598	2,360
Fossil fuels	221	642	2,646	191	2,070	2,360	191	2,234	424
Petroleum	16	43	0	24	110	444	24	111	444
VOC: Total	0.004	0.013	0.048	0.011	0.026	0.074	0.011	-0.136	0.074
VOC: Urban	0.000	0.008	0.048	0.000	0.004	0.074	0.000	0.004	0.074
CO: Total	0.044	0.024	1.545	0.046	0.090	1.931	0.046	0.049	1.931
CO: Urban	0.000	0.006	1.545	0.000	0.002	1.931	0.000	0.002	1.931
NOx: Total	0.043	0.067	0.025	0.041	0.223	0.025	0.041	0.142	0.025
NOx: Urban	0.001	0.011	0.025	0.001	0.006	0.025	0.001	0.006	0.025
PM10: Total	0.002	0.005	0.025	0.005	0.014	0.027	0.005	0.011	0.027
PM10: Urban	0.000	0.001	0.025	0.000	0.000	0.027	0.000	0.000	0.027
SOx: Total	0.013	0.028	0.000	0.015	0.166	0.001	0.015	0.166	0.001
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.001
CH4	0.360	0.022	0.055	0.383	0.050	0.025	0.383	0.031	0.025
N2O	0.000	0.001	0.020	0.000	0.002	0.020	0.000	0.001	0.020
CO2	18	46	189	16	129	172	16	-35	172
GHGs	25	46	196	24	131	179	24	-33	179

	Grid-connected SIDI HEVs: M90, LF gas, US mix			Grid-connected SIDI HEVs: M90, NG, CA mix			Grid-connected SIDI HEVs: M90, flare gas, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	81	2,208	2,360	203	2,418	2,360	203	2,581	2,360
Fossil fuels	72	1,850	424	192	1,499	2,360	192	1,664	424
Petroleum	16	104	444	17	101	444	17	102	444
VOC: Total	0.009	0.005	0.074	0.005	0.025	0.074	0.005	-0.137	0.074
VOC: Urban	0.000	0.000	0.074	0.000	0.004	0.074	0.000	0.004	0.074
CO: Total	0.021	-0.151	1.931	0.042	0.083	1.931	0.042	0.043	1.931
CO: Urban	0.000	-0.081	1.931	0.000	0.002	1.931	0.000	0.002	1.931
NOx: Total	0.021	0.220	0.025	0.040	0.106	0.025	0.040	0.024	0.025
NOx: Urban	0.001	-0.003	0.025	0.001	0.006	0.025	0.001	0.006	0.025
PM10: Total	0.004	-0.049	0.027	0.002	0.006	0.027	0.002	0.003	0.027
PM10: Urban	0.000	-0.032	0.027	0.000	0.000	0.027	0.000	0.000	0.027
SOx: Total	0.010	0.224	0.001	0.011	0.032	0.001	0.011	0.032	0.001
SOx: Urban	0.000	-0.006	0.001	0.000	0.000	0.001	0.000	0.000	0.001
CH4	0.182	-1.275	0.025	0.324	0.049	0.025	0.324	0.030	0.025
N2O	0.000	0.002	0.020	0.000	0.001	0.020	0.000	0.001	0.020
CO2	6	-198	172	16	70	172	16	-94	172
GHGs	10	-224	179	23	71	179	23	-93	179

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	Grid-connected SIDI HEVs: M90, LF gas, CA mix			Grid-connected SIDI HEVs: E90, corn, US mix			Grid-connected SIDI HEVs: E90, W. Biomass, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	82	2,192	2,360	271	2,404	2,360	275	3,957	2,360
Fossil fuels	73	1,279	424	256	2,045	333	261	1,039	333
Petroleum	8	96	444	112	84	333	173	85	333
VOC: Total	0.004	0.004	0.074	-0.040	0.192	0.074	0.022	0.045	0.074
VOC: Urban	0.000	0.000	0.074	0.000	0.005	0.074	0.000	0.005	0.074
CO: Total	0.017	-0.157	1.931	0.064	0.069	1.931	0.083	0.204	1.931
CO: Urban	0.000	-0.081	1.931	0.000	0.004	1.931	0.000	0.004	1.931
NOx: Total	0.019	0.103	0.025	0.126	0.318	0.025	0.108	0.427	0.025
NOx: Urban	0.001	-0.002	0.025	0.001	0.011	0.025	0.001	0.010	0.025
PM10: Total	0.001	-0.056	0.027	0.159	0.022	0.027	0.011	0.044	0.027
PM10: Urban	0.000	-0.032	0.027	0.000	0.001	0.027	0.000	0.001	0.027
SOx: Total	0.006	0.090	0.001	0.015	0.262	0.000	0.015	0.152	0.000
SOx: Urban	0.000	-0.006	0.001	0.000	0.001	0.000	0.000	0.001	0.000
CH4	0.123	-1.276	0.025	0.196	0.161	0.075	0.193	0.028	0.075
N2O	0.000	0.001	0.020	0.066	0.002	0.000	0.004	0.020	0.000
CO2	6	-258	172	22	172	28	-40	91	28
GHGs	9	-284	179	47	176	30	-35	98	30

	Grid-connected SIDI HEVs: E90, H. Biomass, US mix			Grid-connected SIDI HEVs: E90, corn, CA mix			Grid-connected SIDI HEVs: E90, W. Biomass, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	355	3,444	2,360	272	2,388	2,360	276	3,941	2,360
Fossil fuels	333	1,093	333	256	1,475	333	262	468	333
Petroleum	126	81	333	105	75	333	166	76	333
VOC: Total	0.018	0.042	0.074	-0.045	0.191	0.074	0.016	0.044	0.074
VOC: Urban	0.000	0.005	0.074	0.000	0.005	0.074	0.000	0.005	0.074
CO: Total	0.068	0.184	1.931	0.060	0.062	1.931	0.079	0.197	1.931
CO: Urban	0.000	0.004	1.931	0.000	0.005	1.931	0.000	0.004	1.931
NOx: Total	0.135	0.407	0.025	0.124	0.201	0.025	0.107	0.310	0.025
NOx: Urban	0.001	0.010	0.025	0.001	0.012	0.025	0.001	0.011	0.025
PM10: Total	0.010	0.041	0.027	0.156	0.015	0.027	0.008	0.037	0.027
PM10: Urban	0.000	0.001	0.027	0.000	0.001	0.027	0.000	0.001	0.027
SOx: Total	0.018	0.160	0.000	0.011	0.128	0.000	0.011	0.018	0.000
SOx: Urban	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.209	0.033	0.075	0.137	0.160	0.075	0.134	0.027	0.075
N2O	0.057	0.017	0.000	0.066	0.001	0.000	0.004	0.019	0.000
CO2	0	97	28	22	113	28	-40	32	28
GHGs	22	103	30	45	116	30	-36	38	30

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	Grid-connected SIDI HEVs: E90, H. Biomass, CA mix		
	Feedstock	Fuel	Vehicle Operation
Total energy	355	3,428	2,360
Fossil fuels	334	523	333
Petroleum	119	75	333
VOC: Total	0.013	0.042	0.074
VOC: Urban	0.000	0.005	0.074
CO: Total	0.064	0.176	1.931
CO: Urban	0.001	0.004	1.931
NOx: Total	0.133	0.290	0.025
NOx: Urban	0.001	0.011	0.025
PM10: Total	0.007	0.035	0.027
PM10: Urban	0.000	0.001	0.027
SOx: Total	0.014	0.026	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.151	0.024	0.075
N2O	0.057	0.017	0.000
CO2	0	37	28
GHGs	21	43	30

	Grid-independent CIDI HEVs: RFD		
	Feedstock	Fuel	Vehicle Operation
Total energy	99	505	2,712
Fossil fuels	90	489	2,712
Petroleum	26	246	2,712
VOC: Total	0.011	0.016	0.080
VOC: Urban	0.000	0.004	0.080
CO: Total	0.042	0.025	5.518
CO: Urban	0.000	0.004	5.518
NOx: Total	0.025	0.060	0.135
NOx: Urban	0.000	0.006	0.135
PM10: Total	0.001	0.007	0.041
PM10: Urban	0.000	0.000	0.041
SOx: Total	0.005	0.037	0.007
SOx: Urban	0.000	0.000	0.007
CH4	0.245	0.043	0.014
N2O	0.000	0.000	0.024
CO2	10	36	219
GHGs	15	37	227

	Grid-independent CIDI HEVs: DME, NG		
	Feedstock	Fuel	Vehicle Operation
Total energy	169	1,323	2,712
Fossil fuels	167	1,315	2,712
Petroleum	12	71	0
VOC: Total	0.002	0.014	0.056
VOC: Urban	0.000	0.001	0.056
CO: Total	0.034	0.081	5.518
CO: Urban	0.000	0.001	5.518
NOx: Total	0.029	0.058	0.135
NOx: Urban	0.000	0.001	0.135
PM10: Total	0.001	0.001	0.035
PM10: Urban	0.000	0.000	0.035
SOx: Total	0.008	0.006	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.281	0.008	0.028
N2O	0.000	0.000	0.024
CO2	13	47	190
GHGs	19	47	198

	Grid-independent CIDI HEVs: DME, flare gas		
	Feedstock	Fuel	Vehicle Operation
Total energy	169	1,491	2,712
Fossil fuels	167	1,485	0
Petroleum	12	72	0
VOC: Total	0.002	-0.200	0.056
VOC: Urban	0.000	0.001	0.056
CO: Total	0.034	0.015	5.518
CO: Urban	0.000	0.001	5.518
NOx: Total	0.029	-0.065	0.135
NOx: Urban	0.000	0.001	0.135
PM10: Total	0.001	-0.004	0.035
PM10: Urban	0.000	0.000	0.035
SOx: Total	0.008	0.005	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.281	0.009	0.028
N2O	0.000	-0.001	0.024
CO2	13	-183	190
GHGs	19	-183	198

	Grid-independent CIDI HEVs: FT50, NG		
	Feedstock	Fuel	Vehicle Operation
Total energy	133	1,176	2,712
Fossil fuels	127	1,164	2,709
Petroleum	19	169	1,406
VOC: Total	0.007	0.010	0.080
VOC: Urban	0.000	0.002	0.080
CO: Total	0.038	0.036	5.518
CO: Urban	0.000	0.002	5.518
NOx: Total	0.027	0.043	0.135
NOx: Urban	0.000	0.004	0.135
PM10: Total	0.001	0.003	0.037
PM10: Urban	0.000	0.000	0.037
SOx: Total	0.006	0.021	0.004
SOx: Urban	0.000	0.000	0.004
CH4	0.263	0.024	0.014
N2O	0.000	0.000	0.024
CO2	11	41	215
GHGs	17	42	222

	Grid-independent CIDI HEVs: FT50, flare gas		
	Feedstock	Fuel	Vehicle Operation
Total energy	133	1,593	2,712
Fossil fuels	127	1,581	1,406
Petroleum	19	171	1,406
VOC: Total	0.007	-0.115	0.080
VOC: Urban	0.000	0.002	0.080
CO: Total	0.038	0.011	5.518
CO: Urban	0.000	0.002	5.518
NOx: Total	0.027	-0.016	0.135
NOx: Urban	0.000	0.004	0.135
PM10: Total	0.001	0.001	0.037
PM10: Urban	0.000	0.000	0.037
SOx: Total	0.006	0.021	0.004
SOx: Urban	0.000	0.000	0.004
CH4	0.263	0.027	0.014
N2O	0.000	0.000	0.024
CO2	11	-75	215
GHGs	17	-74	222

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	Grid-independent CIDI HEVs: BD20			Grid-connected CIDI HEVs: RFD, US mix			Grid-connected CIDI HEVs: RFD, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	133	658	2,712	132	1,719	1,804	132	1,702	1,804
Fossil fuels	123	629	2,712	118	1,352	1,804	119	782	1,804
Petroleum	53	259	2,207	29	176	1,804	21	167	1,804
VOC: Total	0.012	0.058	0.080	0.014	0.012	0.056	0.009	0.011	0.056
VOC: Urban	0.000	0.007	0.080	0.000	0.003	0.056	0.000	0.003	0.056
CO: Total	0.049	0.074	5.518	0.042	0.031	3.863	0.039	0.024	3.863
CO: Urban	0.000	0.019	5.518	0.000	0.001	3.863	0.000	0.001	3.863
NOx: Total	0.044	0.118	0.135	0.034	0.195	0.095	0.032	0.078	0.095
NOx: Urban	0.000	0.021	0.135	0.001	0.003	0.095	0.001	0.004	0.095
PM10: Total	0.002	0.010	0.039	0.005	0.015	0.035	0.002	0.007	0.035
PM10: Urban	0.000	0.001	0.039	0.000	0.000	0.035	0.000	0.000	0.035
SOx: Total	0.006	0.038	0.006	0.013	0.179	0.005	0.009	0.045	0.005
SOx: Urban	0.000	0.001	0.006	0.000	0.000	0.005	0.000	0.000	0.005
CH4	0.205	0.070	0.014	0.307	0.030	0.010	0.248	0.029	0.010
N2O	0.002	0.001	0.024	0.000	0.002	0.017	0.000	0.001	0.017
CO2	12	43	180	11	116	146	11	56	146
GHGs	17	45	188	17	117	151	16	57	151

	Grid-connected CIDI HEVs: DME, NG, US mix			Grid-connected CIDI HEVs: DME, flare gas, US mix			Grid-connected CIDI HEVs: DME, NG, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	190	2,350	1,984	190	2,474	1,984	190	2,334	1,984
Fossil fuels	180	1,990	1,984	180	2,114	0	181	1,419	1,984
Petroleum	20	64	0	20	65	0	13	55	0
VOC: Total	0.009	0.012	0.039	0.009	-0.145	0.039	0.004	0.011	0.039
VOC: Urban	0.000	0.001	0.039	0.000	0.001	0.039	0.000	0.001	0.039
CO: Total	0.040	0.073	3.863	0.040	0.025	3.863	0.036	0.066	3.863
CO: Urban	0.000	0.001	3.863	0.000	0.001	3.863	0.000	0.002	3.863
NOx: Total	0.038	0.198	0.095	0.038	0.108	0.095	0.036	0.081	0.095
NOx: Urban	0.001	0.004	0.095	0.001	0.004	0.095	0.001	0.005	0.095
PM10: Total	0.005	0.011	0.031	0.005	0.007	0.031	0.002	0.003	0.031
PM10: Urban	0.000	0.000	0.031	0.000	0.000	0.031	0.000	0.000	0.031
SOx: Total	0.015	0.158	0.000	0.015	0.158	0.000	0.011	0.024	0.000
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000
CH4	0.350	0.008	0.020	0.350	0.008	0.020	0.291	0.007	0.020
N2O	0.000	0.001	0.017	0.000	0.001	0.017	0.000	0.000	0.017
CO2	14	126	139	14	-42	139	14	67	139
GHGs	22	127	145	22	-42	145	21	67	145

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	Grid-connected CIDI HEVs: DME, flare gas, CA mix			Grid-connected CIDI HEVs: FT50, NG, US mix			Grid-connected CIDI HEVs: FT50, flare gas, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	190	2,458	1,984	163	2,243	1,984	163	2,548	1,984
Fossil fuels	181	1,543	0	151	1,879	1,983	151	2,184	1,029
Petroleum	13	56	0	26	136	1,029	26	137	1,029
VOC: Total	0.004	-0.146	0.039	0.012	0.009	0.056	0.012	-0.082	0.056
VOC: Urban	0.000	0.001	0.039	0.000	0.002	0.056	0.000	0.002	0.056
CO: Total	0.036	0.018	3.863	0.043	0.040	3.863	0.043	0.022	3.863
CO: Urban	0.000	0.002	3.863	0.000	0.002	3.863	0.000	0.002	3.863
NOx: Total	0.036	-0.009	0.095	0.037	0.187	0.095	0.037	0.144	0.095
NOx: Urban	0.001	0.005	0.095	0.001	0.006	0.095	0.001	0.006	0.095
PM10: Total	0.002	-0.001	0.031	0.005	0.012	0.032	0.005	0.011	0.032
PM10: Urban	0.000	0.000	0.031	0.000	0.000	0.032	0.000	0.000	0.032
SOx: Total	0.011	0.024	0.000	0.014	0.169	0.003	0.014	0.170	0.003
SOx: Urban	0.000	0.000	0.000	0.000	0.001	0.003	0.000	0.001	0.003
CH4	0.291	0.008	0.020	0.336	0.019	0.010	0.336	0.021	0.010
N2O	0.000	0.000	0.017	0.000	0.001	0.017	0.000	0.001	0.017
CO2	14	-101	139	13	122	157	13	37	157
GHGs	21	-101	145	20	123	162	20	38	162

	Grid-connected CIDI HEVs: FT50, NG, CA mix			Grid-connected CIDI HEVs: FT50, flare gas, CA mix			Grid-connected CIDI HEVs: BD20, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	164	2,227	1,984	164	2,532	1,984	163	1,864	1,984
Fossil fuels	152	1,309	1,983	152	1,613	1,029	148	1,487	1,984
Petroleum	18	127	1,029	18	128	1,029	51	201	1,615
VOC: Total	0.007	0.008	0.056	0.007	-0.083	0.056	0.016	0.044	0.056
VOC: Urban	0.000	0.002	0.056	0.000	0.002	0.056	0.000	0.005	0.056
CO: Total	0.039	0.033	3.863	0.039	0.016	3.863	0.050	0.068	3.863
CO: Urban	0.000	0.003	3.863	0.000	0.003	3.863	0.000	0.015	3.863
NOx: Total	0.035	0.069	0.095	0.035	0.026	0.095	0.050	0.242	0.095
NOx: Urban	0.001	0.007	0.095	0.001	0.007	0.095	0.001	0.018	0.095
PM10: Total	0.002	0.005	0.032	0.002	0.003	0.032	0.006	0.017	0.034
PM10: Urban	0.000	0.000	0.032	0.000	0.000	0.032	0.000	0.001	0.034
SOx: Total	0.010	0.035	0.003	0.010	0.036	0.003	0.014	0.182	0.004
SOx: Urban	0.000	0.000	0.003	0.000	0.000	0.003	0.000	0.001	0.004
CH4	0.277	0.019	0.010	0.277	0.021	0.010	0.294	0.053	0.010
N2O	0.000	0.000	0.017	0.000	0.000	0.017	0.001	0.002	0.017
CO2	13	62	157	13	-22	157	13	124	132
GHGs	19	63	162	19	-22	162	20	125	137

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	Grid-connected CIDI HEVs: BD20, CA mix			EV: US mix			EV: US NE mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	164	1,847	1,984	219	4,608	0	318	4,408	0
Fossil fuels	149	917	1,984	193	3,423	0	285	3,042	0
Petroleum	43	192	1,615	39	40	0	31	80	0
VOC: Total	0.011	0.043	0.056	0.024	0.005	0.000	0.016	0.005	0.000
VOC: Urban	0.000	0.005	0.056	0.000	0.000	0.000	0.000	0.001	0.000
CO: Total	0.047	0.061	3.863	0.049	0.047	0.000	0.059	0.045	0.000
CO: Urban	0.000	0.015	3.863	0.001	0.003	0.000	0.001	0.006	0.000
NOx: Total	0.048	0.124	0.095	0.057	0.518	0.000	0.079	0.330	0.000
NOx: Urban	0.001	0.019	0.095	0.002	0.011	0.000	0.004	0.022	0.000
PM10: Total	0.003	0.010	0.034	0.013	0.033	0.021	0.008	0.022	0.021
PM10: Urban	0.000	0.001	0.034	0.000	0.001	0.021	0.000	0.002	0.021
SOx: Total	0.010	0.048	0.004	0.030	0.514	0.000	0.028	0.254	0.000
SOx: Urban	0.000	0.000	0.004	0.000	0.001	0.000	0.000	0.002	0.000
CH4	0.235	0.052	0.010	0.479	0.006	0.000	0.507	0.006	0.000
N2O	0.001	0.001	0.017	0.000	0.004	0.000	0.000	0.003	0.000
CO2	13	64	132	16	306	0	22	237	0
GHGs	19	65	137	26	308	0	33	238	0

	EV: CA mix			H2 FCVs: NG, gas, central			H2 FCVs: NG, gas, decentral		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	221	4,554	0	130	947	2,079	200	1,386	2,079
Fossil fuels	195	1,522	0	128	874	2,079	197	1,383	2,079
Petroleum	14	10	0	9	7	0	10	6	0
VOC: Total	0.006	0.003	0.000	0.002	0.010	0.000	0.005	0.011	0.000
VOC: Urban	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.010	0.000
CO: Total	0.036	0.024	0.000	0.026	0.087	0.000	0.042	0.116	0.000
CO: Urban	0.001	0.004	0.000	0.000	0.018	0.000	0.002	0.105	0.000
NOx: Total	0.052	0.127	0.000	0.022	0.143	0.000	0.062	0.134	0.000
NOx: Urban	0.002	0.013	0.000	0.000	0.050	0.000	0.004	0.122	0.000
PM10: Total	0.004	0.008	0.021	0.001	0.004	0.021	0.002	0.004	0.021
PM10: Urban	0.000	0.001	0.021	0.000	0.001	0.021	0.000	0.004	0.021
SOx: Total	0.017	0.067	0.000	0.006	0.033	0.000	0.006	0.003	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.284	0.003	0.000	0.216	0.138	0.000	0.410	0.091	0.000
N2O	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.001	0.000
CO2	15	108	0	10	178	0	14	203	0
GHGs	21	108	0	15	181	0	23	206	0

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	H2 FCVs: gas, solar			H2 FCVs: NG, liquid			H2 FCVs: solar, liquid		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	0	624	2,079	130	1,020	2,079	0	131	2,079
Fossil fuels	0	532	0	128	1,016	2,079	0	130	0
Petroleum	0	7	0	9	123	0	0	119	0
VOC: Total	0.000	0.012	0.000	0.002	0.026	0.000	0.000	0.021	0.000
VOC: Urban	0.000	0.005	0.000	0.000	0.005	0.000	0.000	0.004	0.000
CO: Total	0.000	0.062	0.000	0.026	0.100	0.000	0.000	0.047	0.000
CO: Urban	0.000	0.026	0.000	0.000	0.009	0.000	0.000	0.009	0.000
NOx: Total	0.000	0.181	0.000	0.022	0.135	0.000	0.000	0.082	0.000
NOx: Urban	0.000	0.070	0.000	0.000	0.018	0.000	0.000	0.016	0.000
PM10: Total	0.000	0.006	0.021	0.001	0.010	0.021	0.000	0.008	0.021
PM10: Urban	0.000	0.001	0.021	0.000	0.002	0.021	0.000	0.001	0.021
SOx: Total	0.000	0.042	0.000	0.006	0.005	0.000	0.000	0.003	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.000	0.124	0.000	0.216	0.133	0.000	0.000	0.012	0.000
N2O	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000
CO2	0	39	0	10	183	0	0	10	0
GHGs	0	42	0	15	186	0	0	11	0

	FCVs: MeOH, NG			FCVs: MeOH, flare gas			FCVs: MeOH, LF gas		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	150	1,188	2,399	150	1,391	2,399	0	908	2,399
Fossil fuels	148	1,181	2,399	148	1,384	0	0	908	0
Petroleum	11	74	0	11	75	0	0	67	0
VOC: Total	0.002	0.023	0.038	0.002	-0.178	0.038	0.000	-0.003	0.038
VOC: Urban	0.000	0.002	0.038	0.000	0.002	0.038	0.000	-0.002	0.038
CO: Total	0.030	0.085	0.552	0.030	0.036	0.552	0.000	-0.212	0.552
CO: Urban	0.000	0.001	0.552	0.000	0.001	0.552	0.000	-0.102	0.552
NOx: Total	0.025	0.069	0.007	0.025	-0.032	0.007	0.000	0.065	0.007
NOx: Urban	0.000	0.002	0.007	0.000	0.002	0.007	0.000	-0.009	0.007
PM10: Total	0.001	0.003	0.021	0.001	-0.001	0.021	0.000	-0.074	0.021
PM10: Urban	0.000	0.000	0.021	0.000	0.000	0.021	0.000	-0.040	0.021
SOx: Total	0.007	0.007	0.000	0.007	0.007	0.000	0.000	0.079	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.008	0.000
CH4	0.249	0.035	0.014	0.249	0.012	0.014	0.000	-1.606	0.014
N2O	0.000	0.000	0.006	0.000	0.000	0.006	0.000	0.001	0.006
CO2	12	37	173	12	-165	173	0	-368	173
GHGs	17	38	175	17	-165	175	0	-402	175

B-II Long-Term Technologies

B-II.2 Light-Duty Truck 1 (Cont.)

	FCVs: RFG			EtOH FCVs: Corn			EtOH FCVs: W. Biomass		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	114	684	3,118	297	1,460	3,118	303	3,849	3,118
Fossil fuels	104	662	3,118	287	1,457	0	295	-91	0
Petroleum	29	283	2,737	150	65	0	244	66	0
VOC: Total	0.012	0.043	0.057	-0.074	0.285	0.038	0.020	0.060	0.038
VOC: Urban	0.000	0.015	0.057	0.000	0.005	0.038	0.000	0.005	0.038
CO: Total	0.048	0.050	0.552	0.068	0.076	0.552	0.097	0.284	0.552
CO: Urban	0.000	0.005	0.552	0.000	0.007	0.552	0.000	0.006	0.552
NOx: Total	0.029	0.089	0.007	0.163	0.236	0.007	0.136	0.404	0.007
NOx: Urban	0.000	0.008	0.007	0.001	0.017	0.007	0.001	0.014	0.007
PM10: Total	0.001	0.009	0.021	0.239	0.018	0.021	0.011	0.051	0.021
PM10: Urban	0.000	0.001	0.021	0.000	0.001	0.021	0.000	0.001	0.021
SOx: Total	0.006	0.046	0.000	0.008	0.158	0.000	0.009	-0.011	0.000
SOx: Urban	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.282	0.144	0.014	0.034	0.221	0.014	0.029	0.017	0.014
N2O	0.000	0.001	0.006	0.102	0.001	0.006	0.007	0.028	0.006
CO2	11	52	236	25	115	1	-71	-9	1
GHGs	17	56	238	57	120	3	-68	0	3

	EtOH FCVs: H. Biomass			FCVs: CNG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	426	3,059	3,118	299	341	3,118
Fossil fuels	406	-8	0	296	277	3,118
Petroleum	172	61	0	14	5	0
VOC: Total	0.015	0.056	0.038	0.007	0.004	0.016
VOC: Urban	0.000	0.005	0.038	0.000	0.003	0.016
CO: Total	0.074	0.253	0.552	0.063	0.020	0.552
CO: Urban	0.001	0.006	0.552	0.002	0.014	0.552
NOx: Total	0.177	0.372	0.007	0.092	0.070	0.007
NOx: Urban	0.001	0.014	0.007	0.006	0.038	0.007
PM10: Total	0.009	0.046	0.021	0.003	0.003	0.021
PM10: Urban	0.000	0.001	0.021	0.000	0.001	0.021
SOx: Total	0.013	0.001	0.000	0.010	0.029	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.054	0.025	0.014	0.615	0.054	0.142
N2O	0.087	0.025	0.006	0.000	0.000	0.006
CO2	-9	-1	1	21	22	187
GHGs	19	7	3	34	24	191

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2

	Baseline Conv. GV: FRFG2, MTBE			CNGV: dedicated			LNGV: dedicated		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	267	1,598	7,290	700	798	7,290	456	1,320	7,290
Fossil fuels	243	1,547	7,290	691	649	7,290	450	1,305	7,290
Petroleum	69	661	6,397	33	11	0	32	269	0
VOC: Total	0.029	0.101	0.158	0.016	0.010	0.072	0.007	0.042	0.072
VOC: Urban	0.000	0.035	0.158	0.001	0.006	0.072	0.000	0.003	0.072
CO: Total	0.113	0.116	5.518	0.147	0.048	4.414	0.092	0.187	4.414
CO: Urban	0.000	0.012	5.518	0.005	0.033	4.414	0.000	0.007	4.414
NOx: Total	0.067	0.208	0.135	0.216	0.164	0.135	0.077	0.446	0.135
NOx: Urban	0.000	0.019	0.135	0.014	0.089	0.135	0.000	0.012	0.135
PM10: Total	0.004	0.022	0.041	0.006	0.007	0.025	0.004	0.013	0.025
PM10: Urban	0.000	0.001	0.041	0.000	0.002	0.025	0.000	0.001	0.025
SOx: Total	0.014	0.108	0.011	0.022	0.068	0.002	0.021	0.012	0.000
SOx: Urban	0.000	0.001	0.011	0.000	0.000	0.002	0.000	0.000	0.000
CH4	0.659	0.338	0.091	1.439	0.125	0.455	0.759	0.803	0.455
N2O	0.000	0.002	0.040	0.001	0.001	0.020	0.001	0.002	0.020
CO2	26	123	552	49	52	436	36	71	430
GHGs	40	130	566	80	55	451	52	88	446

	LPGV: dedicated, crude			LPGV: dedicated, NG			Dedi. MeOH Vehicle: M90, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	254	779	6,943	433	520	6,943	401	3,094	6,943
Fossil fuels	231	735	6,943	427	485	6,943	392	3,068	6,943
Petroleum	66	360	6,943	31	105	0	37	289	1,306
VOC: Total	0.028	0.036	0.088	0.006	0.031	0.088	0.010	0.072	0.158
VOC: Urban	0.000	0.012	0.088	0.000	0.020	0.088	0.000	0.011	0.158
CO: Total	0.107	0.054	4.414	0.088	0.045	4.414	0.091	0.222	5.518
CO: Urban	0.000	0.013	4.414	0.000	0.012	4.414	0.000	0.004	5.518
NOx: Total	0.064	0.113	0.135	0.073	0.076	0.135	0.071	0.199	0.135
NOx: Urban	0.000	0.018	0.135	0.000	0.018	0.135	0.000	0.007	0.135
PM10: Total	0.003	0.012	0.025	0.003	0.006	0.025	0.003	0.010	0.033
PM10: Urban	0.000	0.001	0.025	0.000	0.001	0.025	0.000	0.000	0.033
SOx: Total	0.014	0.058	0.000	0.020	0.020	0.000	0.019	0.035	0.002
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.002
CH4	0.628	0.070	0.100	0.720	0.055	0.100	0.704	0.142	0.046
N2O	0.000	0.001	0.040	0.000	0.001	0.040	0.000	0.001	0.040
CO2	24	56	497	34	35	497	33	110	506
GHGs	38	58	511	50	36	511	48	113	519

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	Dedi. MeOH Vehicle: M90, flare gas			Dedi. MeOH Vehicle: M90, LF gas			Dedi. EtOH Vehicle: E90, corn		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	401	3,575	6,943	46	2,429	6,943	605	3,008	6,943
Fossil fuels	392	3,551	1,247	42	2,420	1,247	581	2,998	979
Petroleum	37	292	1,306	12	272	1,306	296	221	979
VOC: Total	0.010	-0.405	0.158	0.005	0.009	0.158	-0.138	0.562	0.158
VOC: Urban	0.000	0.011	0.158	0.000	0.001	0.158	0.001	0.013	0.158
CO: Total	0.091	0.104	5.518	0.019	-0.484	5.518	0.144	0.158	5.518
CO: Urban	0.000	0.004	5.518	0.000	-0.240	5.518	0.001	0.010	5.518
NOx: Total	0.071	-0.041	0.135	0.011	0.191	0.135	0.320	0.480	0.135
NOx: Urban	0.000	0.007	0.135	0.000	-0.018	0.135	0.001	0.023	0.135
PM10: Total	0.003	0.001	0.033	0.001	-0.173	0.033	0.457	0.040	0.033
PM10: Urban	0.000	0.000	0.033	0.000	-0.095	0.033	0.000	0.001	0.033
SOx: Total	0.019	0.035	0.002	0.002	0.206	0.002	0.017	0.319	0.001
SOx: Urban	0.000	0.001	0.002	0.000	-0.019	0.002	0.000	0.001	0.001
CH4	0.704	0.086	0.046	0.113	-3.757	0.046	0.154	0.442	0.137
N2O	0.000	0.000	0.040	0.000	0.002	0.040	0.194	0.004	0.040
CO2	33	-372	506	4	-853	506	51	235	82
GHGs	47	-370	519	7	-931	519	115	246	98

	Dedi. EtOH Vehicle: E90, W. Biomass			Dedi. EtOH Vehicle: E90, H. Biomass			SIDI Vehicle: FRFG2, MTBE		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	616	7,577	6,943	850	6,067	6,943	214	1,279	5,832
Fossil fuels	598	37	979	809	196	979	194	1,237	5,832
Petroleum	475	221	979	338	212	979	55	529	5,118
VOC: Total	0.043	0.130	0.158	0.032	0.123	0.158	0.023	0.081	0.150
VOC: Urban	0.001	0.013	0.158	0.001	0.013	0.158	0.000	0.028	0.150
CO: Total	0.201	0.556	5.518	0.157	0.496	5.518	0.090	0.093	5.518
CO: Urban	0.001	0.009	5.518	0.001	0.009	5.518	0.000	0.010	5.518
NOx: Total	0.268	0.800	0.135	0.347	0.740	0.135	0.053	0.166	0.135
NOx: Urban	0.001	0.019	0.135	0.002	0.020	0.135	0.000	0.016	0.135
PM10: Total	0.021	0.104	0.033	0.018	0.094	0.033	0.003	0.018	0.049
PM10: Urban	0.000	0.001	0.033	0.000	0.001	0.033	0.000	0.001	0.049
SOx: Total	0.018	-0.005	0.001	0.027	0.018	0.001	0.011	0.086	0.009
SOx: Urban	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.009
CH4	0.144	0.052	0.137	0.192	0.067	0.137	0.528	0.270	0.091
N2O	0.013	0.056	0.040	0.167	0.049	0.040	0.000	0.001	0.040
CO2	-132	-2	82	-13	13	82	20	98	441
GHGs	-125	16	98	42	30	98	32	104	456

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

SIDI Vehicle: FRFG2, ETBE

	Feedstock	Fuel	Vehicle Operation
Total energy	214	1,330	5,832
Fossil fuels	194	1,289	5,460
Petroleum	55	531	4,975
VOC: Total	0.023	0.113	0.150
VOC: Urban	0.000	0.029	0.150
CO: Total	0.090	0.105	5.518
CO: Urban	0.000	0.012	5.518
NOx: Total	0.053	0.225	0.135
NOx: Urban	0.000	0.020	0.135
PM10: Total	0.003	0.062	0.049
PM10: Urban	0.000	0.002	0.049
SOx: Total	0.011	0.112	0.009
SOx: Urban	0.000	0.001	0.009
CH4	0.528	0.277	0.091
N2O	0.000	0.019	0.040
CO2	20	115	442
GHGs	32	127	456

SIDI Vehicle: FRFG2, EtOH

	Feedstock	Fuel	Vehicle Operation
Total energy	214	1,293	5,832
Fossil fuels	194	1,255	5,611
Petroleum	55	574	5,611
VOC: Total	0.023	0.096	0.158
VOC: Urban	0.000	0.028	0.158
CO: Total	0.090	0.071	5.518
CO: Urban	0.000	0.009	5.518
NOx: Total	0.053	0.172	0.135
NOx: Urban	0.000	0.016	0.135
PM10: Total	0.003	0.040	0.049
PM10: Urban	0.000	0.001	0.049
SOx: Total	0.011	0.097	0.009
SOx: Urban	0.000	0.001	0.009
CH4	0.528	0.118	0.091
N2O	0.000	0.011	0.040
CO2	20	94	443
GHGs	32	99	458

SIDI Vehicle: CARFG2, ETBE

	Feedstock	Fuel	Vehicle Operation
Total energy	214	1,330	5,832
Fossil fuels	194	1,289	5,544
Petroleum	55	531	5,170
VOC: Total	0.023	0.113	0.150
VOC: Urban	0.000	0.029	0.150
CO: Total	0.090	0.105	5.518
CO: Urban	0.000	0.012	5.518
NOx: Total	0.053	0.225	0.135
NOx: Urban	0.000	0.020	0.135
PM10: Total	0.003	0.062	0.049
PM10: Urban	0.000	0.002	0.049
SOx: Total	0.011	0.112	0.009
SOx: Urban	0.000	0.001	0.009
CH4	0.528	0.277	0.091
N2O	0.000	0.019	0.040
CO2	20	115	442
GHGs	32	127	456

SIDI Vehicle: CARFG2, EtOH

	Feedstock	Fuel	Vehicle Operation
Total energy	214	1,293	5,832
Fossil fuels	194	1,255	5,611
Petroleum	55	574	5,611
VOC: Total	0.023	0.096	0.158
VOC: Urban	0.000	0.028	0.158
CO: Total	0.090	0.071	5.518
CO: Urban	0.000	0.009	5.518
NOx: Total	0.053	0.172	0.135
NOx: Urban	0.000	0.016	0.135
PM10: Total	0.003	0.040	0.049
PM10: Urban	0.000	0.001	0.049
SOx: Total	0.011	0.097	0.009
SOx: Urban	0.000	0.001	0.009
CH4	0.528	0.118	0.091
N2O	0.000	0.011	0.040
CO2	20	94	443
GHGs	32	99	458

SIDI Dedi. MeOH Vehicle: M90, NG

	Feedstock	Fuel	Vehicle Operation
Total energy	337	2,370	5,832
Fossil fuels	329	2,355	5,832
Petroleum	31	148	1,097
VOC: Total	0.009	0.051	0.150
VOC: Urban	0.000	0.009	0.150
CO: Total	0.076	0.171	5.518
CO: Urban	0.000	0.003	5.518
NOx: Total	0.060	0.140	0.135
NOx: Urban	0.000	0.006	0.135
PM10: Total	0.003	0.006	0.041
PM10: Urban	0.000	0.000	0.041
SOx: Total	0.016	0.014	0.002
SOx: Urban	0.000	0.001	0.002
CH4	0.591	0.070	0.046
N2O	0.000	0.001	0.040
CO2	27	74	425
GHGs	40	76	438

SIDI Dedi. MeOH Vehicle: M90, flare gas

	Feedstock	Fuel	Vehicle Operation
Total energy	337	2,774	5,832
Fossil fuels	329	2,761	1,047
Petroleum	31	150	1,097
VOC: Total	0.009	-0.349	0.150
VOC: Urban	0.000	0.009	0.150
CO: Total	0.076	0.072	5.518
CO: Urban	0.000	0.003	5.518
NOx: Total	0.060	-0.062	0.135
NOx: Urban	0.000	0.006	0.135
PM10: Total	0.003	-0.002	0.041
PM10: Urban	0.000	0.000	0.041
SOx: Total	0.016	0.014	0.002
SOx: Urban	0.000	0.001	0.002
CH4	0.591	0.024	0.046
N2O	0.000	0.000	0.040
CO2	27	-330	425
GHGs	40	-329	438

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	SIDI Dedi. MeOH Vehicle: M90, LF gas			SIDI Dedi. EtOH Vehicle: E90, corn			SIDI Dedi. EtOH Vehicle: E90, W. Biomass		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	38	1,811	5,832	508	2,527	5,832	517	6,365	5,832
Fossil fuels	35	1,811	1,047	488	2,518	822	502	31	822
Petroleum	10	134	1,097	249	185	822	399	186	822
VOC: Total	0.004	-0.002	0.150	-0.116	0.472	0.150	0.036	0.110	0.150
VOC: Urban	0.000	0.001	0.150	0.001	0.011	0.150	0.001	0.011	0.150
CO: Total	0.016	-0.422	5.518	0.121	0.133	5.518	0.169	0.467	5.518
CO: Urban	0.000	-0.202	5.518	0.000	0.009	5.518	0.001	0.008	5.518
NOx: Total	0.010	0.133	0.135	0.269	0.403	0.135	0.225	0.672	0.135
NOx: Urban	0.000	-0.015	0.135	0.001	0.019	0.135	0.001	0.016	0.135
PM10: Total	0.001	-0.148	0.041	0.384	0.034	0.041	0.018	0.087	0.041
PM10: Urban	0.000	-0.080	0.041	0.000	0.001	0.041	0.000	0.001	0.041
SOx: Total	0.002	0.158	0.002	0.015	0.268	0.001	0.015	-0.004	0.001
SOx: Urban	0.000	-0.016	0.002	0.000	0.001	0.001	0.000	0.000	0.001
CH4	0.095	-3.204	0.046	0.129	0.371	0.137	0.121	0.043	0.137
N2O	0.000	0.002	0.040	0.163	0.003	0.040	0.011	0.047	0.040
CO2	4	-734	425	43	198	70	-111	-2	70
GHGs	6	-801	438	96	207	86	-105	14	86

	SIDI Dedi. EtOH Vehicle: E90, H. Biomass			CIDI Vehicle: RFD			CIDI Vehicle: DME, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	714	5,096	5,832	178	906	4,860	303	2,370	4,860
Fossil fuels	680	165	822	162	876	4,860	299	2,358	4,860
Petroleum	284	178	822	46	441	4,860	22	127	0
VOC: Total	0.027	0.103	0.150	0.019	0.028	0.111	0.004	0.026	0.078
VOC: Urban	0.000	0.011	0.150	0.000	0.008	0.111	0.000	0.002	0.078
CO: Total	0.132	0.417	5.518	0.075	0.045	5.518	0.061	0.145	5.518
CO: Urban	0.001	0.008	5.518	0.000	0.006	5.518	0.000	0.001	5.518
NOx: Total	0.291	0.622	0.135	0.045	0.107	0.180	0.051	0.104	0.180
NOx: Urban	0.001	0.017	0.135	0.000	0.010	0.180	0.000	0.003	0.180
PM10: Total	0.015	0.079	0.041	0.002	0.013	0.041	0.002	0.001	0.035
PM10: Urban	0.000	0.001	0.041	0.000	0.001	0.041	0.000	0.000	0.035
SOx: Total	0.022	0.015	0.001	0.010	0.066	0.012	0.014	0.010	0.000
SOx: Urban	0.000	0.000	0.001	0.000	0.001	0.012	0.000	0.001	0.000
CH4	0.162	0.056	0.137	0.440	0.076	0.017	0.504	0.015	0.034
N2O	0.140	0.041	0.040	0.000	0.001	0.032	0.000	0.000	0.032
CO2	-11	11	70	17	65	392	24	85	341
GHGs	36	25	86	26	67	403	35	85	352

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	CIDI Vehicle: DME, flare gas			CIDI Vehicle: FT50, NG			CIDI Vehicle: FT50, flare gas		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	303	2,673	4,860	238	2,105	4,860	238	2,850	4,860
Fossil fuels	299	2,661	0	228	2,084	4,855	228	2,828	2,521
Petroleum	22	129	0	34	303	2,521	34	306	2,521
VOC: Total	0.004	-0.358	0.078	0.012	0.017	0.111	0.012	-0.205	0.111
VOC: Urban	0.000	0.002	0.078	0.000	0.004	0.111	0.000	0.004	0.111
CO: Total	0.061	0.027	5.518	0.068	0.064	5.518	0.068	0.021	5.518
CO: Urban	0.000	0.001	5.518	0.000	0.004	5.518	0.000	0.004	5.518
NOx: Total	0.051	-0.116	0.180	0.048	0.076	0.180	0.048	-0.029	0.180
NOx: Urban	0.000	0.003	0.180	0.000	0.007	0.180	0.000	0.007	0.180
PM10: Total	0.002	-0.008	0.035	0.002	0.005	0.038	0.002	0.002	0.038
PM10: Urban	0.000	0.000	0.035	0.000	0.000	0.038	0.000	0.000	0.038
SOx: Total	0.014	0.009	0.000	0.012	0.037	0.006	0.012	0.038	0.006
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.006	0.000	0.001	0.006
CH4	0.504	0.016	0.034	0.471	0.043	0.017	0.471	0.048	0.017
N2O	0.000	-0.001	0.032	0.000	0.000	0.032	0.000	0.000	0.032
CO2	24	-328	341	20	74	384	20	-133	384
GHGs	35	-328	352	30	75	395	30	-133	395

	CIDI Vehicle: BD20			Grid-independent SIDI HEVs: FRFG2, MTBE			Grid-independent SIDI HEVs: FRFG2, ETBE		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	239	1,179	4,860	141	841	3,837	141	875	3,837
Fossil fuels	220	1,127	4,860	128	814	3,837	128	848	3,592
Petroleum	95	464	3,955	36	348	3,367	36	350	3,273
VOC: Total	0.021	0.104	0.111	0.015	0.053	0.135	0.015	0.074	0.135
VOC: Urban	0.000	0.013	0.111	0.000	0.019	0.109	0.000	0.019	0.109
CO: Total	0.088	0.132	5.518	0.059	0.061	5.518	0.059	0.069	5.518
CO: Urban	0.000	0.034	5.518	0.000	0.006	5.518	0.000	0.008	5.518
NOx: Total	0.079	0.212	0.180	0.035	0.109	0.135	0.035	0.148	0.135
NOx: Urban	0.000	0.037	0.180	0.000	0.010	0.135	0.000	0.013	0.135
PM10: Total	0.004	0.018	0.039	0.002	0.012	0.045	0.002	0.041	0.045
PM10: Urban	0.000	0.003	0.039	0.000	0.001	0.045	0.000	0.001	0.045
SOx: Total	0.012	0.068	0.010	0.008	0.057	0.006	0.008	0.074	0.006
SOx: Urban	0.000	0.001	0.010	0.000	0.001	0.006	0.000	0.001	0.006
CH4	0.368	0.125	0.017	0.347	0.178	0.091	0.347	0.182	0.091
N2O	0.003	0.001	0.032	0.000	0.001	0.040	0.000	0.013	0.040
CO2	21	78	321	13	65	290	13	76	290
GHGs	30	81	331	21	69	305	21	84	305

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	Grid-independent SIDI HEVs: FRFG2, EtOH			Grid-independent SI HEVs: CNG			Grid-independent SI HEVs: LNG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	141	851	3,837	412	469	4,288	269	777	4,288
Fossil fuels	128	825	3,649	407	382	4,288	265	768	4,288
Petroleum	36	378	3,649	20	6	0	19	158	0
VOC: Total	0.015	0.063	0.142	0.009	0.006	0.080	0.004	0.025	0.080
VOC: Urban	0.000	0.018	0.125	0.001	0.004	0.080	0.000	0.002	0.080
CO: Total	0.059	0.046	5.518	0.087	0.028	4.414	0.054	0.110	4.414
CO: Urban	0.000	0.006	5.518	0.003	0.019	4.414	0.000	0.004	4.414
NOx: Total	0.035	0.113	0.135	0.127	0.096	0.135	0.045	0.262	0.135
NOx: Urban	0.000	0.010	0.135	0.008	0.053	0.135	0.000	0.007	0.135
PM10: Total	0.002	0.026	0.045	0.004	0.004	0.031	0.002	0.008	0.031
PM10: Urban	0.000	0.001	0.045	0.000	0.001	0.031	0.000	0.001	0.031
SOx: Total	0.008	0.064	0.006	0.013	0.040	0.001	0.012	0.007	0.000
SOx: Urban	0.000	0.001	0.006	0.000	0.000	0.001	0.000	0.000	0.000
CH4	0.347	0.078	0.091	0.846	0.074	0.455	0.446	0.472	0.455
N2O	0.000	0.007	0.040	0.001	0.000	0.020	0.000	0.001	0.020
CO2	13	62	292	29	31	256	21	42	252
GHGs	21	65	306	47	32	272	31	52	268

	Grid-independent SI HEVs: LPG, crude			Grid-independent SI HEVs: LPG, NG			Grid-independent SIDI HEVs: M90, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	157	481	4,288	268	321	4,288	222	1,710	3,837
Fossil fuels	143	454	4,288	264	300	4,288	217	1,696	3,837
Petroleum	40	222	4,288	19	65	0	20	160	722
VOC: Total	0.017	0.022	0.088	0.004	0.019	0.088	0.006	0.040	0.135
VOC: Urban	0.000	0.007	0.088	0.000	0.013	0.088	0.000	0.006	0.135
CO: Total	0.066	0.034	4.414	0.054	0.027	4.414	0.050	0.123	5.518
CO: Urban	0.000	0.008	4.414	0.000	0.008	4.414	0.000	0.002	5.518
NOx: Total	0.039	0.070	0.135	0.045	0.047	0.135	0.039	0.110	0.135
NOx: Urban	0.000	0.011	0.135	0.000	0.011	0.135	0.000	0.004	0.135
PM10: Total	0.002	0.008	0.031	0.002	0.004	0.031	0.002	0.006	0.038
PM10: Urban	0.000	0.001	0.031	0.000	0.001	0.031	0.000	0.000	0.038
SOx: Total	0.008	0.036	0.000	0.012	0.012	0.000	0.010	0.020	0.001
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.001
CH4	0.388	0.043	0.100	0.445	0.034	0.100	0.389	0.078	0.046
N2O	0.000	0.000	0.040	0.000	0.000	0.040	0.000	0.001	0.040
CO2	15	35	307	21	21	307	18	61	280
GHGs	23	36	321	31	22	321	26	62	293

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	Grid-independent SIDI HEVs: M90, flare gas			Grid-independent SIDI HEVs: M90, LF gas			Grid-independent SIDI HEVs: E90, corn		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	222	1,976	3,837	25	1,342	3,837	334	1,662	3,837
Fossil fuels	217	1,963	689	23	1,338	689	321	1,657	541
Petroleum	20	161	722	7	150	722	164	122	541
VOC: Total	0.006	-0.224	0.135	0.003	0.005	0.135	-0.077	0.311	0.135
VOC: Urban	0.000	0.006	0.135	0.000	0.001	0.135	0.000	0.007	0.135
CO: Total	0.050	0.058	5.518	0.011	-0.268	5.518	0.080	0.087	5.518
CO: Urban	0.000	0.002	5.518	0.000	-0.133	5.518	0.000	0.006	5.518
NOx: Total	0.039	-0.023	0.135	0.006	0.105	0.135	0.177	0.265	0.135
NOx: Urban	0.000	0.004	0.135	0.000	-0.010	0.135	0.001	0.013	0.135
PM10: Total	0.002	0.001	0.038	0.000	-0.096	0.038	0.253	0.022	0.038
PM10: Urban	0.000	0.000	0.038	0.000	-0.053	0.038	0.000	0.001	0.038
SOx: Total	0.010	0.019	0.001	0.001	0.114	0.001	0.010	0.176	0.001
SOx: Urban	0.000	0.001	0.001	0.000	-0.010	0.001	0.000	0.000	0.001
CH4	0.389	0.047	0.046	0.062	-2.076	0.046	0.085	0.244	0.137
N2O	0.000	0.000	0.040	0.000	0.001	0.040	0.107	0.002	0.040
CO2	18	-205	280	2	-472	280	28	130	49
GHGs	26	-204	293	4	-515	293	63	136	64

	Grid-independent SIDI HEVs: E90, W. Biomass			Grid-independent SIDI HEVs: E90, H. Biomass			Grid-connected SIDI HEVs: FRFG2, MTBE, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	340	4,188	3,837	470	3,353	3,837	178	2,221	2,758
Fossil fuels	330	20	541	447	108	541	160	1,786	2,758
Petroleum	262	122	541	187	117	541	40	264	2,497
VOC: Total	0.024	0.072	0.135	0.018	0.068	0.135	0.019	0.040	0.094
VOC: Urban	0.000	0.007	0.135	0.000	0.007	0.135	0.000	0.014	0.094
CO: Total	0.111	0.307	5.518	0.087	0.274	5.518	0.060	0.060	3.863
CO: Urban	0.000	0.005	5.518	0.000	0.005	5.518	0.000	0.006	3.863
NOx: Total	0.148	0.442	0.135	0.192	0.409	0.135	0.045	0.260	0.095
NOx: Urban	0.001	0.011	0.135	0.001	0.011	0.135	0.001	0.011	0.095
PM10: Total	0.012	0.057	0.038	0.010	0.052	0.038	0.006	0.020	0.038
PM10: Urban	0.000	0.001	0.038	0.000	0.001	0.038	0.000	0.001	0.038
SOx: Total	0.010	-0.003	0.001	0.015	0.010	0.001	0.016	0.221	0.004
SOx: Urban	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.004
CH4	0.079	0.029	0.137	0.106	0.037	0.137	0.418	0.130	0.064
N2O	0.007	0.031	0.040	0.092	0.027	0.040	0.000	0.002	0.028
CO2	-73	-1	49	-7	7	49	15	154	209
GHGs	-69	9	64	23	17	64	24	157	219

B-II.3 Light-Duty Truck 2 (Cont.)

	Grid-connected SIDI HEVs: FRFG2, ETBE, US mix			Grid-connected SIDI HEVs: FRFG2, EtOH, US mix			Grid-connected SIDI HEVs: FRFG2, MTBE, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	178	2,245	2,758	178	2,227	2,758	179	2,202	2,758
Fossil fuels	160	1,810	2,622	160	1,794	2,654	160	1,119	2,758
Petroleum	40	265	2,445	40	286	2,654	31	254	2,497
VOC: Total	0.019	0.055	0.094	0.019	0.047	0.100	0.013	0.039	0.094
VOC: Urban	0.000	0.014	0.094	0.000	0.013	0.100	0.000	0.014	0.094
CO: Total	0.060	0.066	3.863	0.060	0.050	3.863	0.055	0.052	3.863
CO: Urban	0.000	0.007	3.863	0.000	0.005	3.863	0.000	0.006	3.863
NOx: Total	0.045	0.288	0.095	0.045	0.263	0.095	0.043	0.123	0.095
NOx: Urban	0.001	0.013	0.095	0.001	0.011	0.095	0.001	0.012	0.095
PM10: Total	0.006	0.041	0.038	0.006	0.031	0.038	0.003	0.011	0.038
PM10: Urban	0.000	0.001	0.038	0.000	0.001	0.038	0.000	0.001	0.038
SOx: Total	0.016	0.233	0.004	0.016	0.226	0.004	0.011	0.064	0.004
SOx: Urban	0.000	0.001	0.004	0.000	0.001	0.004	0.000	0.001	0.004
CH4	0.418	0.133	0.064	0.418	0.058	0.064	0.349	0.129	0.064
N2O	0.000	0.010	0.028	0.000	0.006	0.028	0.000	0.001	0.028
CO2	15	162	209	15	152	210	15	84	209
GHGs	24	168	219	24	155	220	22	87	219

	Grid-connected SIDI HEVs: FRFG2, ETBE, CA mix			Grid-connected SIDI HEVs: FRFG2, EtOH, CA mix			Grid-connected SI HEVs: CNG, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	179	2,226	2,758	179	2,208	2,758	374	1,954	3,093
Fossil fuels	160	1,143	2,622	160	1,127	2,654	361	1,476	3,093
Petroleum	31	255	2,445	31	275	2,654	28	18	0
VOC: Total	0.013	0.054	0.094	0.013	0.047	0.100	0.015	0.006	0.056
VOC: Urban	0.000	0.014	0.094	0.000	0.013	0.100	0.000	0.003	0.056
CO: Total	0.055	0.058	3.863	0.055	0.042	3.863	0.080	0.037	3.090
CO: Urban	0.000	0.007	3.863	0.000	0.006	3.863	0.003	0.015	3.090
NOx: Total	0.043	0.151	0.095	0.043	0.126	0.095	0.112	0.251	0.095
NOx: Urban	0.001	0.014	0.095	0.001	0.012	0.095	0.006	0.042	0.095
PM10: Total	0.003	0.032	0.038	0.003	0.022	0.038	0.007	0.015	0.028
PM10: Urban	0.000	0.001	0.038	0.000	0.001	0.038	0.000	0.001	0.028
SOx: Total	0.011	0.076	0.004	0.011	0.069	0.004	0.020	0.209	0.001
SOx: Urban	0.000	0.001	0.004	0.000	0.001	0.004	0.000	0.000	0.001
CH4	0.349	0.132	0.064	0.349	0.057	0.064	0.778	0.055	0.319
N2O	0.000	0.010	0.028	0.000	0.006	0.028	0.000	0.002	0.014
CO2	15	92	209	15	82	210	26	130	184
GHGs	22	98	219	22	85	220	43	131	196

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	Grid-connected SI HEVs: CNG, CA mix			Grid-connected SI HEVs: LNG, US mix			Grid-connected SI HEVs: LNG, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	375	1,935	3,093	271	2,176	3,093	271	2,157	3,093
Fossil fuels	362	809	3,093	259	1,754	3,093	260	1,087	3,093
Petroleum	19	8	0	27	128	0	19	118	0
VOC: Total	0.009	0.005	0.056	0.011	0.020	0.056	0.005	0.019	0.056
VOC: Urban	0.000	0.003	0.056	0.000	0.001	0.056	0.000	0.001	0.056
CO: Total	0.075	0.029	3.090	0.056	0.096	3.090	0.052	0.088	3.090
CO: Urban	0.003	0.015	3.090	0.000	0.004	3.090	0.000	0.004	3.090
NOx: Total	0.110	0.114	0.095	0.053	0.371	0.095	0.051	0.234	0.095
NOx: Urban	0.007	0.043	0.095	0.001	0.009	0.095	0.001	0.010	0.095
PM10: Total	0.004	0.006	0.028	0.006	0.017	0.028	0.003	0.008	0.028
PM10: Urban	0.000	0.001	0.028	0.000	0.001	0.028	0.000	0.001	0.028
SOx: Total	0.015	0.052	0.001	0.019	0.185	0.000	0.015	0.029	0.000
SOx: Urban	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.710	0.054	0.319	0.490	0.343	0.319	0.421	0.342	0.319
N2O	0.000	0.001	0.014	0.000	0.002	0.014	0.000	0.001	0.014
CO2	26	60	184	21	138	182	21	68	182
GHGs	41	61	196	31	145	193	30	76	193

	Grid-connected SI HEVs: LPG, crude, US mix			Grid-connected SI HEVs: LPG, NG, US mix			Grid-connected SI HEVs: LPG, crude, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	190	1,963	3,093	270	1,848	3,093	191	1,944	3,093
Fossil fuels	171	1,528	3,093	258	1,417	3,093	172	861	3,093
Petroleum	43	174	3,093	27	61	0	34	164	3,093
VOC: Total	0.021	0.018	0.061	0.011	0.016	0.061	0.015	0.017	0.061
VOC: Urban	0.000	0.005	0.061	0.000	0.009	0.061	0.000	0.005	0.061
CO: Total	0.065	0.040	3.090	0.056	0.036	3.090	0.060	0.032	3.090
CO: Urban	0.000	0.007	3.090	0.000	0.007	3.090	0.000	0.007	3.090
NOx: Total	0.048	0.232	0.095	0.053	0.216	0.095	0.046	0.095	0.095
NOx: Urban	0.001	0.012	0.095	0.001	0.012	0.095	0.001	0.013	0.095
PM10: Total	0.006	0.017	0.028	0.006	0.014	0.028	0.003	0.009	0.028
PM10: Urban	0.000	0.001	0.028	0.000	0.001	0.028	0.000	0.001	0.028
SOx: Total	0.017	0.206	0.000	0.019	0.189	0.000	0.012	0.050	0.000
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000
CH4	0.448	0.033	0.070	0.489	0.026	0.070	0.379	0.032	0.070
N2O	0.000	0.002	0.028	0.000	0.002	0.028	0.000	0.001	0.028
CO2	16	132	221	21	123	221	16	63	221
GHGs	26	134	231	31	124	231	24	64	231

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	Grid-connected SI HEVs: LPG, NG, CA mix			Grid-connected SIDI HEVs: M90, NG, US mix			Grid-connected SIDI HEVs: M90, flare gas, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	271	1,829	3,093	236	2,845	2,758	236	3,036	2,758
Fossil fuels	259	750	3,093	224	2,419	2,758	224	2,611	495
Petroleum	19	50	0	28	129	519	28	130	519
VOC: Total	0.005	0.015	0.061	0.012	0.031	0.094	0.012	-0.159	0.094
VOC: Urban	0.000	0.009	0.061	0.000	0.004	0.094	0.000	0.004	0.094
CO: Total	0.052	0.028	3.090	0.053	0.105	3.863	0.053	0.058	3.863
CO: Urban	0.000	0.007	3.090	0.000	0.003	3.863	0.000	0.003	3.863
NOx: Total	0.051	0.078	0.095	0.048	0.261	0.095	0.048	0.165	0.095
NOx: Urban	0.001	0.013	0.095	0.001	0.007	0.095	0.001	0.007	0.095
PM10: Total	0.003	0.006	0.028	0.006	0.016	0.033	0.006	0.012	0.033
PM10: Urban	0.000	0.001	0.028	0.000	0.000	0.033	0.000	0.000	0.033
SOx: Total	0.015	0.032	0.000	0.018	0.194	0.001	0.018	0.194	0.001
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.001
CH4	0.420	0.025	0.070	0.448	0.058	0.032	0.448	0.036	0.032
N2O	0.000	0.001	0.028	0.000	0.002	0.028	0.000	0.002	0.028
CO2	21	53	221	18	151	201	18	-40	201
GHGs	30	54	231	28	153	210	28	-39	210

	Grid-connected SIDI HEVs: M90, LF gas, US mix			Grid-connected SIDI HEVs: M90, NG, CA mix			Grid-connected SIDI HEVs: M90, flare gas, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	95	2,581	2,758	237	2,826	2,758	237	3,017	2,758
Fossil fuels	84	2,162	495	224	1,753	2,758	224	1,945	495
Petroleum	18	122	519	20	118	519	20	120	519
VOC: Total	0.010	0.005	0.094	0.006	0.030	0.094	0.006	-0.160	0.094
VOC: Urban	0.000	0.001	0.094	0.000	0.004	0.094	0.000	0.004	0.094
CO: Total	0.025	-0.176	3.863	0.049	0.097	3.863	0.049	0.050	3.863
CO: Urban	0.000	-0.094	3.863	0.000	0.003	3.863	0.000	0.003	3.863
NOx: Total	0.025	0.258	0.095	0.046	0.124	0.095	0.046	0.028	0.095
NOx: Urban	0.001	-0.003	0.095	0.001	0.007	0.095	0.001	0.007	0.095
PM10: Total	0.005	-0.057	0.033	0.003	0.007	0.033	0.003	0.004	0.033
PM10: Urban	0.000	-0.038	0.033	0.000	0.001	0.033	0.000	0.001	0.033
SOx: Total	0.012	0.262	0.001	0.013	0.038	0.001	0.013	0.037	0.001
SOx: Urban	0.000	-0.007	0.001	0.000	0.000	0.001	0.000	0.000	0.001
CH4	0.213	-1.490	0.032	0.379	0.057	0.032	0.379	0.035	0.032
N2O	0.000	0.002	0.028	0.000	0.001	0.028	0.000	0.001	0.028
CO2	7	-232	201	18	81	201	18	-110	201
GHGs	12	-262	210	26	83	210	26	-109	210

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	Grid-connected SIDI HEVs: M90, LF gas, CA mix			Grid-connected SIDI HEVs: E90, corn, US mix			Grid-connected SIDI HEVs: E90, W. Biomass, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	96	2,562	2,758	317	2,811	2,758	322	4,626	2,758
Fossil fuels	85	1,495	495	299	2,391	389	305	1,215	389
Petroleum	9	112	519	131	102	389	202	102	389
VOC: Total	0.004	0.005	0.094	-0.047	0.225	0.094	0.025	0.054	0.094
VOC: Urban	0.000	0.001	0.094	0.000	0.005	0.094	0.000	0.005	0.094
CO: Total	0.020	-0.184	3.863	0.074	0.079	3.863	0.097	0.237	3.863
CO: Urban	0.000	-0.094	3.863	0.000	0.005	3.863	0.000	0.005	3.863
NOx: Total	0.023	0.120	0.095	0.147	0.372	0.095	0.127	0.500	0.095
NOx: Urban	0.001	-0.002	0.095	0.001	0.013	0.095	0.001	0.011	0.095
PM10: Total	0.001	-0.066	0.033	0.186	0.028	0.033	0.013	0.053	0.033
PM10: Urban	0.000	-0.037	0.033	0.000	0.001	0.033	0.000	0.001	0.033
SOx: Total	0.007	0.105	0.001	0.017	0.307	0.001	0.018	0.178	0.001
SOx: Urban	0.000	-0.007	0.001	0.000	0.001	0.001	0.000	0.001	0.001
CH4	0.144	-1.491	0.032	0.229	0.178	0.096	0.225	0.023	0.096
N2O	0.000	0.002	0.028	0.077	0.003	0.000	0.005	0.024	0.000
CO2	7	-301	201	26	201	35	-47	107	35
GHGs	10	-332	210	55	206	37	-41	114	37

	Grid-connected SIDI HEVs: E90, H. Biomass, US mix			Grid-connected SIDI HEVs: E90, corn, CA mix			Grid-connected SIDI HEVs: E90, W. Biomass, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	415	4,026	2,758	318	2,792	2,758	322	4,607	2,758
Fossil fuels	389	1,278	389	300	1,725	389	306	548	389
Petroleum	148	98	389	122	91	389	193	91	389
VOC: Total	0.021	0.051	0.094	-0.053	0.224	0.094	0.019	0.053	0.094
VOC: Urban	0.000	0.005	0.094	0.000	0.006	0.094	0.000	0.005	0.094
CO: Total	0.079	0.214	3.863	0.070	0.071	3.863	0.093	0.229	3.863
CO: Urban	0.001	0.005	3.863	0.001	0.005	3.863	0.001	0.005	3.863
NOx: Total	0.158	0.476	0.095	0.145	0.235	0.095	0.125	0.363	0.095
NOx: Urban	0.001	0.012	0.095	0.001	0.014	0.095	0.001	0.012	0.095
PM10: Total	0.012	0.049	0.033	0.183	0.019	0.033	0.010	0.044	0.033
PM10: Urban	0.000	0.001	0.033	0.000	0.001	0.033	0.000	0.001	0.033
SOx: Total	0.021	0.187	0.001	0.013	0.150	0.001	0.013	0.022	0.001
SOx: Urban	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.001
CH4	0.244	0.029	0.096	0.161	0.177	0.096	0.157	0.022	0.096
N2O	0.066	0.021	0.000	0.077	0.002	0.000	0.005	0.023	0.000
CO2	0	113	35	26	131	35	-47	37	35
GHGs	26	120	37	53	136	37	-42	44	37

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	Grid-connected SIDI HEVs: E90, H. Biomass, CA mix			Grid-independent CIDI HEVs: RFD			Grid-independent CIDI HEVs: DME, NG		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	415	4,007	2,758	116	591	3,170	198	1,546	3,170
Fossil fuels	390	611	389	106	571	3,170	195	1,538	3,170
Petroleum	139	88	389	30	288	3,170	14	83	0
VOC: Total	0.015	0.050	0.094	0.013	0.018	0.111	0.003	0.017	0.078
VOC: Urban	0.000	0.005	0.094	0.000	0.005	0.111	0.000	0.001	0.078
CO: Total	0.075	0.206	3.863	0.049	0.029	5.518	0.040	0.094	5.518
CO: Urban	0.001	0.005	3.863	0.000	0.004	5.518	0.000	0.001	5.518
NOx: Total	0.156	0.339	0.095	0.029	0.070	0.180	0.033	0.068	0.180
NOx: Urban	0.002	0.013	0.095	0.000	0.007	0.180	0.000	0.002	0.180
PM10: Total	0.008	0.040	0.033	0.002	0.009	0.041	0.002	0.001	0.035
PM10: Urban	0.000	0.001	0.033	0.000	0.000	0.041	0.000	0.000	0.035
SOx: Total	0.017	0.031	0.001	0.006	0.043	0.008	0.009	0.006	0.000
SOx: Urban	0.000	0.000	0.001	0.000	0.000	0.008	0.000	0.000	0.000
CH4	0.176	0.028	0.096	0.287	0.050	0.017	0.329	0.010	0.034
N2O	0.066	0.020	0.000	0.000	0.001	0.032	0.000	0.000	0.032
CO2	0	43	35	11	42	256	16	55	222
GHGs	24	50	37	17	43	266	23	56	233

	Grid-independent CIDI HEVs: DME, flare gas			Grid-independent CIDI HEVs: FT50, NG			Grid-independent CIDI HEVs: FT50, flare gas		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	198	1,743	3,170	155	1,375	3,170	155	1,862	3,170
Fossil fuels	195	1,736	0	149	1,361	3,166	149	1,847	1,644
Petroleum	14	84	0	22	198	1,644	22	200	1,644
VOC: Total	0.003	-0.234	0.078	0.008	0.011	0.111	0.008	-0.134	0.111
VOC: Urban	0.000	0.001	0.078	0.000	0.003	0.111	0.000	0.003	0.111
CO: Total	0.040	0.018	5.518	0.045	0.042	5.518	0.045	0.013	5.518
CO: Urban	0.000	0.001	5.518	0.000	0.003	5.518	0.000	0.003	5.518
NOx: Total	0.033	-0.076	0.180	0.031	0.050	0.180	0.031	-0.019	0.180
NOx: Urban	0.000	0.002	0.180	0.000	0.004	0.180	0.000	0.004	0.180
PM10: Total	0.002	-0.005	0.035	0.002	0.003	0.038	0.002	0.001	0.038
PM10: Urban	0.000	0.000	0.035	0.000	0.000	0.038	0.000	0.000	0.038
SOx: Total	0.009	0.006	0.000	0.008	0.024	0.004	0.008	0.025	0.004
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.004
CH4	0.329	0.011	0.034	0.307	0.028	0.017	0.307	0.031	0.017
N2O	0.000	-0.001	0.032	0.000	0.000	0.032	0.000	0.000	0.032
CO2	16	-214	222	13	48	251	13	-87	251
GHGs	23	-214	233	20	49	261	20	-87	261

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	Grid-independent CIDI HEVs: BD20			Grid-connected CIDI HEVs: RFD, US mix			Grid-connected CIDI HEVs: RFD, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	156	769	3,170	169	2,258	2,209	170	2,237	2,209
Fossil fuels	144	735	3,170	151	1,770	2,209	152	1,008	2,209
Petroleum	62	302	2,580	36	217	2,209	26	205	2,209
VOC: Total	0.014	0.068	0.111	0.018	0.015	0.078	0.011	0.014	0.078
VOC: Urban	0.000	0.008	0.111	0.000	0.004	0.078	0.000	0.004	0.078
CO: Total	0.057	0.086	5.518	0.054	0.039	3.863	0.049	0.030	3.863
CO: Urban	0.000	0.022	5.518	0.000	0.001	3.863	0.000	0.002	3.863
NOx: Total	0.052	0.138	0.180	0.043	0.256	0.126	0.041	0.100	0.126
NOx: Urban	0.000	0.024	0.180	0.001	0.004	0.126	0.001	0.005	0.126
PM10: Total	0.003	0.012	0.039	0.006	0.019	0.035	0.002	0.009	0.035
PM10: Urban	0.000	0.002	0.039	0.000	0.000	0.035	0.000	0.000	0.035
SOx: Total	0.008	0.044	0.007	0.016	0.236	0.006	0.011	0.057	0.006
SOx: Urban	0.000	0.001	0.007	0.000	0.000	0.006	0.000	0.000	0.006
CH4	0.240	0.082	0.017	0.392	0.037	0.012	0.313	0.036	0.012
N2O	0.002	0.001	0.032	0.000	0.002	0.022	0.000	0.001	0.022
CO2	14	51	210	14	152	178	14	73	178
GHGs	19	53	220	22	154	186	21	74	186

	Grid-connected CIDI HEVs: DME, NG, US mix			Grid-connected CIDI HEVs: DME, flare gas, US mix			Grid-connected CIDI HEVs: DME, NG, CA mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	233	2,978	2,320	233	3,122	2,320	233	2,956	2,320
Fossil fuels	220	2,497	2,320	220	2,642	0	221	1,735	2,320
Petroleum	26	77	0	26	78	0	16	65	0
VOC: Total	0.012	0.014	0.054	0.012	-0.169	0.054	0.005	0.013	0.054
VOC: Urban	0.000	0.001	0.054	0.000	0.001	0.054	0.000	0.001	0.054
CO: Total	0.049	0.088	3.863	0.049	0.032	3.863	0.044	0.079	3.863
CO: Urban	0.000	0.002	3.863	0.000	0.002	3.863	0.000	0.002	3.863
NOx: Total	0.047	0.258	0.126	0.047	0.152	0.126	0.045	0.101	0.126
NOx: Urban	0.001	0.006	0.126	0.001	0.006	0.126	0.001	0.007	0.126
PM10: Total	0.006	0.014	0.031	0.006	0.010	0.031	0.003	0.004	0.031
PM10: Urban	0.000	0.000	0.031	0.000	0.000	0.031	0.000	0.000	0.031
SOx: Total	0.019	0.211	0.000	0.019	0.210	0.000	0.013	0.032	0.000
SOx: Urban	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000
CH4	0.433	0.010	0.024	0.433	0.010	0.024	0.354	0.008	0.024
N2O	0.000	0.002	0.022	0.000	0.001	0.022	0.000	0.001	0.022
CO2	18	163	163	18	-34	163	18	84	163
GHGs	27	164	170	27	-33	170	25	84	170

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	Grid-connected CIDI HEVs: DME, flare gas, CA mix			Grid-connected CIDI HEVs: FT50, NG, US mix			Grid-connected CIDI HEVs: FT50, flare gas, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	233	3,101	2,320	202	2,853	2,320	202	3,209	2,320
Fossil fuels	221	1,880	0	186	2,368	2,317	186	2,724	1,203
Petroleum	16	66	0	32	161	1,203	32	162	1,203
VOC: Total	0.005	-0.170	0.054	0.015	0.010	0.078	0.015	-0.096	0.078
VOC: Urban	0.000	0.001	0.054	0.000	0.002	0.078	0.000	0.002	0.078
CO: Total	0.044	0.023	3.863	0.052	0.049	3.863	0.052	0.028	3.863
CO: Urban	0.000	0.002	3.863	0.000	0.003	3.863	0.000	0.003	3.863
NOx: Total	0.045	-0.005	0.126	0.046	0.244	0.126	0.046	0.194	0.126
NOx: Urban	0.001	0.007	0.126	0.001	0.007	0.126	0.001	0.007	0.126
PM10: Total	0.003	0.000	0.031	0.006	0.016	0.033	0.006	0.014	0.033
PM10: Urban	0.000	0.000	0.031	0.000	0.001	0.033	0.000	0.001	0.033
SOx: Total	0.013	0.031	0.000	0.018	0.224	0.003	0.018	0.224	0.003
SOx: Urban	0.000	0.000	0.000	0.000	0.001	0.003	0.000	0.001	0.003
CH4	0.354	0.009	0.024	0.417	0.023	0.012	0.417	0.025	0.012
N2O	0.000	0.000	0.022	0.000	0.001	0.022	0.000	0.001	0.022
CO2	18	-113	163	16	158	183	16	59	183
GHGs	25	-113	170	25	159	191	25	60	191

	Grid-connected CIDI HEVs: FT50, NG, CA mix			Grid-connected CIDI HEVs: FT50, flare gas, CA mix			Grid-connected CIDI HEVs: BD20, US mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	202	2,831	2,320	202	3,187	2,320	202	2,409	2,320
Fossil fuels	187	1,606	2,317	187	1,962	1,203	183	1,910	2,320
Petroleum	22	149	1,203	22	150	1,203	61	237	1,888
VOC: Total	0.008	0.009	0.078	0.008	-0.097	0.078	0.020	0.052	0.078
VOC: Urban	0.000	0.002	0.078	0.000	0.002	0.078	0.000	0.006	0.078
CO: Total	0.047	0.040	3.863	0.047	0.019	3.863	0.061	0.082	3.863
CO: Urban	0.000	0.003	3.863	0.000	0.003	3.863	0.000	0.018	3.863
NOx: Total	0.043	0.087	0.126	0.043	0.037	0.126	0.061	0.309	0.126
NOx: Urban	0.001	0.009	0.126	0.001	0.009	0.126	0.001	0.022	0.126
PM10: Total	0.003	0.006	0.033	0.003	0.004	0.033	0.007	0.022	0.034
PM10: Urban	0.000	0.001	0.033	0.000	0.001	0.033	0.000	0.002	0.034
SOx: Total	0.012	0.045	0.003	0.012	0.045	0.003	0.018	0.238	0.005
SOx: Urban	0.000	0.000	0.003	0.000	0.000	0.003	0.000	0.001	0.005
CH4	0.338	0.022	0.012	0.338	0.024	0.012	0.368	0.062	0.012
N2O	0.000	0.001	0.022	0.000	0.001	0.022	0.002	0.002	0.022
CO2	16	78	183	16	-21	183	16	160	154
GHGs	23	79	191	23	-20	191	24	162	161

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	Grid-connected CIDI HEVs: BD20, CA mix			EV: US mix			EV: US NE mix		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	203	2,388	2,320	293	6,156	0	425	5,888	0
Fossil fuels	184	1,148	2,320	258	4,573	0	380	4,064	0
Petroleum	51	225	1,888	52	53	0	41	107	0
VOC: Total	0.013	0.051	0.078	0.031	0.007	0.000	0.021	0.007	0.000
VOC: Urban	0.000	0.006	0.078	0.000	0.000	0.000	0.000	0.001	0.000
CO: Total	0.056	0.073	3.863	0.065	0.062	0.000	0.078	0.060	0.000
CO: Urban	0.000	0.018	3.863	0.001	0.004	0.000	0.002	0.008	0.000
NOx: Total	0.058	0.152	0.126	0.077	0.692	0.000	0.105	0.441	0.000
NOx: Urban	0.001	0.023	0.126	0.002	0.014	0.000	0.005	0.030	0.000
PM10: Total	0.003	0.012	0.034	0.017	0.045	0.021	0.011	0.029	0.021
PM10: Urban	0.000	0.002	0.034	0.000	0.001	0.021	0.000	0.002	0.021
SOx: Total	0.012	0.059	0.005	0.040	0.686	0.000	0.037	0.339	0.000
SOx: Urban	0.000	0.001	0.005	0.000	0.001	0.000	0.000	0.003	0.000
CH4	0.289	0.061	0.012	0.640	0.008	0.000	0.677	0.008	0.000
N2O	0.002	0.001	0.022	0.000	0.005	0.000	0.000	0.005	0.000
CO2	16	80	154	21	409	0	30	317	0
GHGs	23	82	161	34	411	0	44	318	0

	EV: CA mix			H2 FCVs: NG, gas, centralized			H2 FCVs: NG, gas, decentralized		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	296	6,083	0	152	1,107	2,430	233	1,620	2,430
Fossil fuels	261	2,033	0	150	1,022	2,430	230	1,616	2,430
Petroleum	18	13	0	11	9	0	11	7	0
VOC: Total	0.009	0.004	0.000	0.002	0.011	0.000	0.005	0.013	0.000
VOC: Urban	0.000	0.001	0.000	0.000	0.004	0.000	0.000	0.012	0.000
CO: Total	0.048	0.032	0.000	0.031	0.102	0.000	0.049	0.135	0.000
CO: Urban	0.001	0.005	0.000	0.000	0.021	0.000	0.002	0.122	0.000
NOx: Total	0.069	0.170	0.000	0.026	0.168	0.000	0.072	0.157	0.000
NOx: Urban	0.003	0.018	0.000	0.000	0.058	0.000	0.005	0.142	0.000
PM10: Total	0.005	0.011	0.021	0.001	0.005	0.021	0.002	0.005	0.021
PM10: Urban	0.000	0.001	0.021	0.000	0.001	0.021	0.000	0.004	0.021
SOx: Total	0.023	0.090	0.000	0.007	0.038	0.000	0.007	0.004	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.379	0.004	0.000	0.253	0.161	0.000	0.480	0.107	0.000
N2O	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.001	0.000
CO2	21	144	0	12	208	0	16	238	0
GHGs	29	145	0	17	212	0	27	240	0

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

	H2 FCVs: solar, gas			H2 FCVs: NG, liquid			H2 FCVs: solar, liquid		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	0	729	2,430	152	1,192	2,430	0	153	2,430
Fossil fuels	0	622	0	150	1,187	2,430	0	152	0
Petroleum	0	8	0	11	143	0	0	139	0
VOC: Total	0.000	0.013	0.000	0.002	0.031	0.000	0.000	0.025	0.000
VOC: Urban	0.000	0.006	0.000	0.000	0.005	0.000	0.000	0.005	0.000
CO: Total	0.000	0.072	0.000	0.031	0.117	0.000	0.000	0.055	0.000
CO: Urban	0.000	0.030	0.000	0.000	0.010	0.000	0.000	0.011	0.000
NOx: Total	0.000	0.212	0.000	0.026	0.157	0.000	0.000	0.096	0.000
NOx: Urban	0.000	0.082	0.000	0.000	0.021	0.000	0.000	0.019	0.000
PM10: Total	0.000	0.007	0.021	0.001	0.011	0.021	0.000	0.009	0.021
PM10: Urban	0.000	0.001	0.021	0.000	0.002	0.021	0.000	0.002	0.021
SOx: Total	0.000	0.049	0.000	0.007	0.006	0.000	0.000	0.003	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CH4	0.000	0.145	0.000	0.252	0.155	0.000	0.000	0.014	0.000
N2O	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000
CO2	0	46	0	12	214	0	0	12	0
GHGs	0	49	0	17	218	0	0	13	0

	FCVs: MeOH, NG			FCVs: MeOH, flare gas			FCVs: MeOH, LF gas		
	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation	Feedstock	Fuel	Vehicle Operation
Total energy	175	1,389	2,804	175	1,625	2,804	0	1,061	2,804
Fossil fuels	173	1,380	2,804	173	1,618	0	0	1,061	0
Petroleum	12	87	0	12	88	0	0	78	0
VOC: Total	0.003	0.027	0.047	0.003	-0.208	0.047	0.000	-0.004	0.047
VOC: Urban	0.000	0.002	0.047	0.000	0.002	0.047	0.000	-0.002	0.047
CO: Total	0.035	0.100	1.104	0.035	0.042	1.104	0.000	-0.248	1.104
CO: Urban	0.000	0.001	1.104	0.000	0.001	1.104	0.000	-0.119	1.104
NOx: Total	0.030	0.081	0.027	0.030	-0.038	0.027	0.000	0.076	0.027
NOx: Urban	0.000	0.002	0.027	0.000	0.002	0.027	0.000	-0.010	0.027
PM10: Total	0.001	0.003	0.021	0.001	-0.001	0.021	0.000	-0.087	0.021
PM10: Urban	0.000	0.000	0.021	0.000	0.000	0.021	0.000	-0.047	0.021
SOx: Total	0.008	0.008	0.000	0.008	0.008	0.000	0.000	0.092	0.000
SOx: Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.009	0.000
CH4	0.291	0.041	0.018	0.291	0.014	0.018	0.000	-1.878	0.018
N2O	0.000	0.001	0.008	0.000	0.000	0.008	0.000	0.001	0.008
CO2	14	44	203	14	-193	203	0	-430	203
GHGs	20	45	205	20	-193	205	0	-469	205

B-II Long-Term Technologies

B-II.3 Light-Duty Truck 2 (Cont.)

FCVs: RFG

	Feedstock	Fuel	Vehicle Operation
Total energy	134	799	3,645
Fossil fuels	121	773	3,645
Petroleum	34	330	3,199
VOC: Total	0.015	0.050	0.071
VOC: Urban	0.000	0.018	0.071
CO: Total	0.056	0.058	1.104
CO: Urban	0.000	0.006	1.104
NOx: Total	0.033	0.104	0.027
NOx: Urban	0.000	0.010	0.027
PM10: Total	0.002	0.011	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.007	0.054	0.000
SOx: Urban	0.000	0.001	0.000
CH4	0.330	0.169	0.018
N2O	0.000	0.001	0.008
CO2	13	61	276
GHGs	20	65	279

EtOH FCVs: corn

	Feedstock	Fuel	Vehicle Operation
Total energy	348	1,706	3,645
Fossil fuels	335	1,703	0
Petroleum	175	76	0
VOC: Total	-0.087	0.334	0.047
VOC: Urban	0.000	0.005	0.047
CO: Total	0.079	0.089	1.104
CO: Urban	0.001	0.009	1.104
NOx: Total	0.190	0.276	0.027
NOx: Urban	0.001	0.021	0.027
PM10: Total	0.279	0.020	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.009	0.185	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.040	0.258	0.018
N2O	0.119	0.001	0.008
CO2	29	134	2
GHGs	67	140	5

EtOH FCVs: W. Biomass

	Feedstock	Fuel	Vehicle Operation
Total energy	354	4,499	3,645
Fossil fuels	345	-106	0
Petroleum	285	77	0
VOC: Total	0.024	0.070	0.047
VOC: Urban	0.000	0.005	0.047
CO: Total	0.114	0.332	1.104
CO: Urban	0.001	0.008	1.104
NOx: Total	0.158	0.472	0.027
NOx: Urban	0.001	0.017	0.027
PM10: Total	0.013	0.059	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.010	-0.013	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.034	0.019	0.018
N2O	0.008	0.033	0.008
CO2	-83	-11	2
GHGs	-79	0	5

EtOH FCVs: H. Biomass

	Feedstock	Fuel	Vehicle Operation
Total energy	498	3,576	3,645
Fossil fuels	475	-9	0
Petroleum	201	71	0
VOC: Total	0.017	0.065	0.047
VOC: Urban	0.000	0.005	0.047
CO: Total	0.087	0.296	1.104
CO: Urban	0.001	0.008	1.104
NOx: Total	0.206	0.435	0.027
NOx: Urban	0.002	0.018	0.027
PM10: Total	0.010	0.054	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.015	0.001	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.063	0.029	0.018
N2O	0.102	0.029	0.008
CO2	-10	-1	2
GHGs	23	8	5

FCVs: CNG

	Feedstock	Fuel	Vehicle Operation
Total energy	350	399	3,645
Fossil fuels	346	324	3,645
Petroleum	17	5	0
VOC: Total	0.008	0.005	0.020
VOC: Urban	0.000	0.003	0.020
CO: Total	0.074	0.024	1.104
CO: Urban	0.003	0.016	1.104
NOx: Total	0.108	0.082	0.027
NOx: Urban	0.007	0.045	0.027
PM10: Total	0.003	0.004	0.021
PM10: Urban	0.000	0.001	0.021
SOx: Total	0.011	0.034	0.000
SOx: Urban	0.000	0.000	0.000
CH4	0.719	0.063	0.182
N2O	0.000	0.000	0.008
CO2	25	26	218
GHGs	40	28	224

Appendix C
Graphic Presentation of Changes in Per-Mile Fuel-Cycle Energy Use and Emissions by Use of Alternative-Transportation Fuels and Advanced Vehicle Technologies: Light-Duty Trucks 1 and Light-Duty Trucks 2

This appendix graphically shows changes in fuel-cycle energy use and emissions by transportation fuels and advanced vehicle technologies relative to baseline gasoline vehicles. Changes for passenger cars are presented and discussed in Volume 1 of this report. This appendix presents charts for LDT1 and LDT2. The charts are in the following order: near-term LDT1, near-term LDT2, long-term LDT1, and long-term LDT2.

Acronyms, initialisms, and abbreviations are defined on pages xv–xviii of Volume 1.

1 Near-Term Technologies

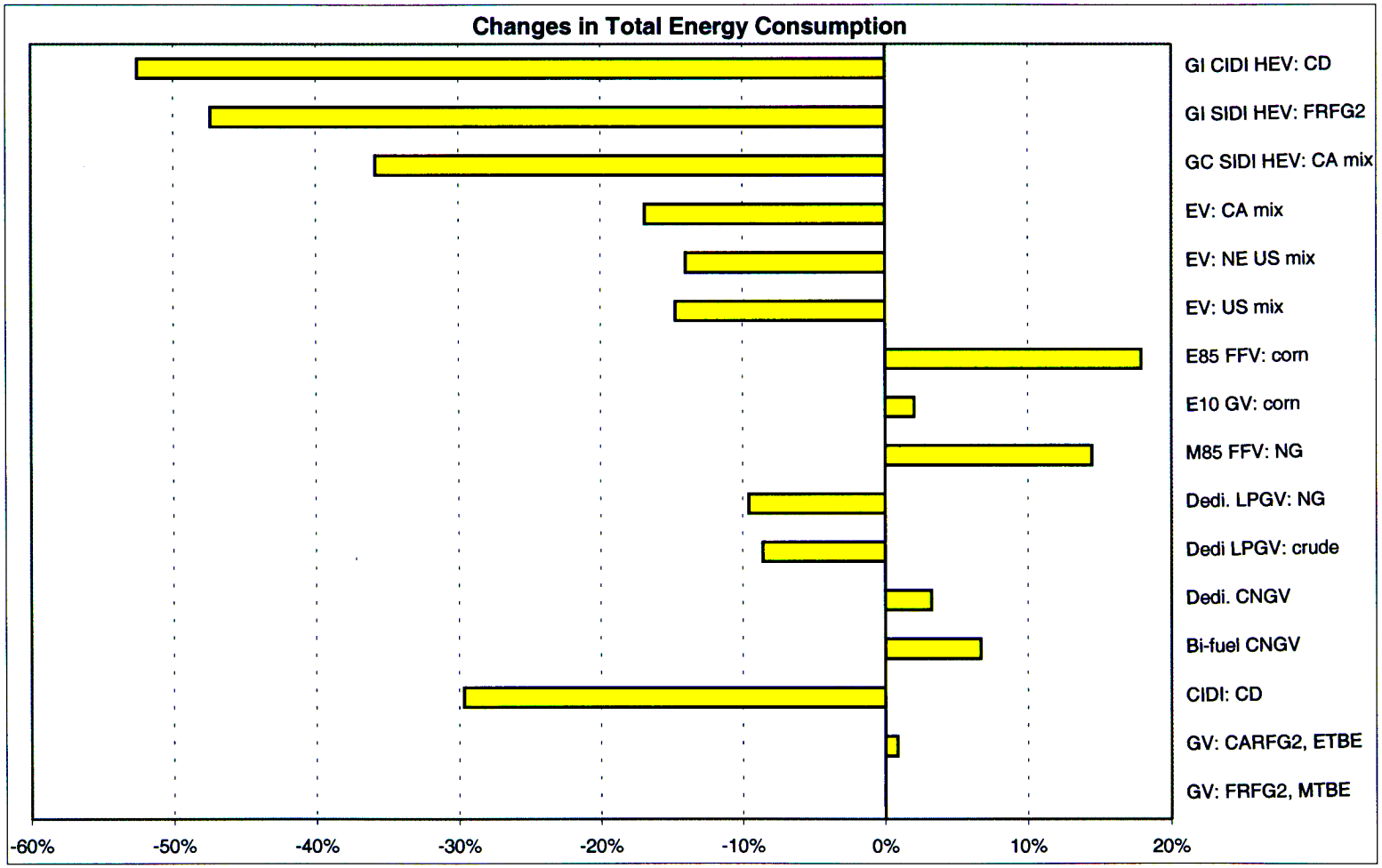

Figure C-1.1 Changes in Fuel-Cycle Total Energy Consumption Relative to GVs Fueled with CG, Light-Duty Trucks 1: Near-Term Technologies

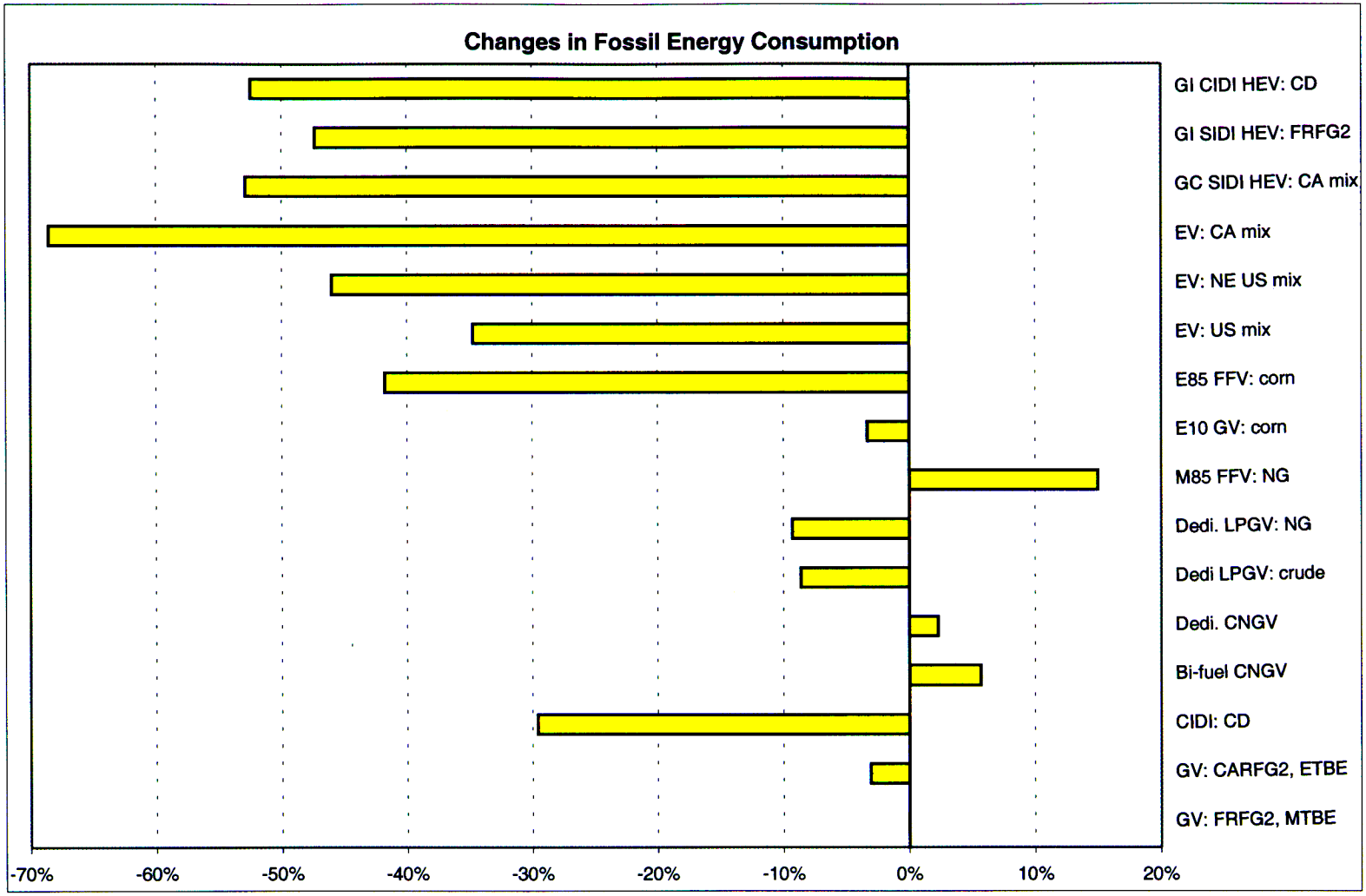

Figure C-1.2 Changes in Fuel-Cycle Fossil Energy Consumption Relative to GVs Fueled with CG, Light-Duty Trucks 1: Near-Term Technologies

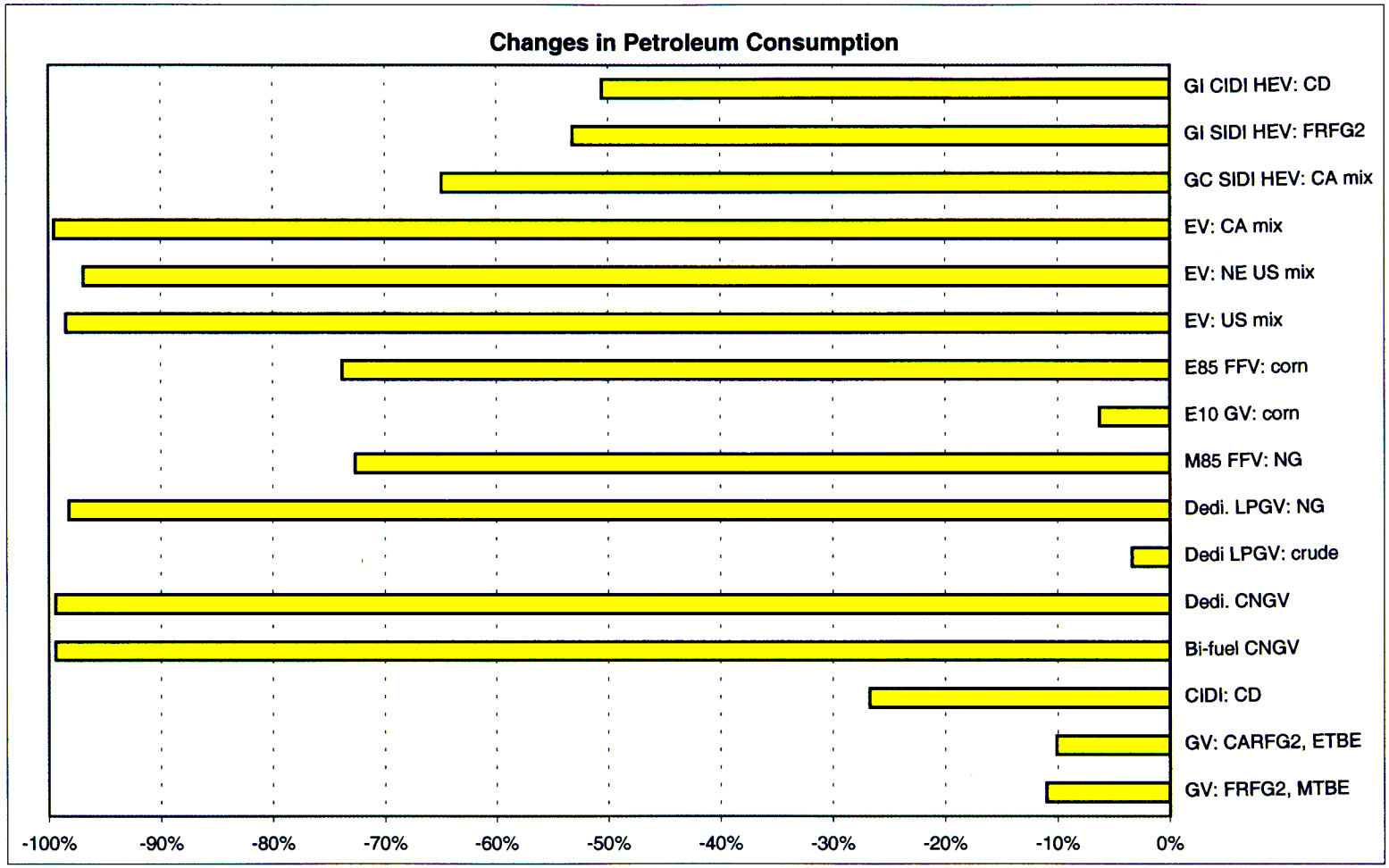

Figure C-1.3 Changes in Fuel-Cycle Petroleum Consumption Relative to GVs Fueled with CG, Light-Duty Trucks 1: Near-Term Technologies

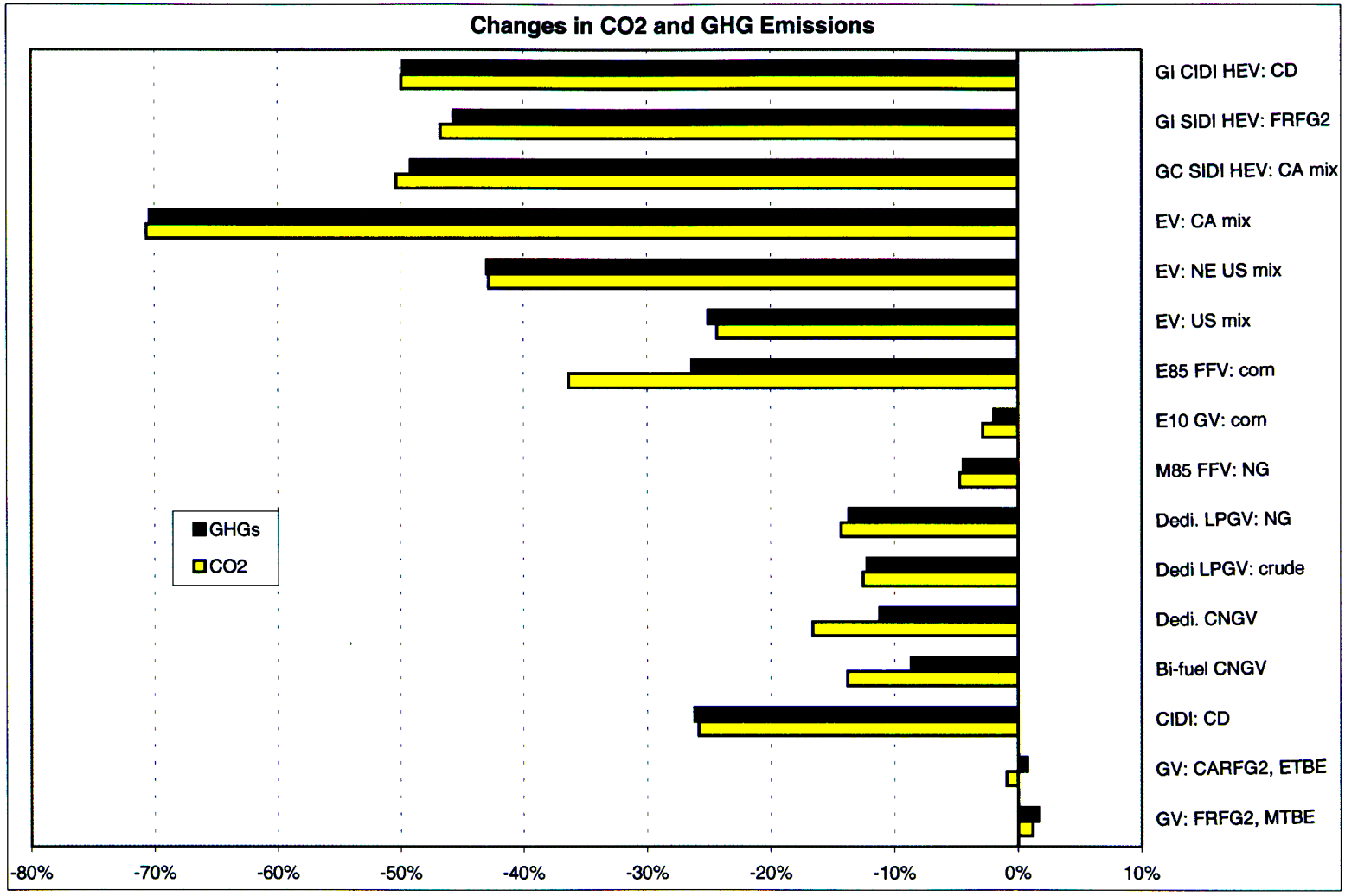

Figure C-1.4 Changes in Fuel-Cycle CO_2 and GHG Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 1: Near-Term Technologies

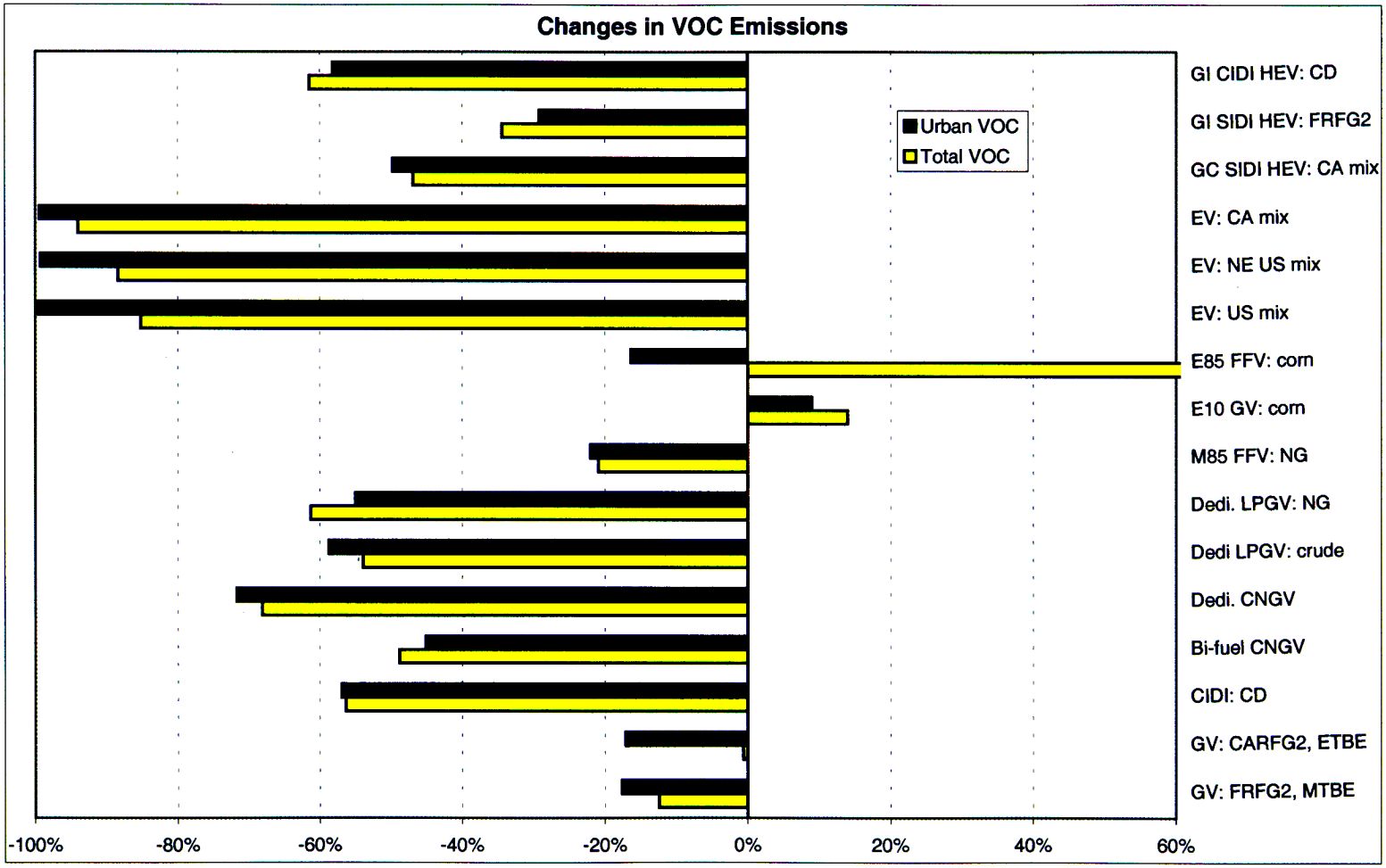

Figure C-1.5 Changes in Fuel-Cycle VOC Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 1: Near-Term Technologies

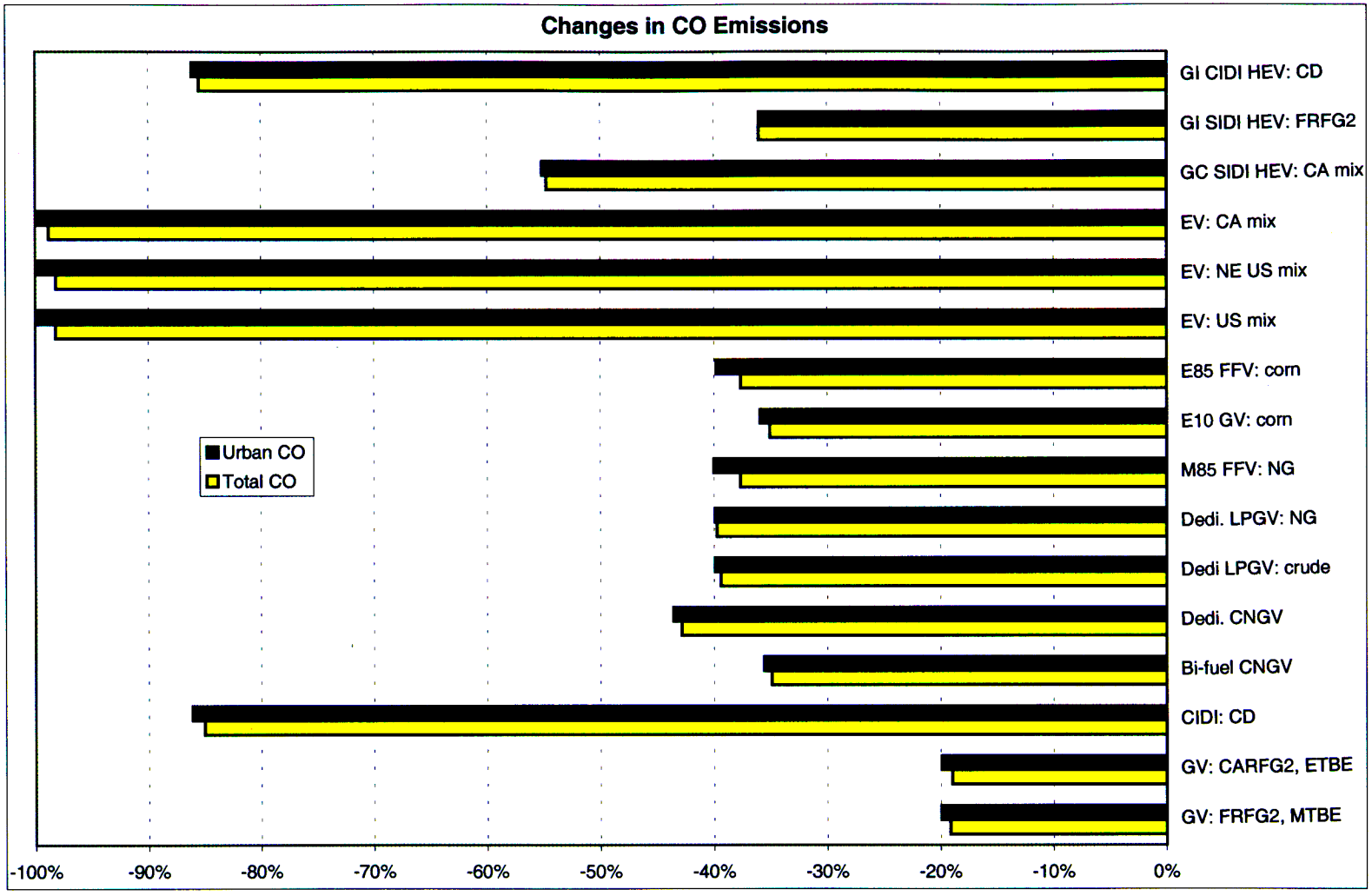

Figure C-1.6 Changes in Fuel-Cycle CO Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 1: Near-Term Technologies

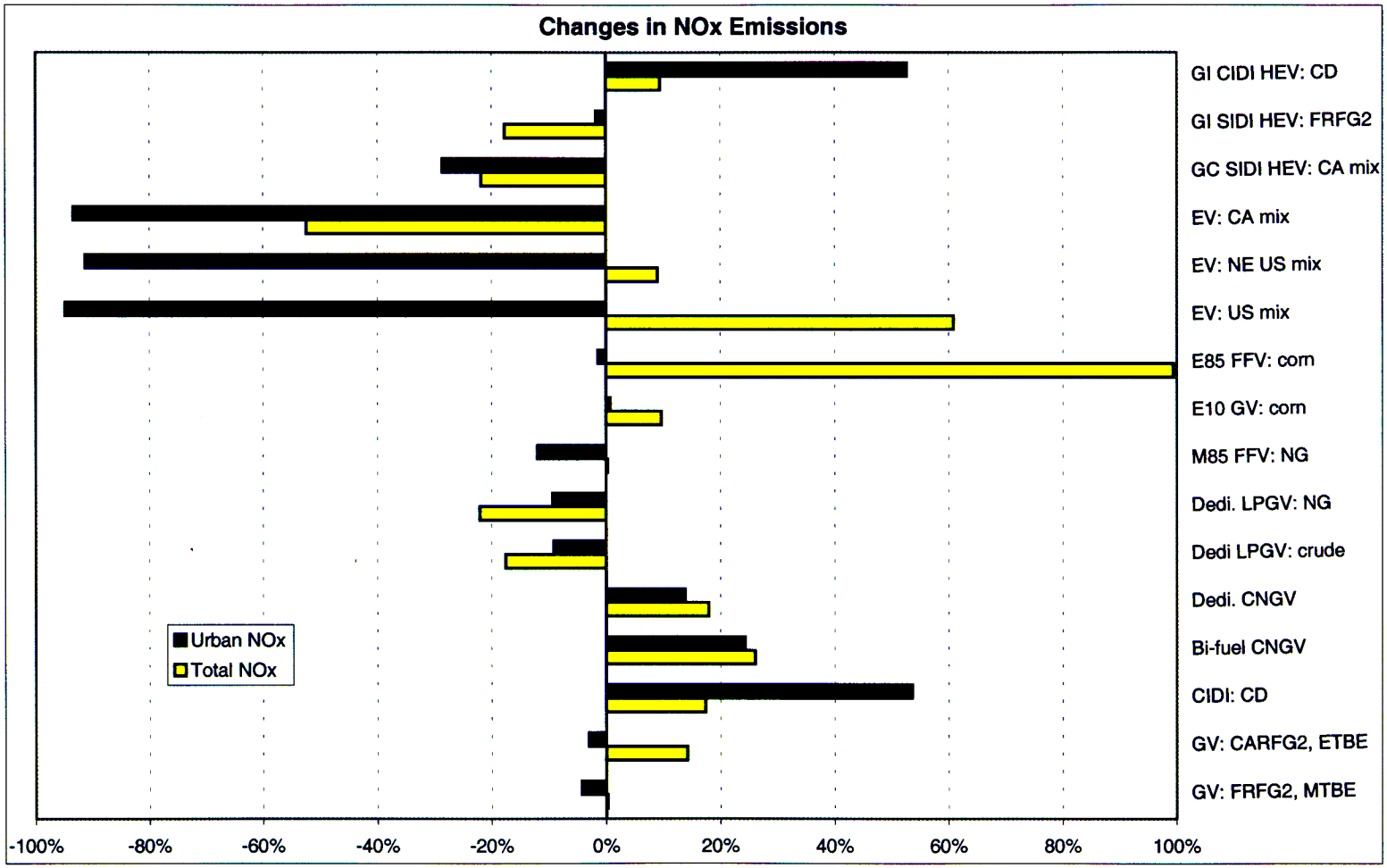

Figure C-1.7 Changes in Fuel-Cycle NO_x Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 1: Near-Term Technologies

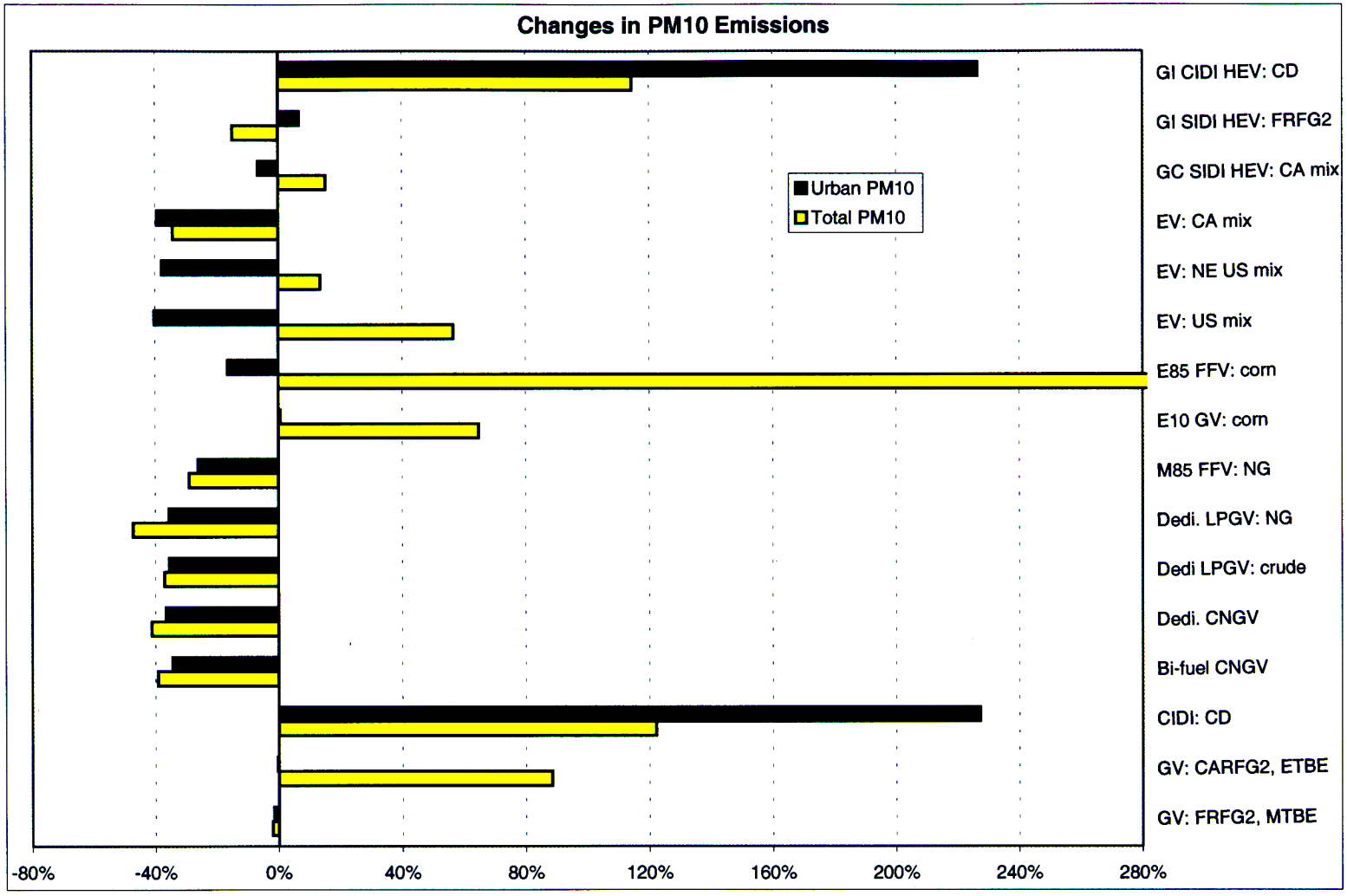

Figure C-1.8 Changes in Fuel-Cycle PM_{10} Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 1: Near-Term Technologies

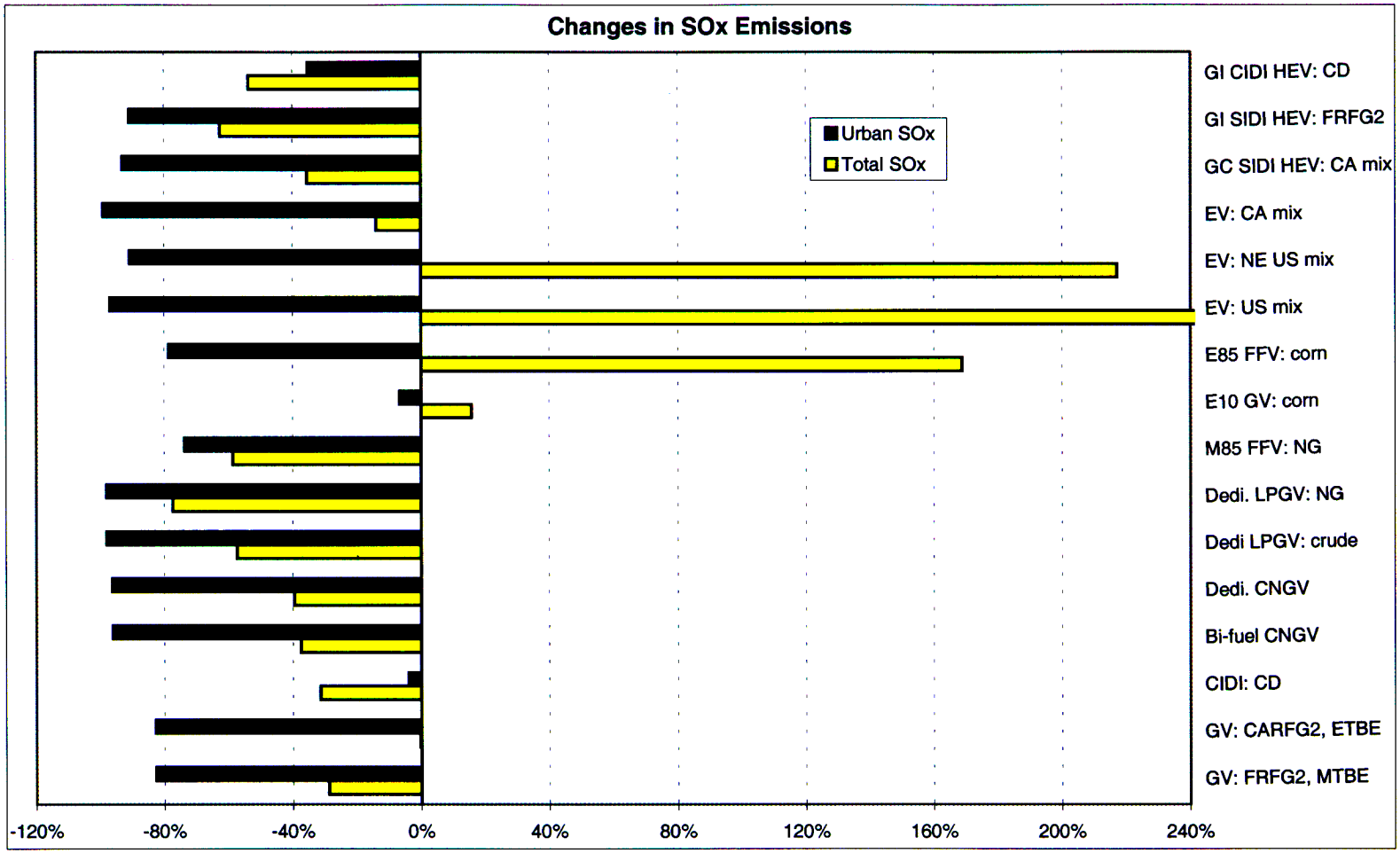

Figure C-1.9 Changes in Fuel-Cycle SO_x Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 1: Near-Term Technologies

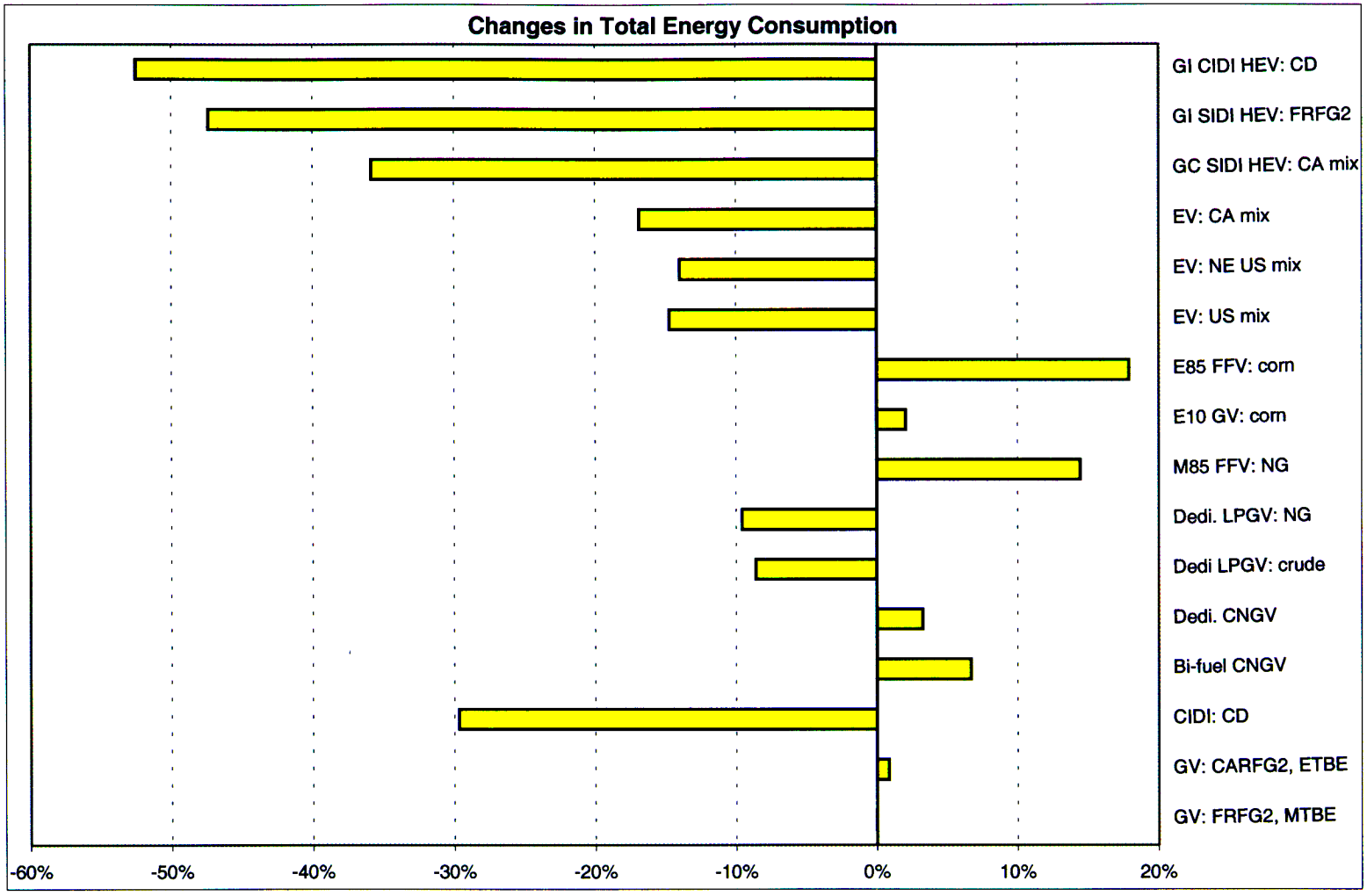

Figure C-1.10 Changes in Fuel-Cycle Total Energy Consumption Relative to GVs Fueled with CG, Light-Duty Trucks 2: Near-Term Technologies

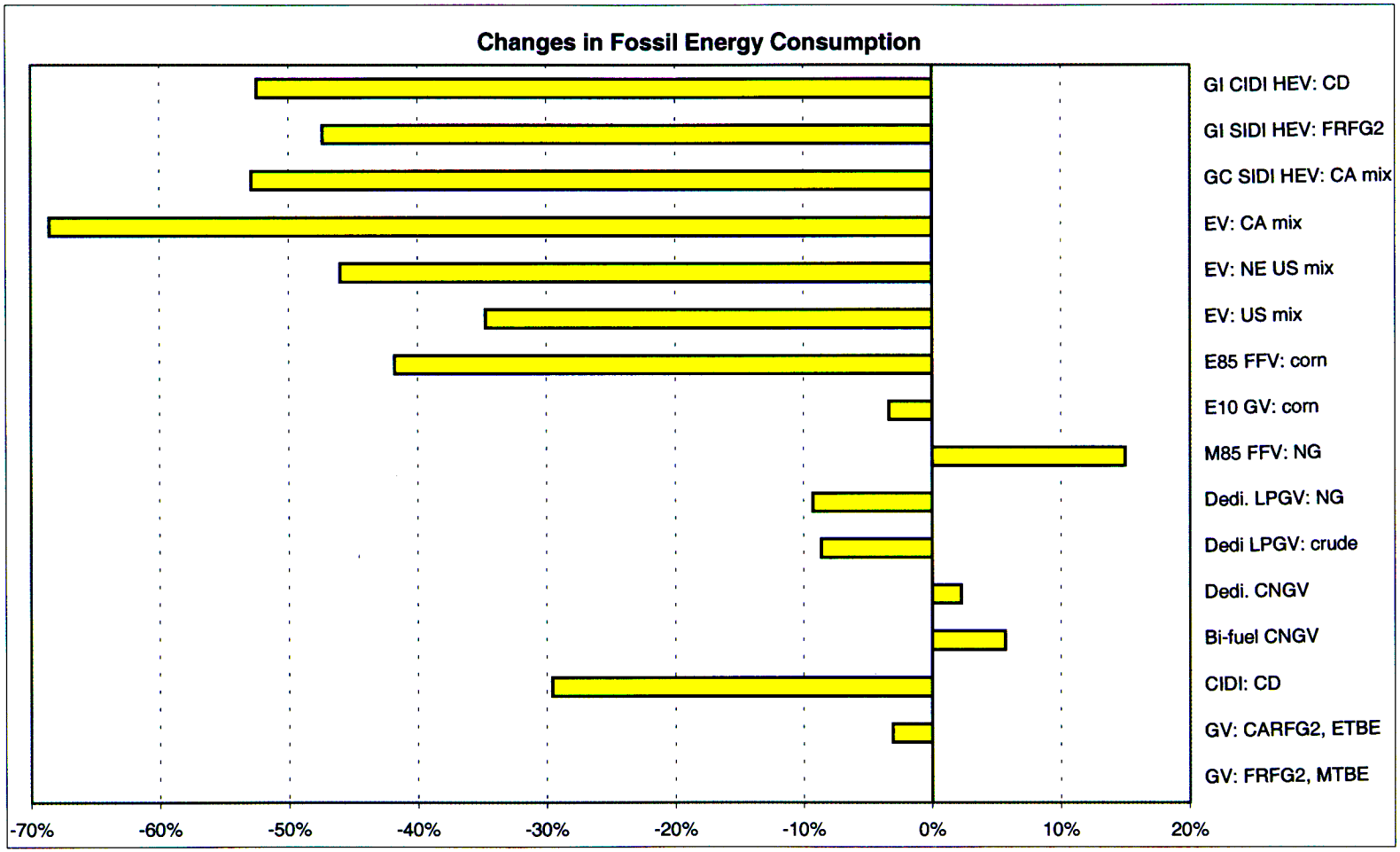

Figure C-1.11 Changes in Fuel-Cycle Fossil Energy Use Relative to GVs Fueled with CG, Light-Duty Trucks 2: Near-Term Technologies

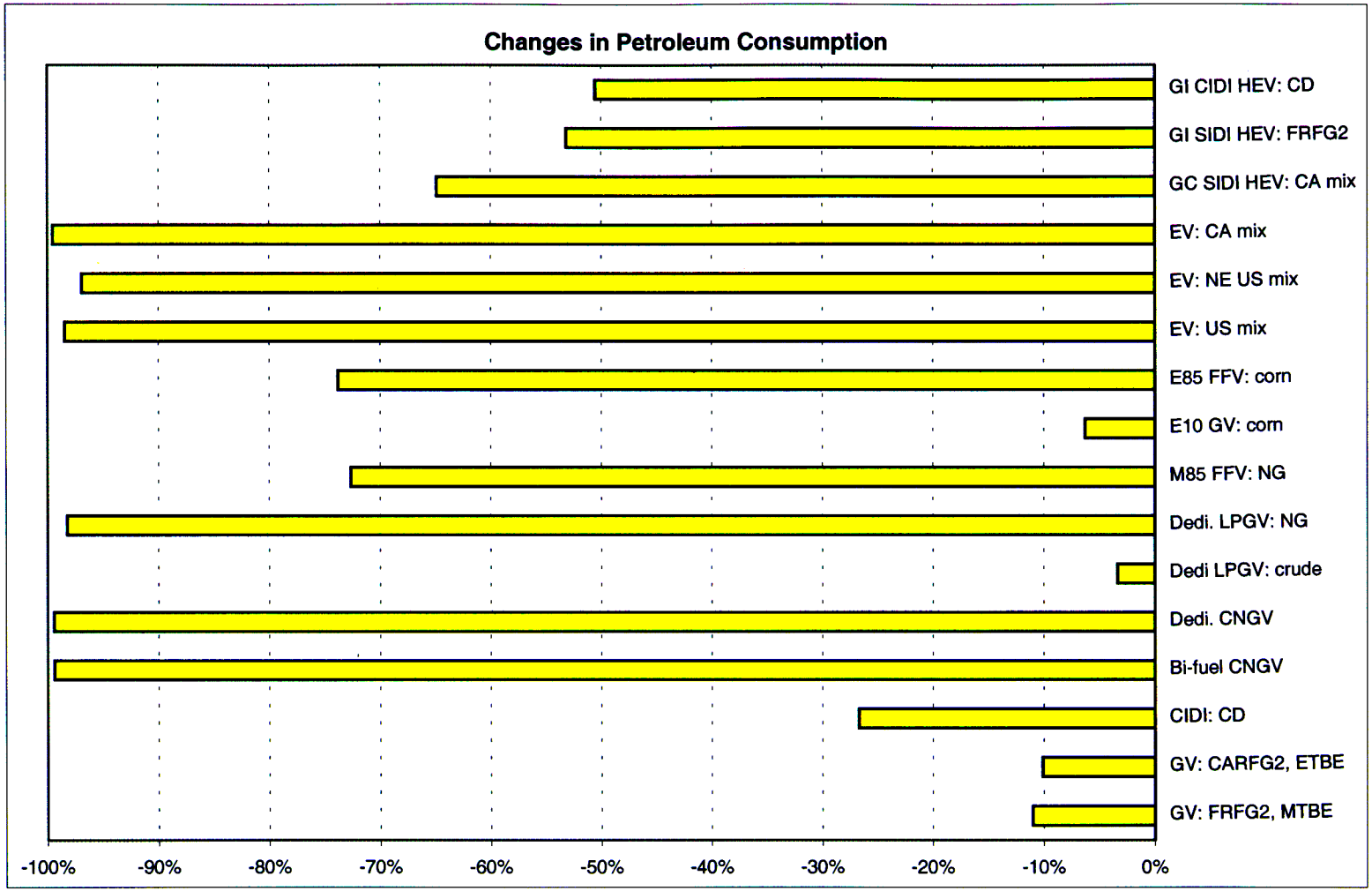

Figure C-1.12 Changes in Fuel-Cycle Petroleum Consumption Relative to GVs Fueled with CG, Light-Duty Trucks 2: Near-Term Technologies

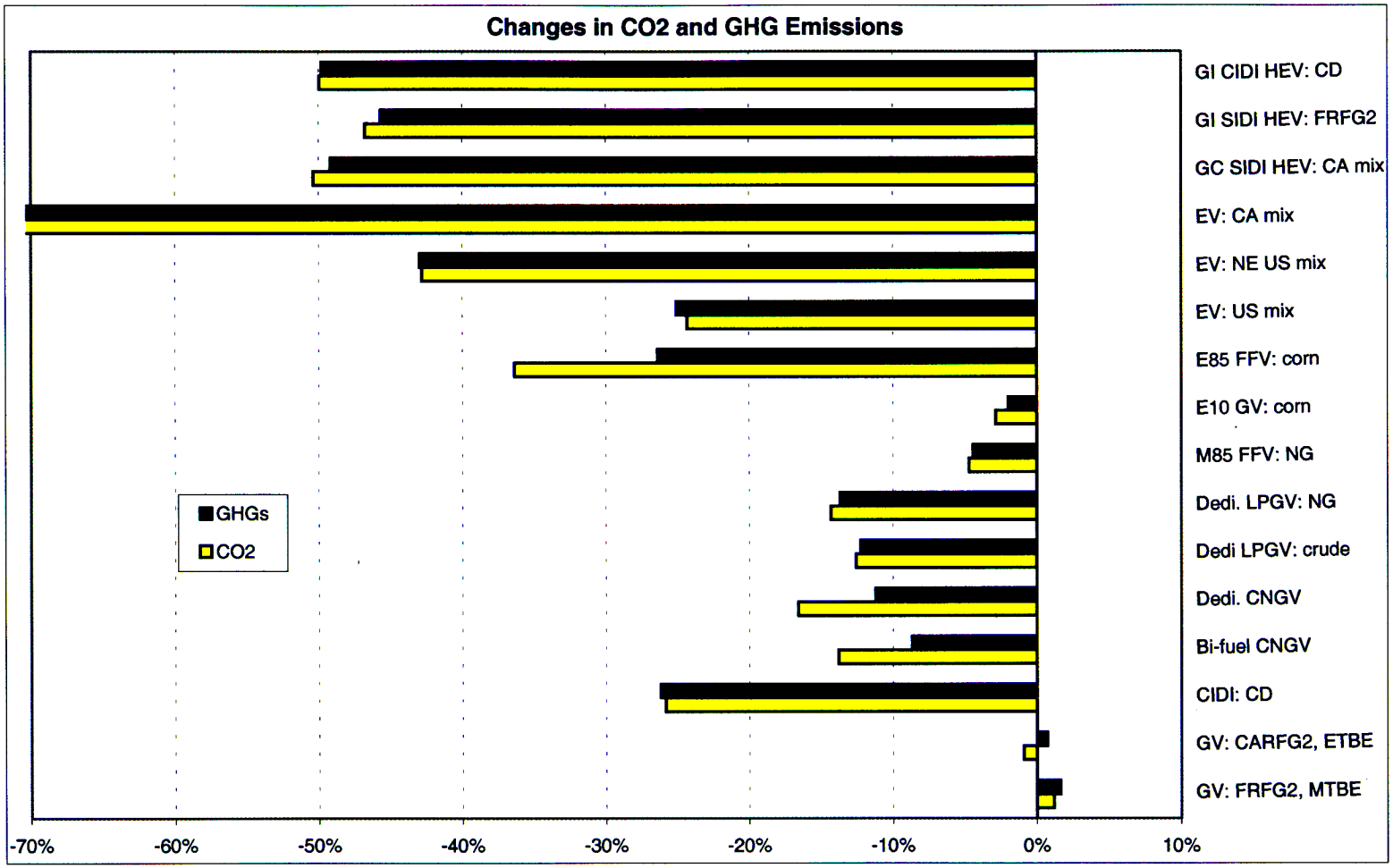

Figure C-1.13 Changes in Fuel-Cycle CO_2 and GHG Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 2: Near-Term Technologies

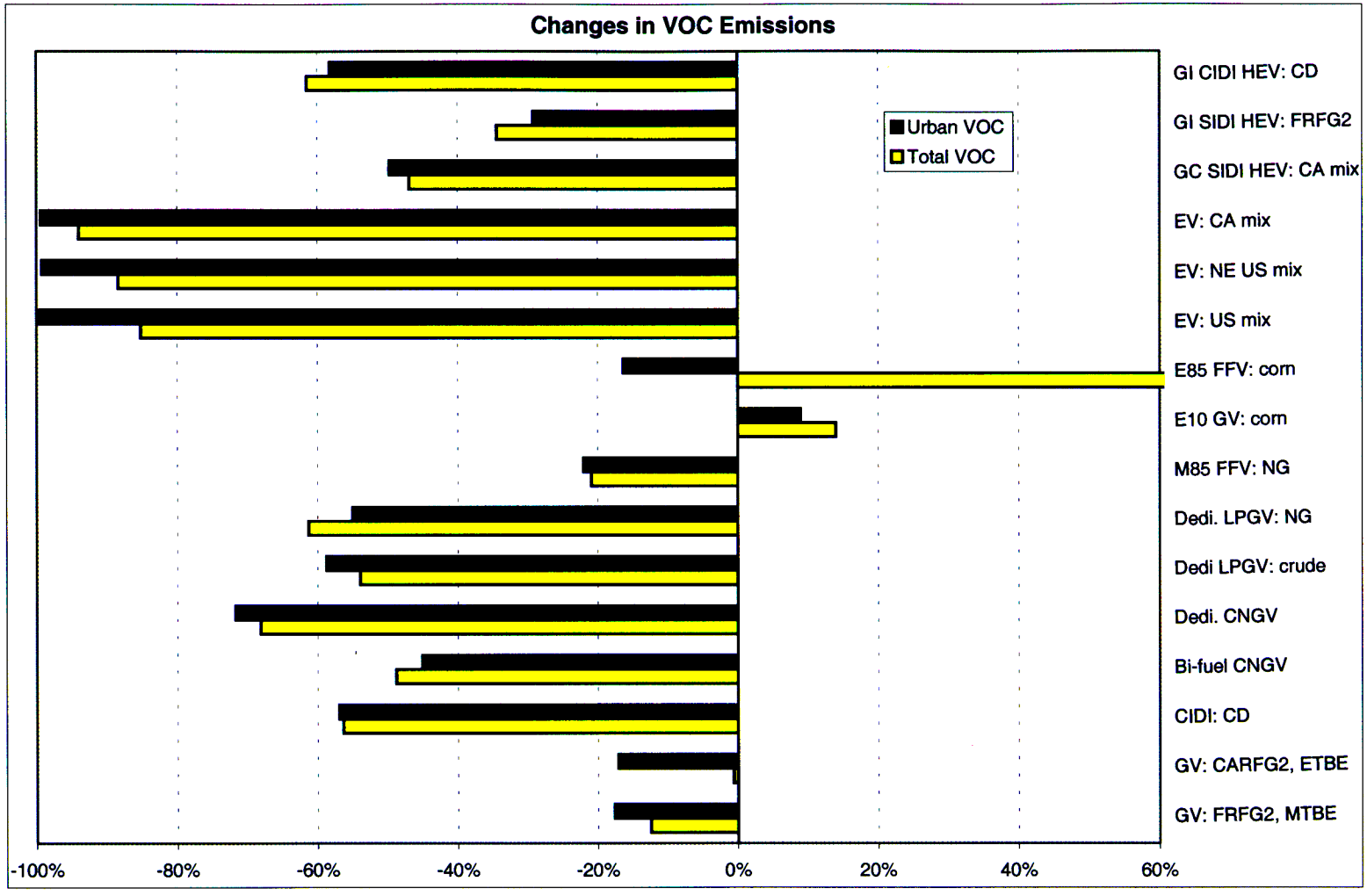

Figure C-1.14 Changes in Fuel-Cycle VOC Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 2: Near-Term Technologies

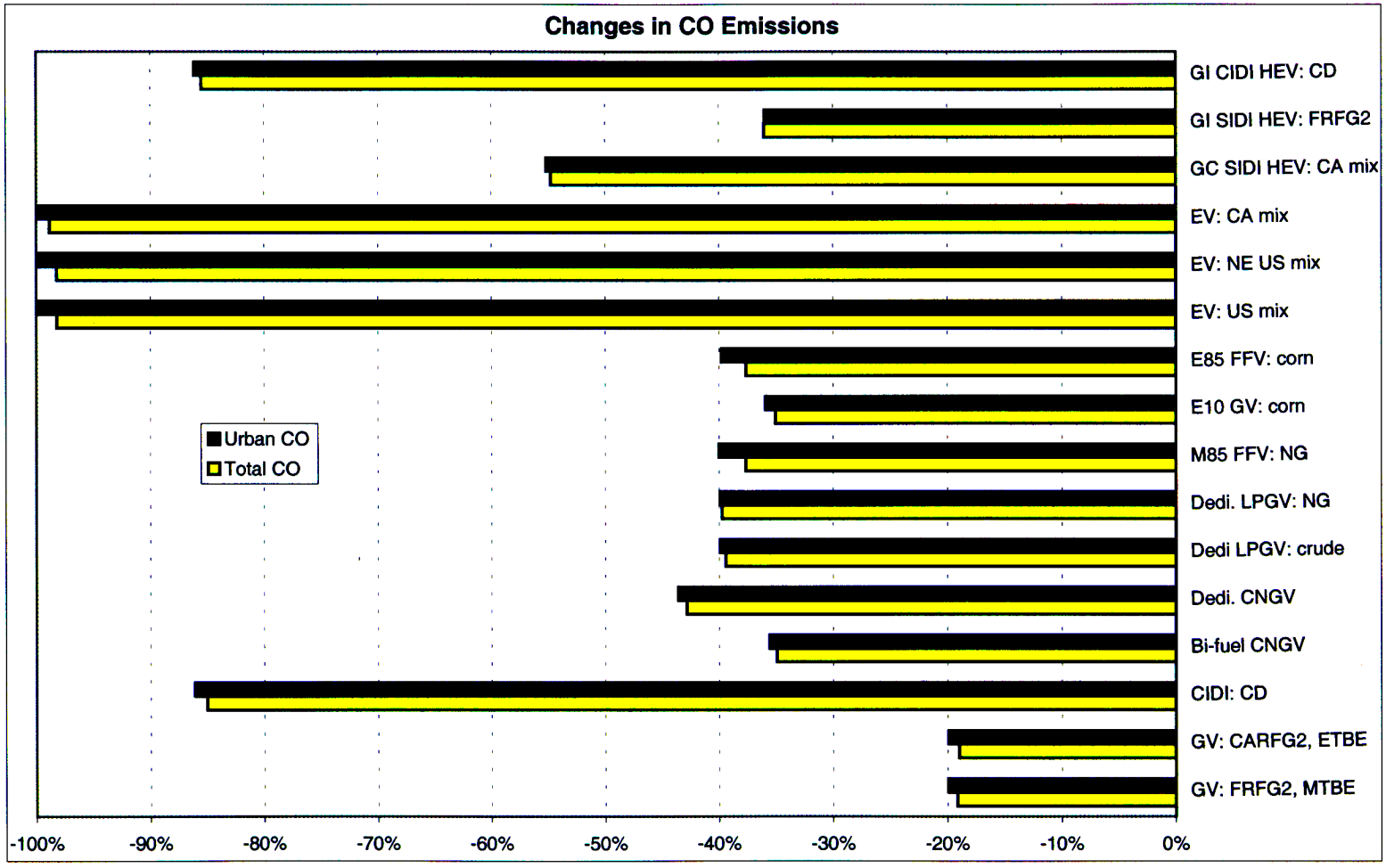

Figure C-1.15 Changes in Fuel-Cycle CO Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 2: Near-Term Technologies

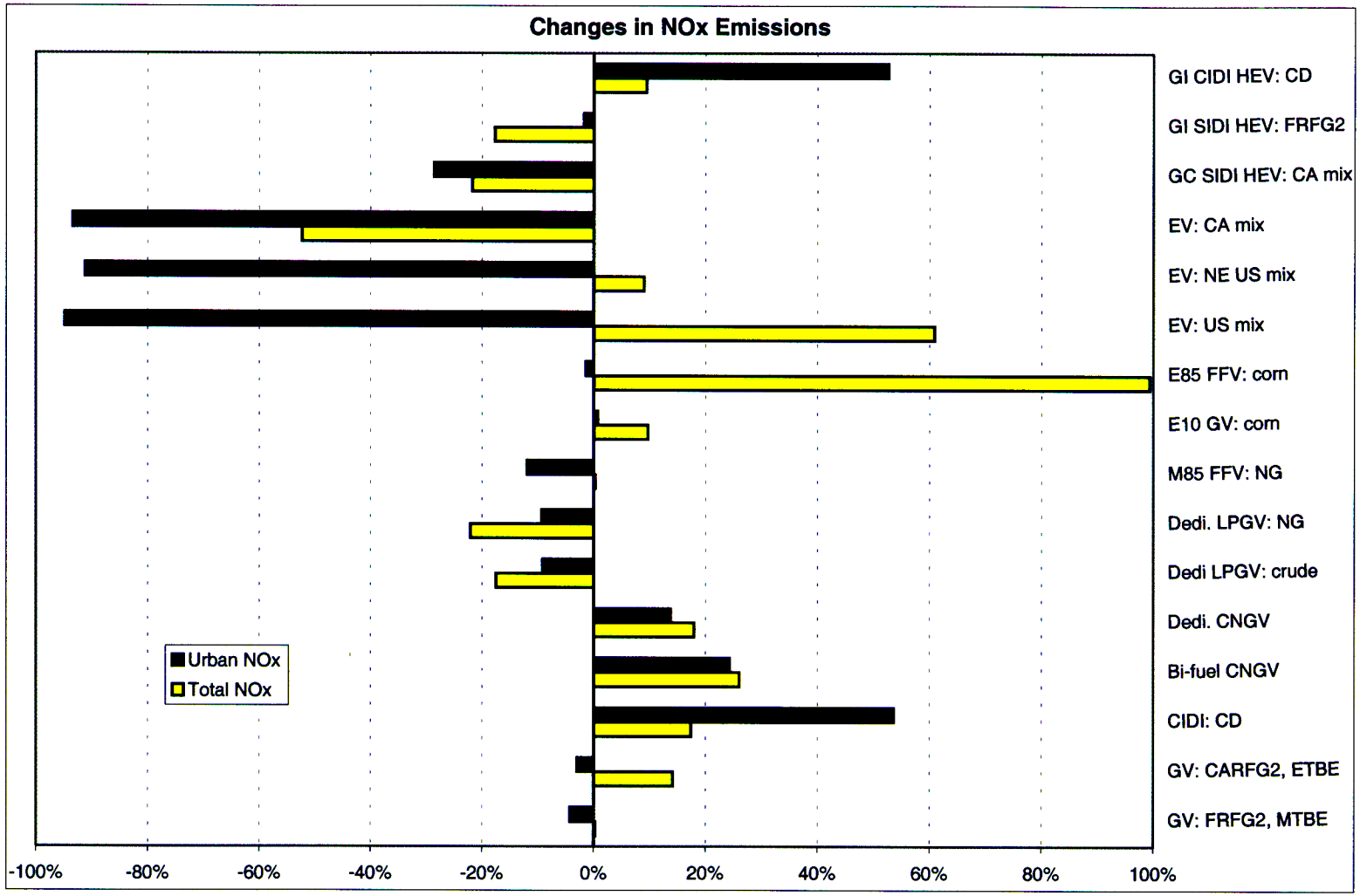

Figure C-1.16 Changes in Fuel-Cycle NO_x Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 2: Near-Term Technologies

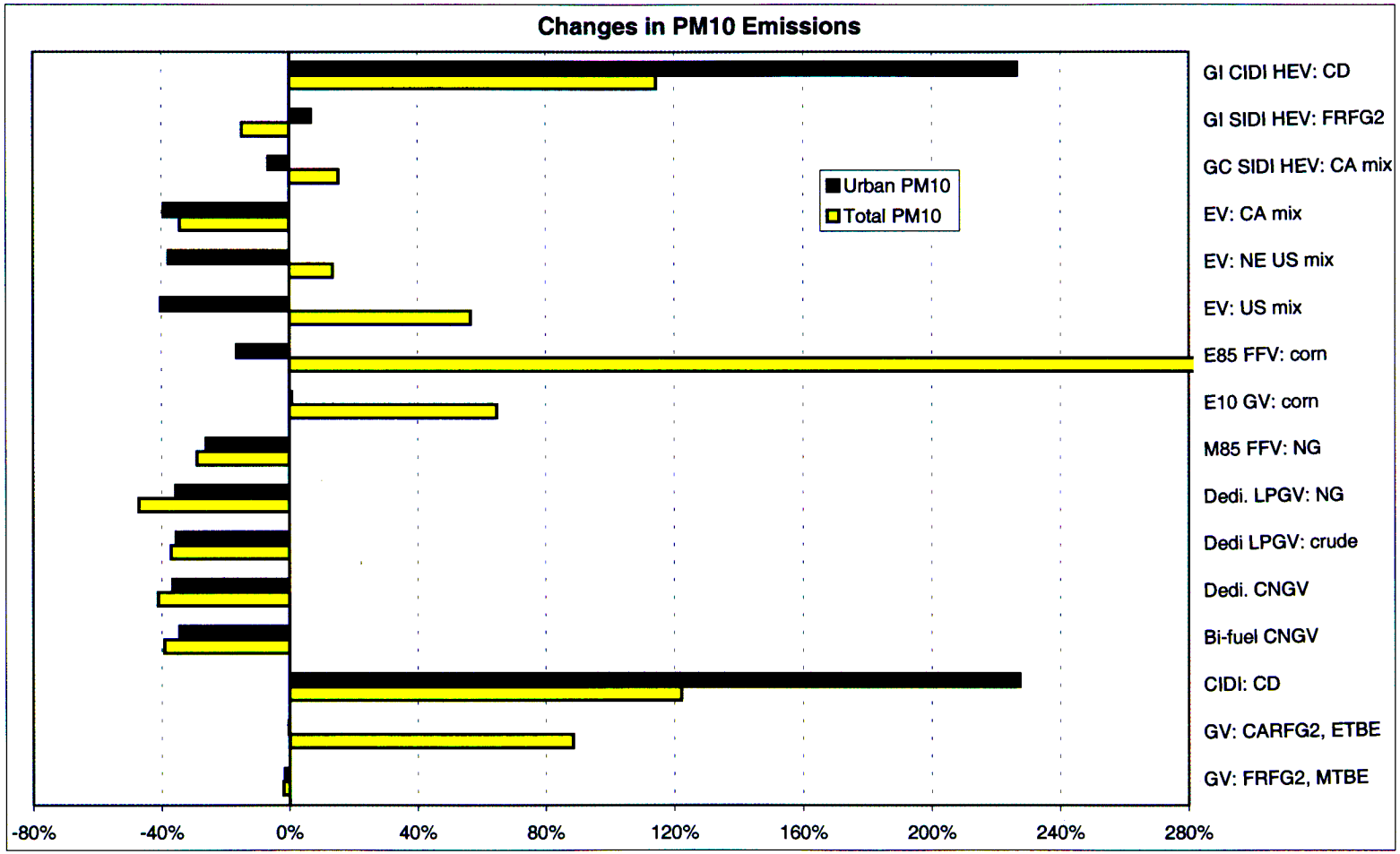

Figure C-1.17 Changes in Fuel-Cycle PM_{10} Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 2: Near-Term Technologies

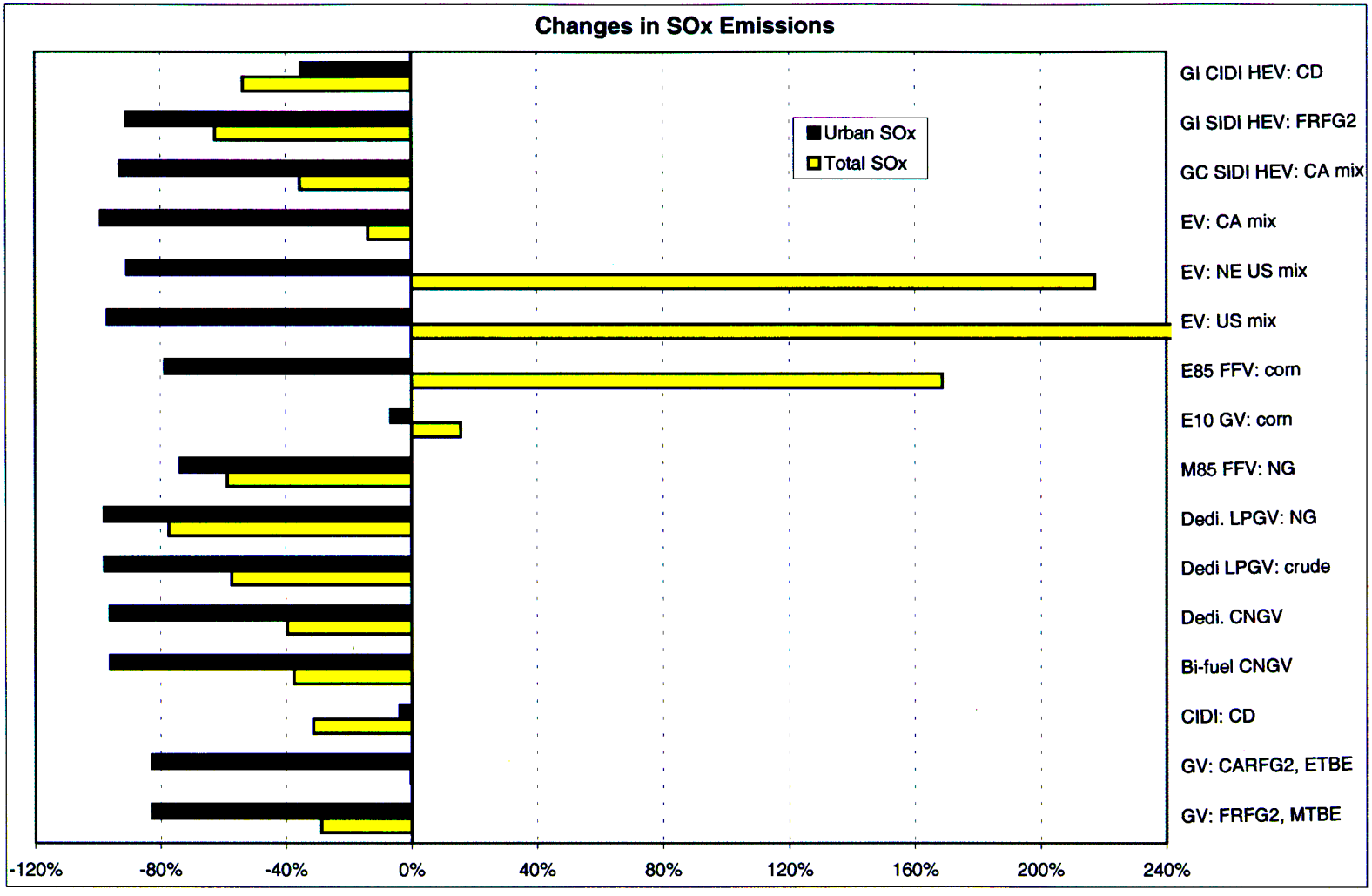

Figure C-1.18 Changes in Fuel-Cycle SO_x Emissions Relative to GVs Fueled with CG, Light-Duty Trucks 2: Near-Term Technologies

2 Long-Term Technologies

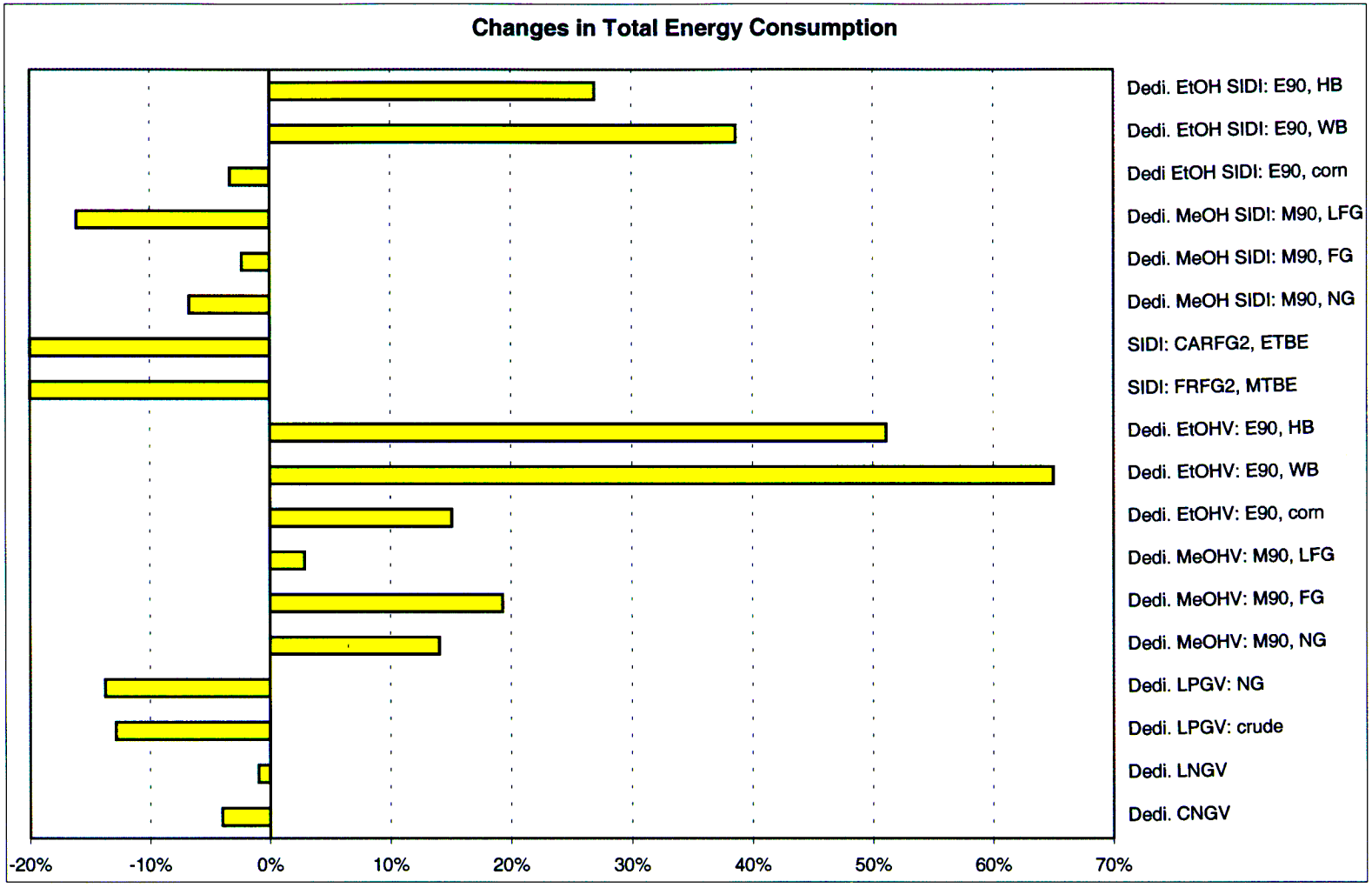

Figure C-2.1 Changes in Fuel-Cycle Total Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Vehicles

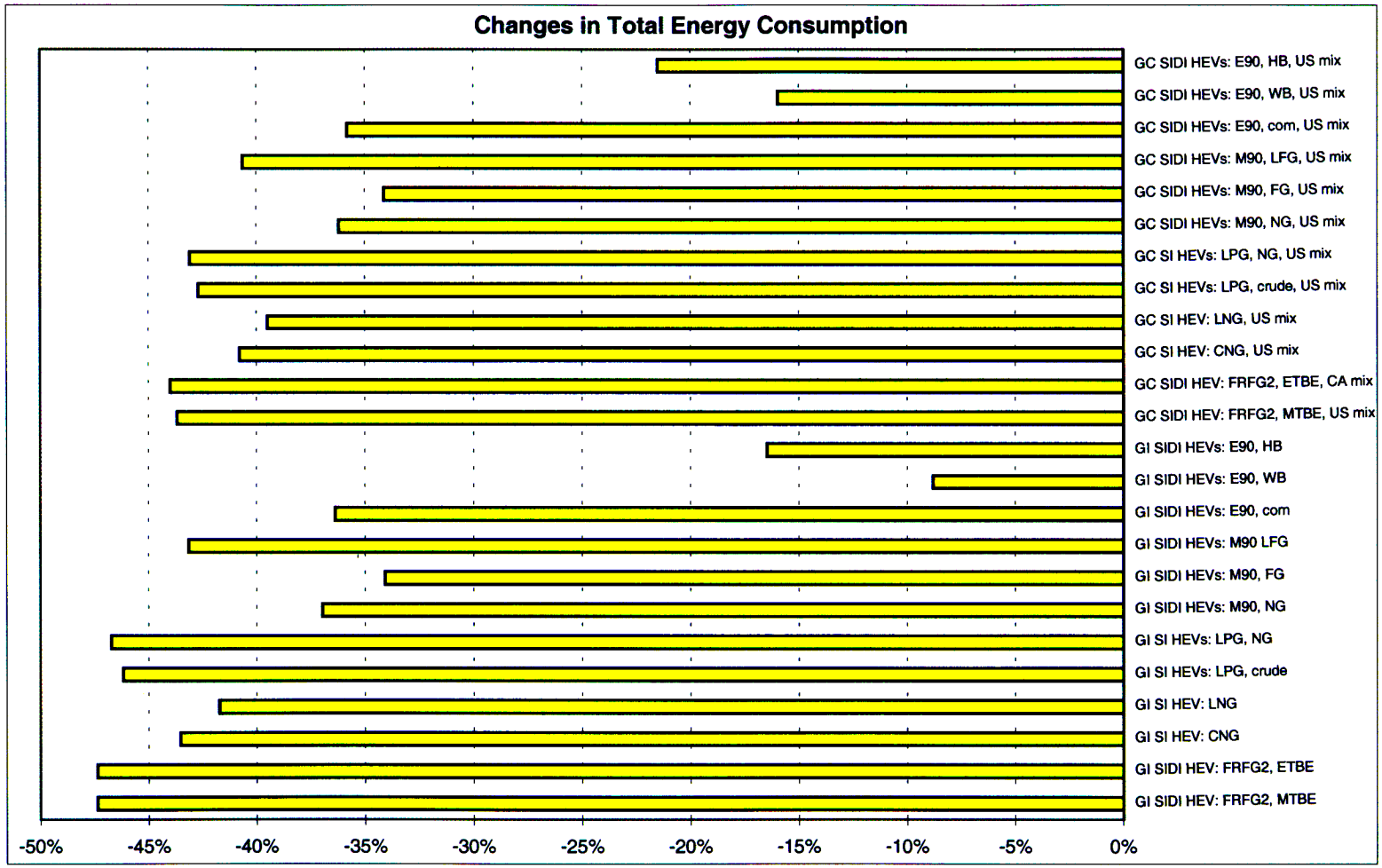

Figure C-2.2 Changes in Fuel-Cycle Total Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Hybrid Electric Vehicles

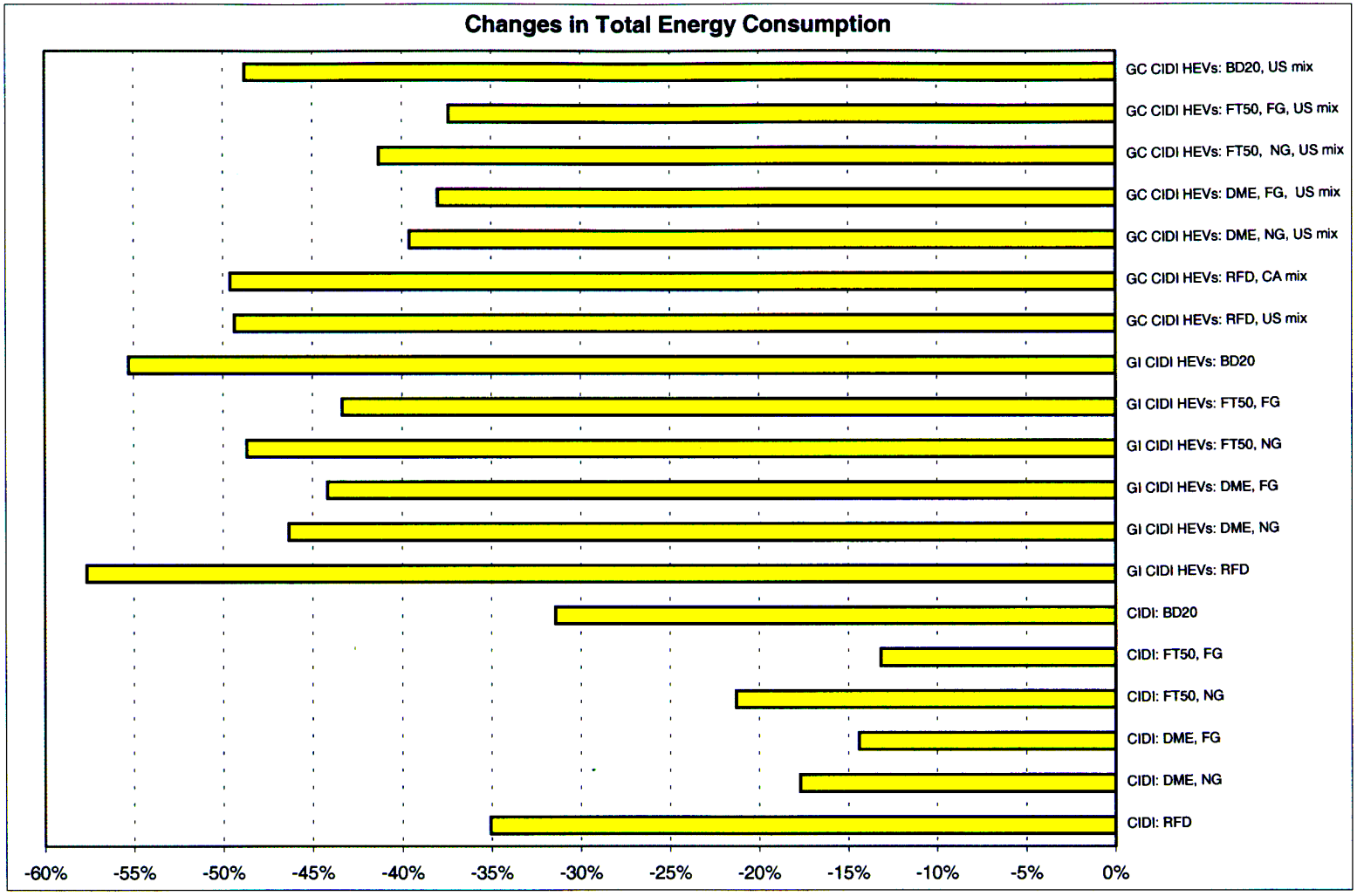

Figure C-2.3 Changes in Fuel-Cycle Total Energy Use Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

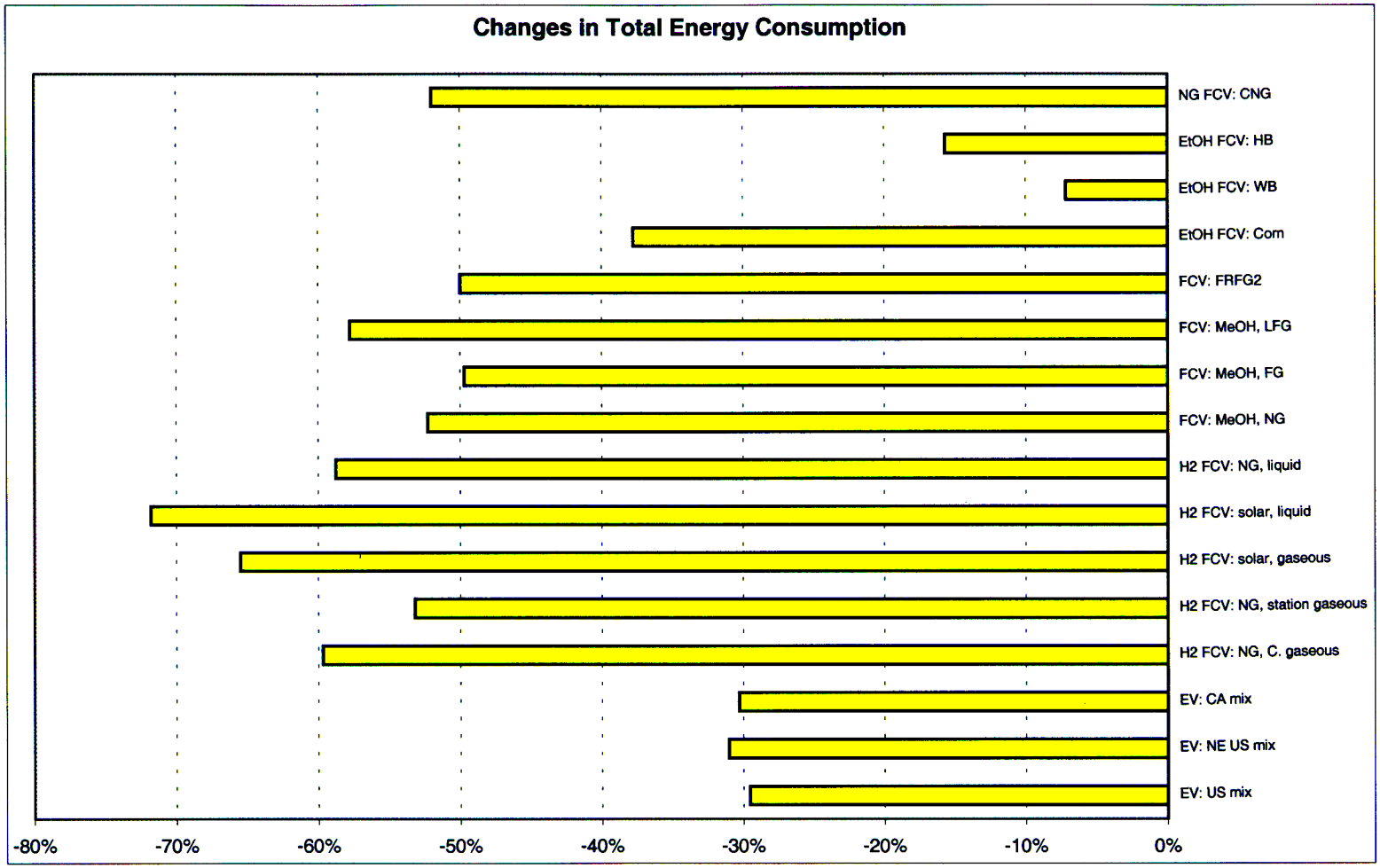

Figure C-2.4 Changes in Fuel-Cycle Total Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term Electric Vehicles and Fuel-Cell Vehicles

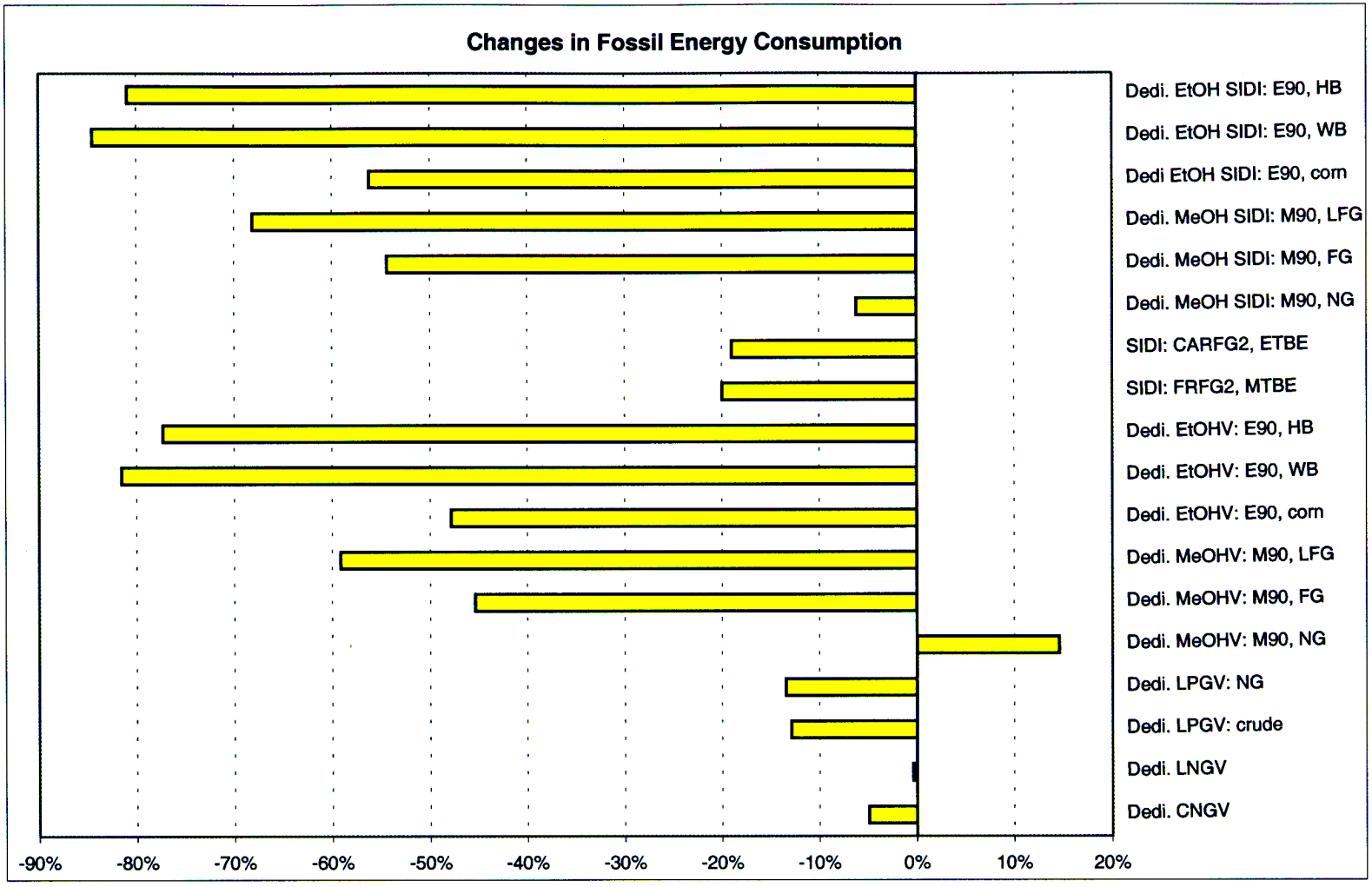

Figure C-2.5 Changes in Fuel-Cycle Fossil Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Vehicles

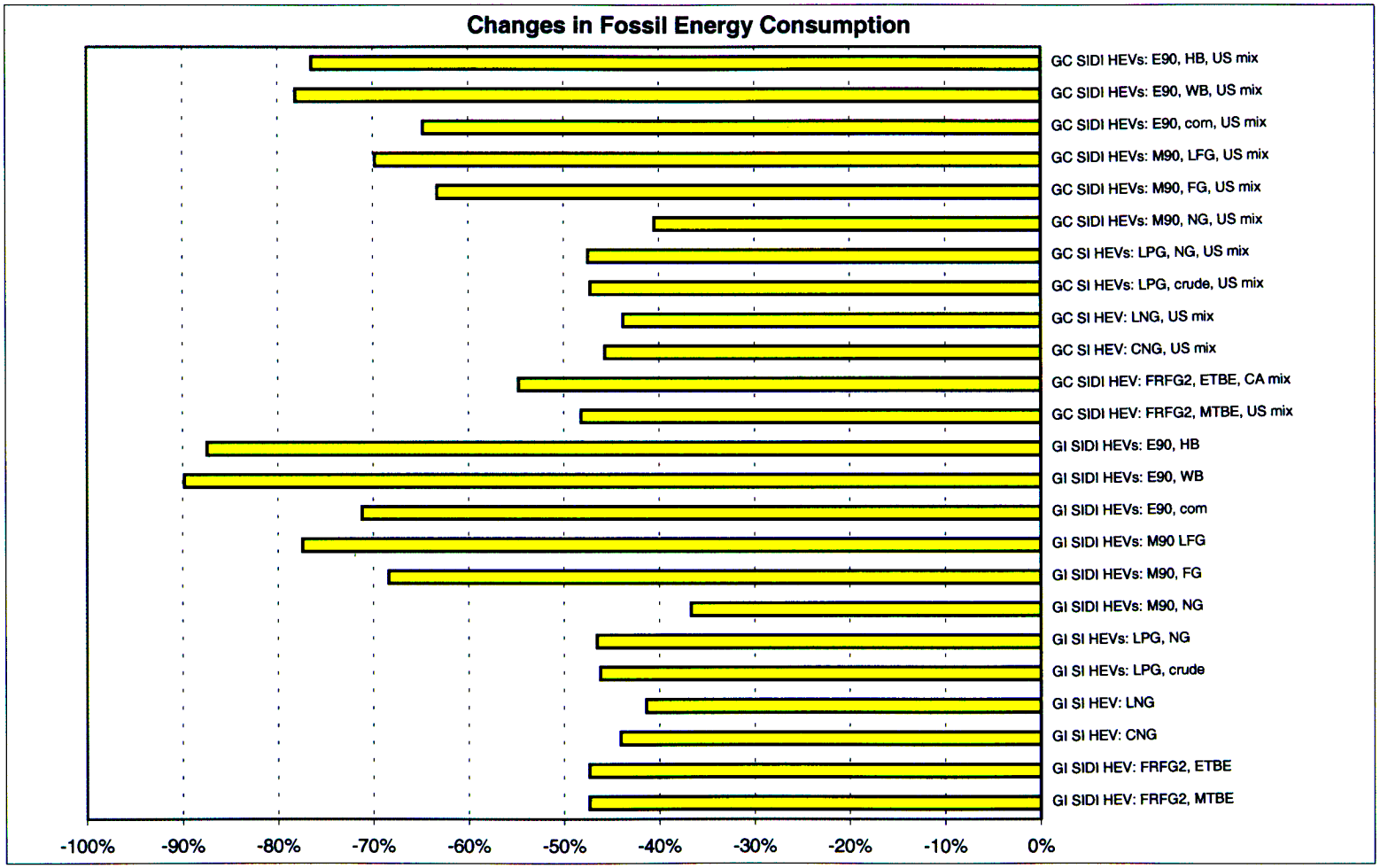

Figure C-2.6 Changes in Fuel-Cycle Fossil Energy Use Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Hybrid Electric Vehicles

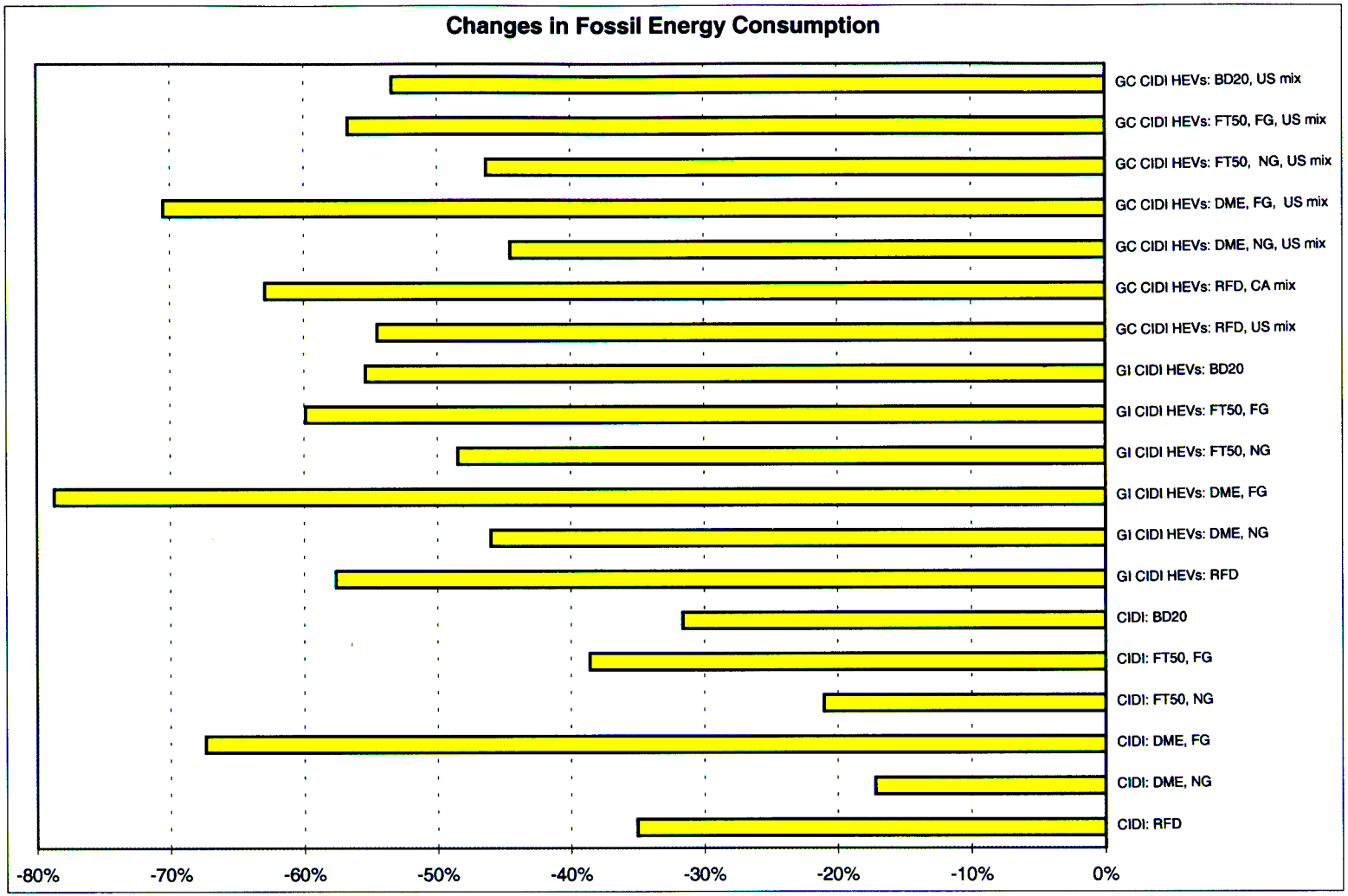

Figure C-2.7 Changes in Fuel-Cycle Fossil Energy Use Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

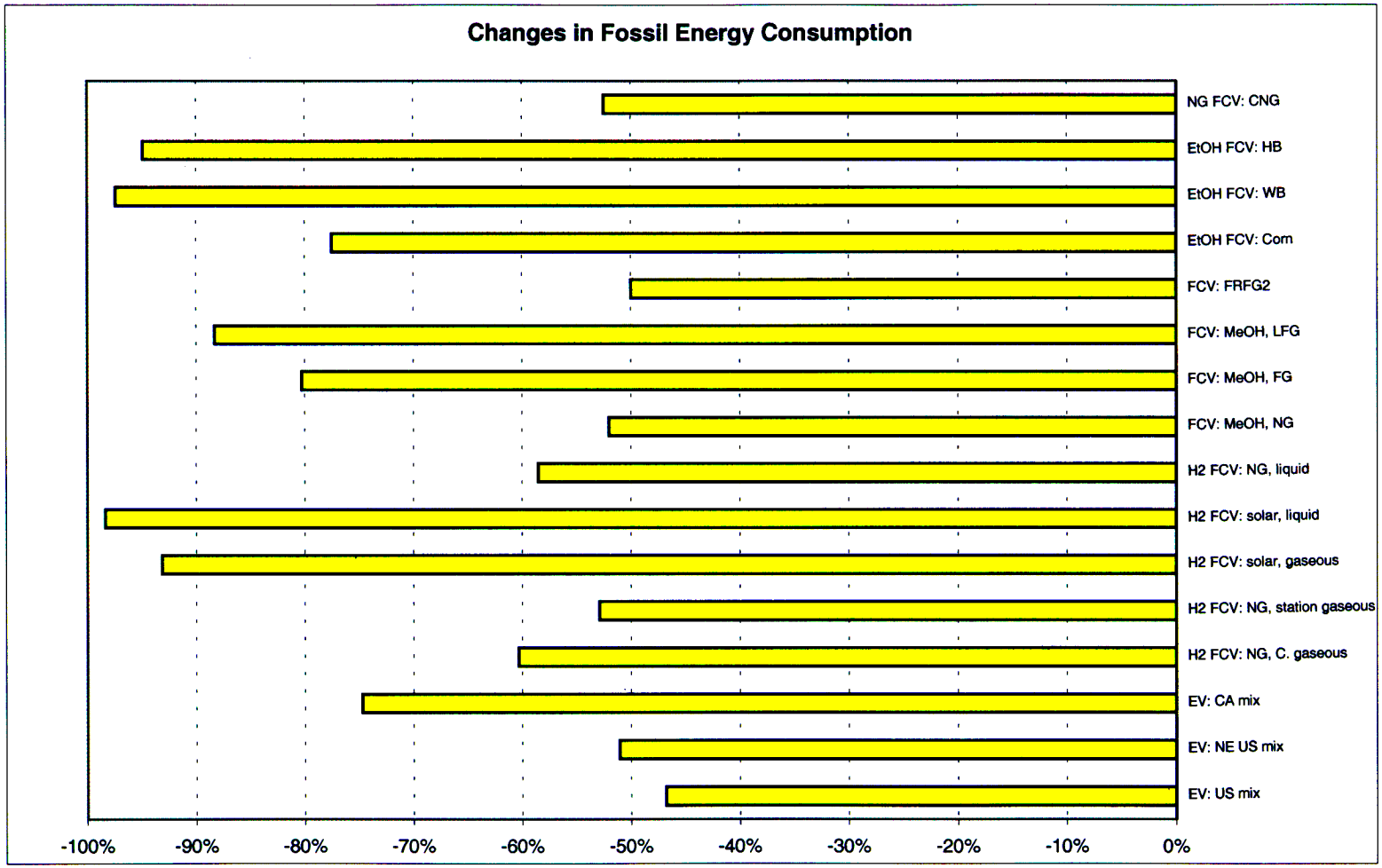

Figure C-2.8 Changes in Fuel-Cycle Fossil Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term Electric Vehicles and Fuel-Cell Vehicles

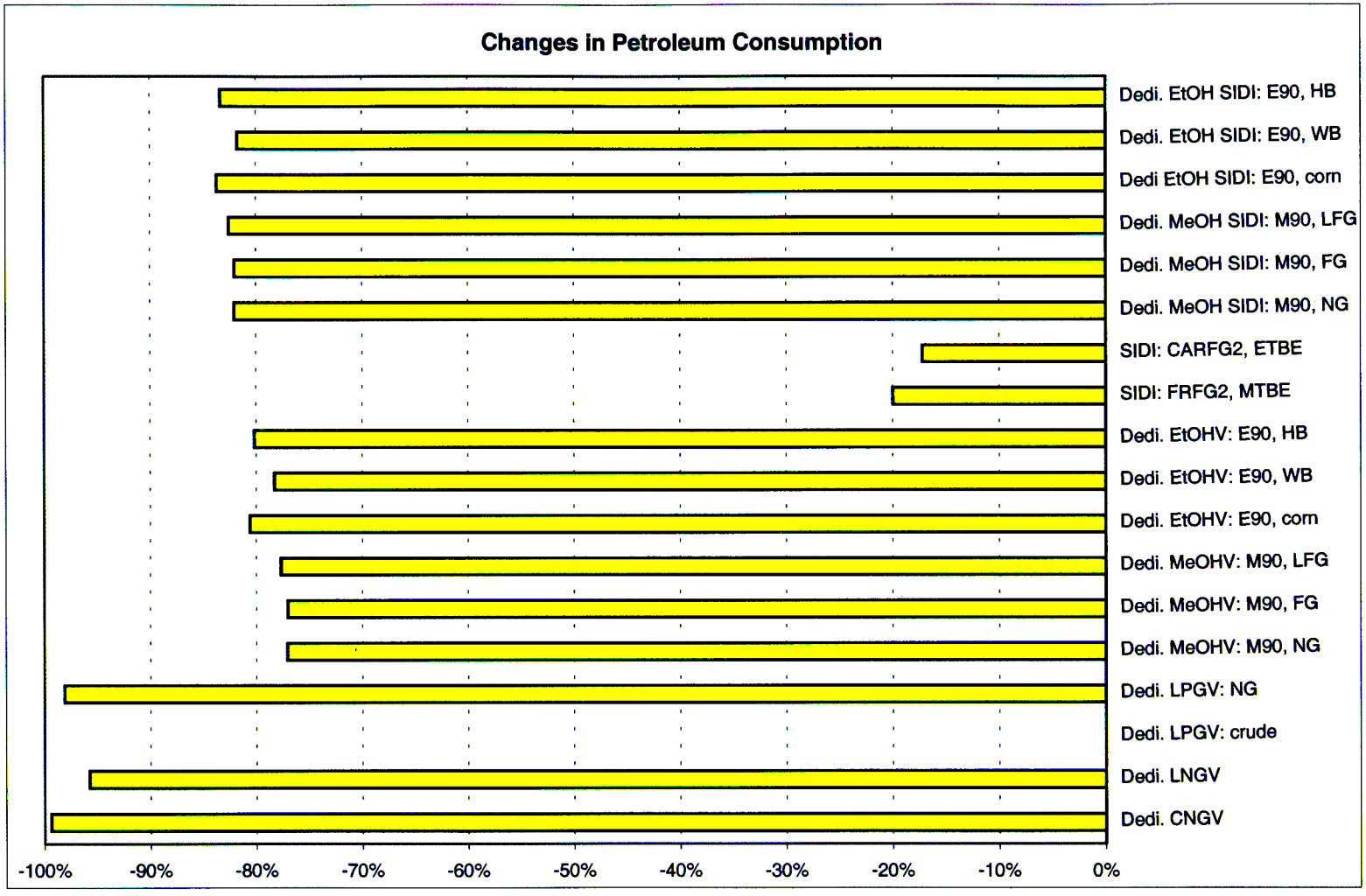

Figure C-2.9 Changes in Fuel-Cycle Petroleum Use Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Vehicles

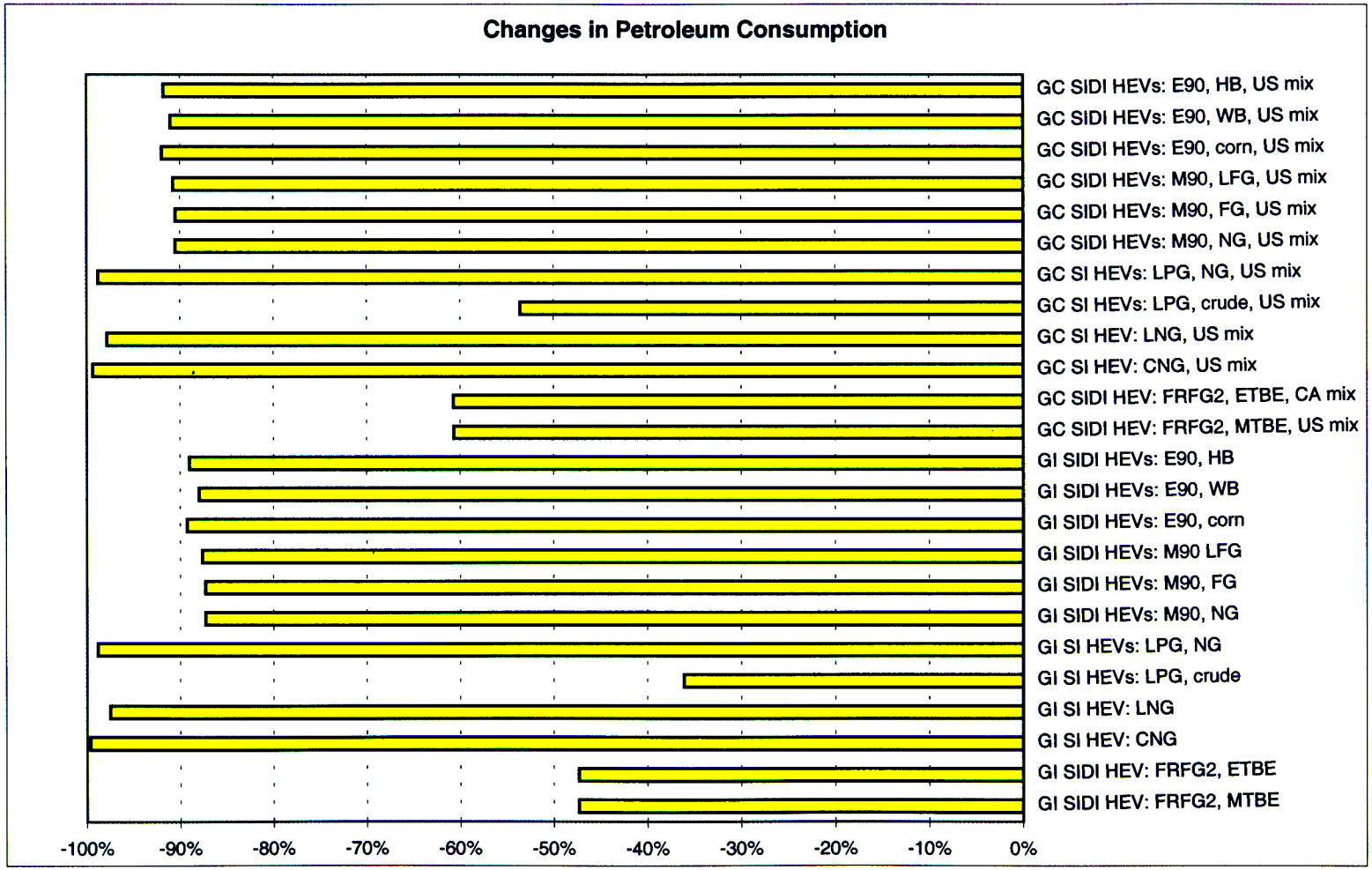

Figure C-2.10 Changes in Fuel-Cycle Petroleum Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Hybrid Electric Vehicles

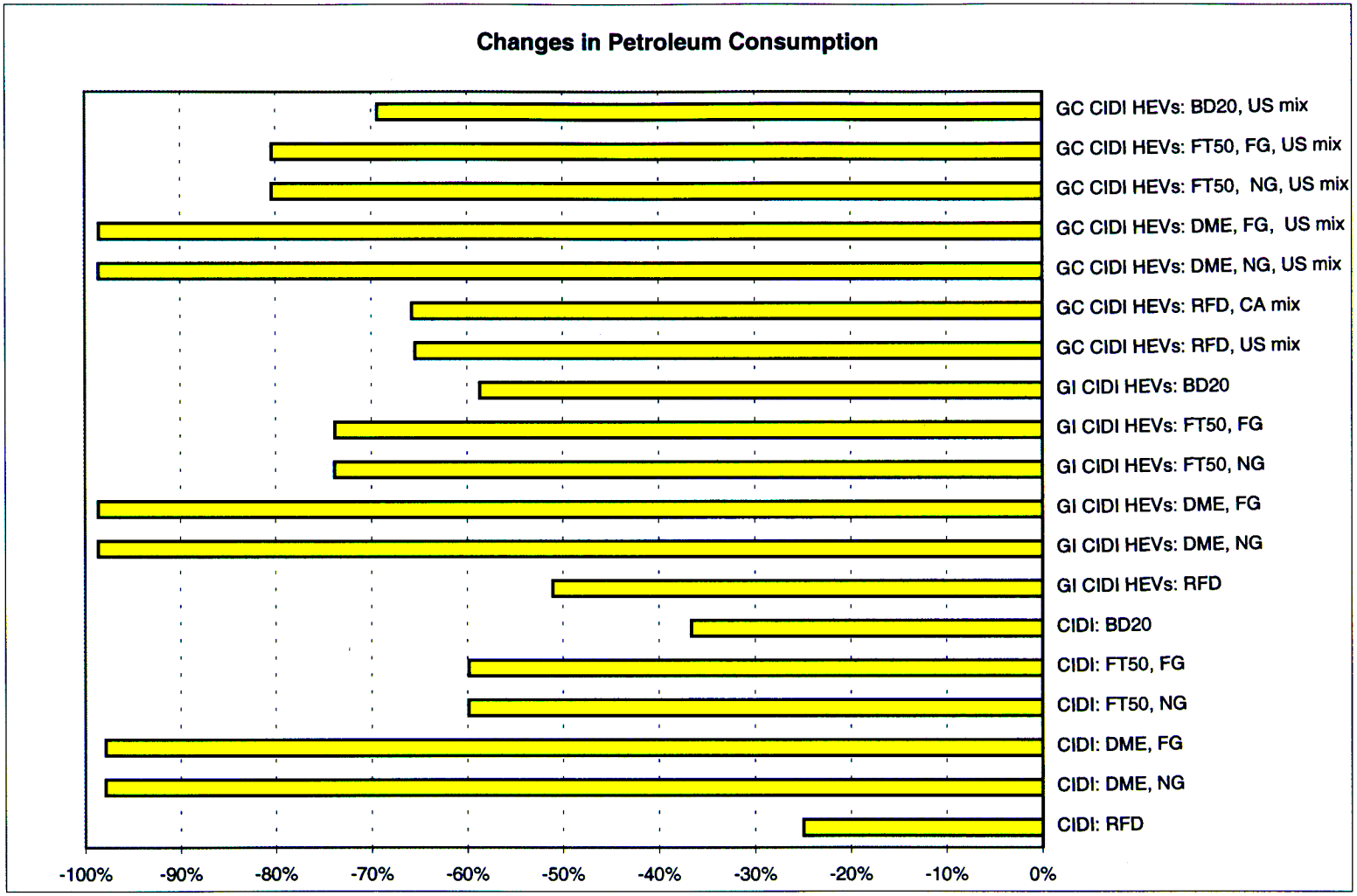

Figure C-2.11 Changes in Fuel-Cycle Petroleum Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

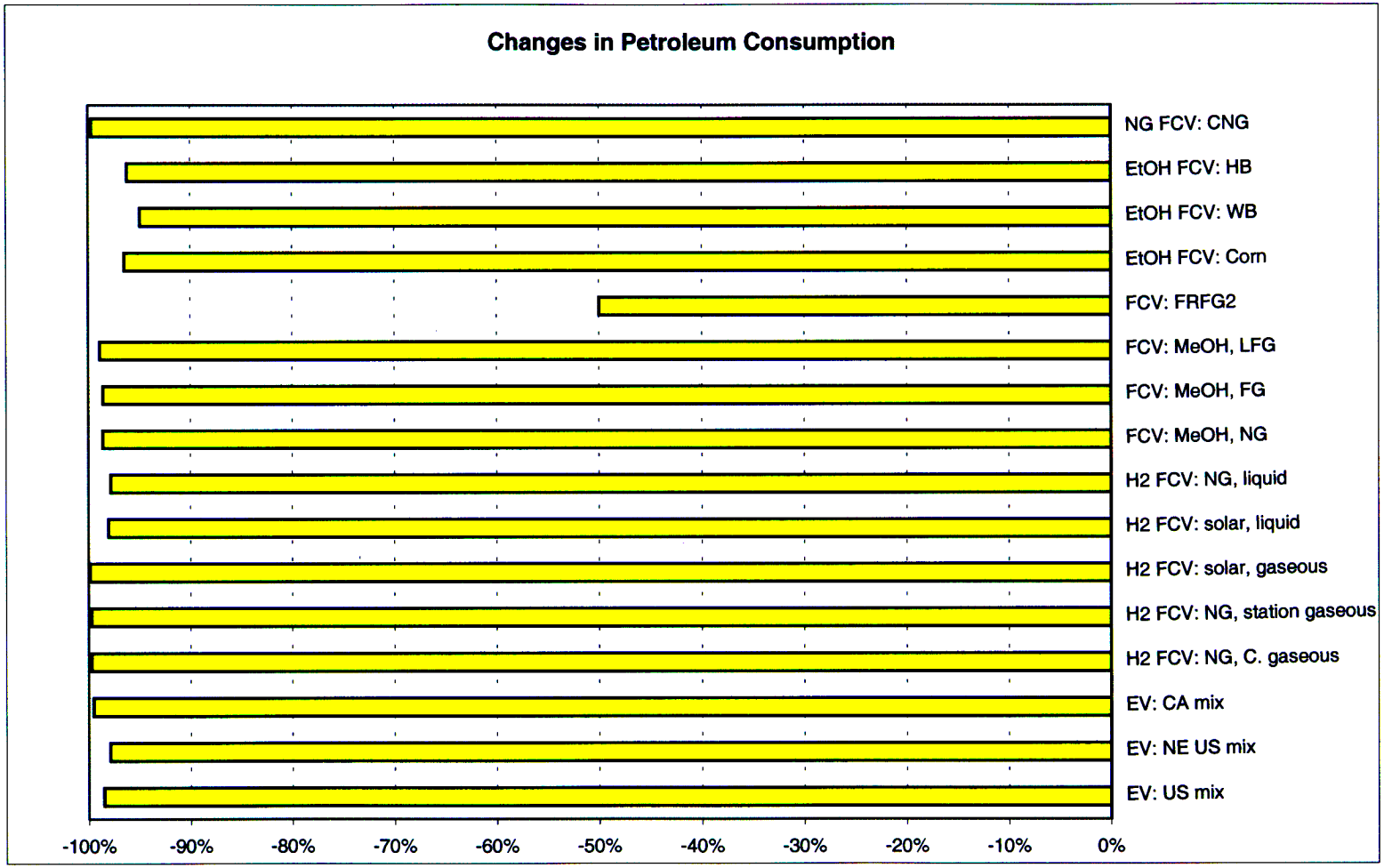

Figure C-2.12 Changes in Fuel-Cycle Petroleum Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term Electric Vehicles and Fuel-Cell Vehicles

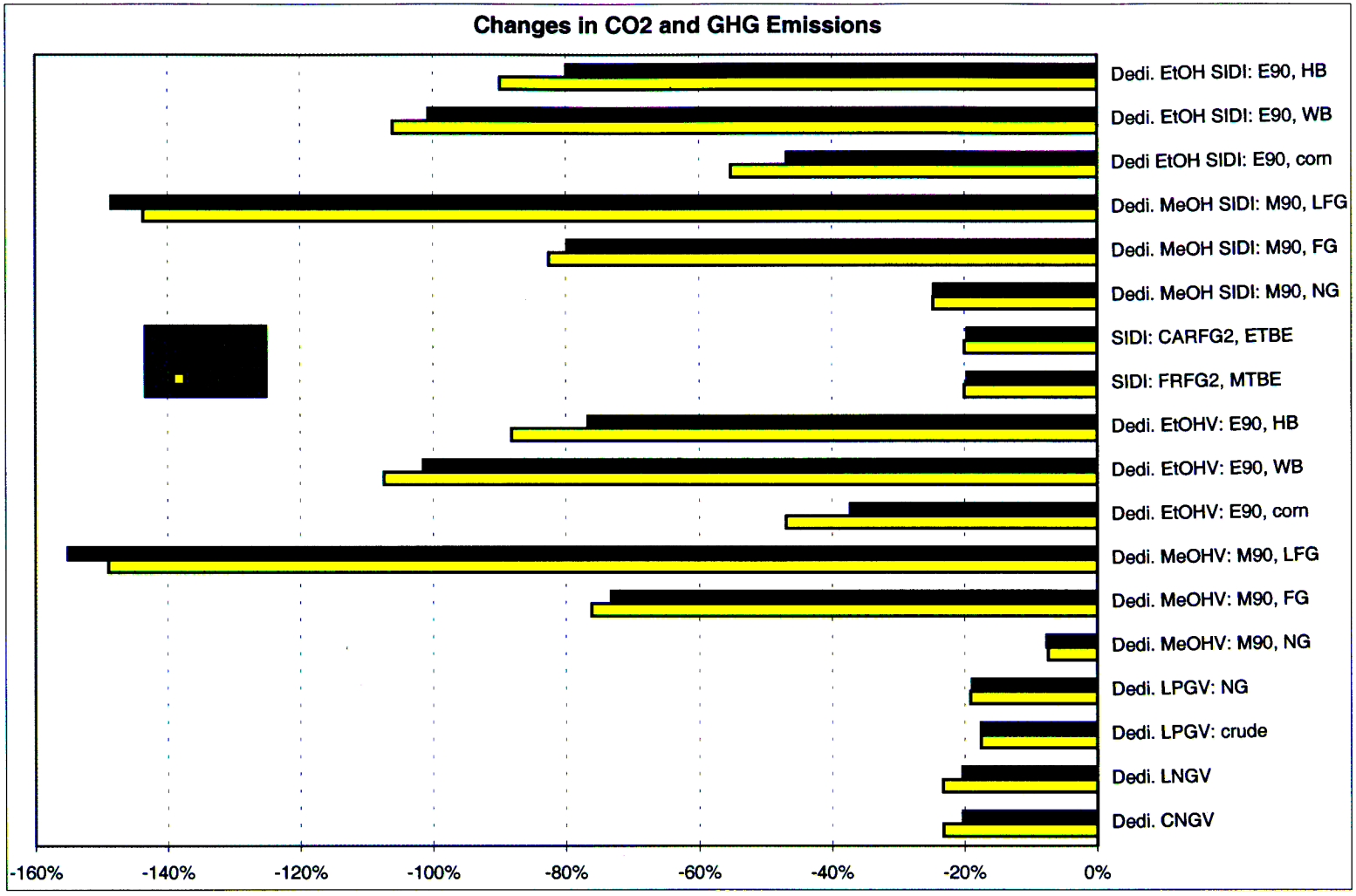

Figure C-2.13 Changes in Fuel-Cycle CO_2 and GHG Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Vehicles

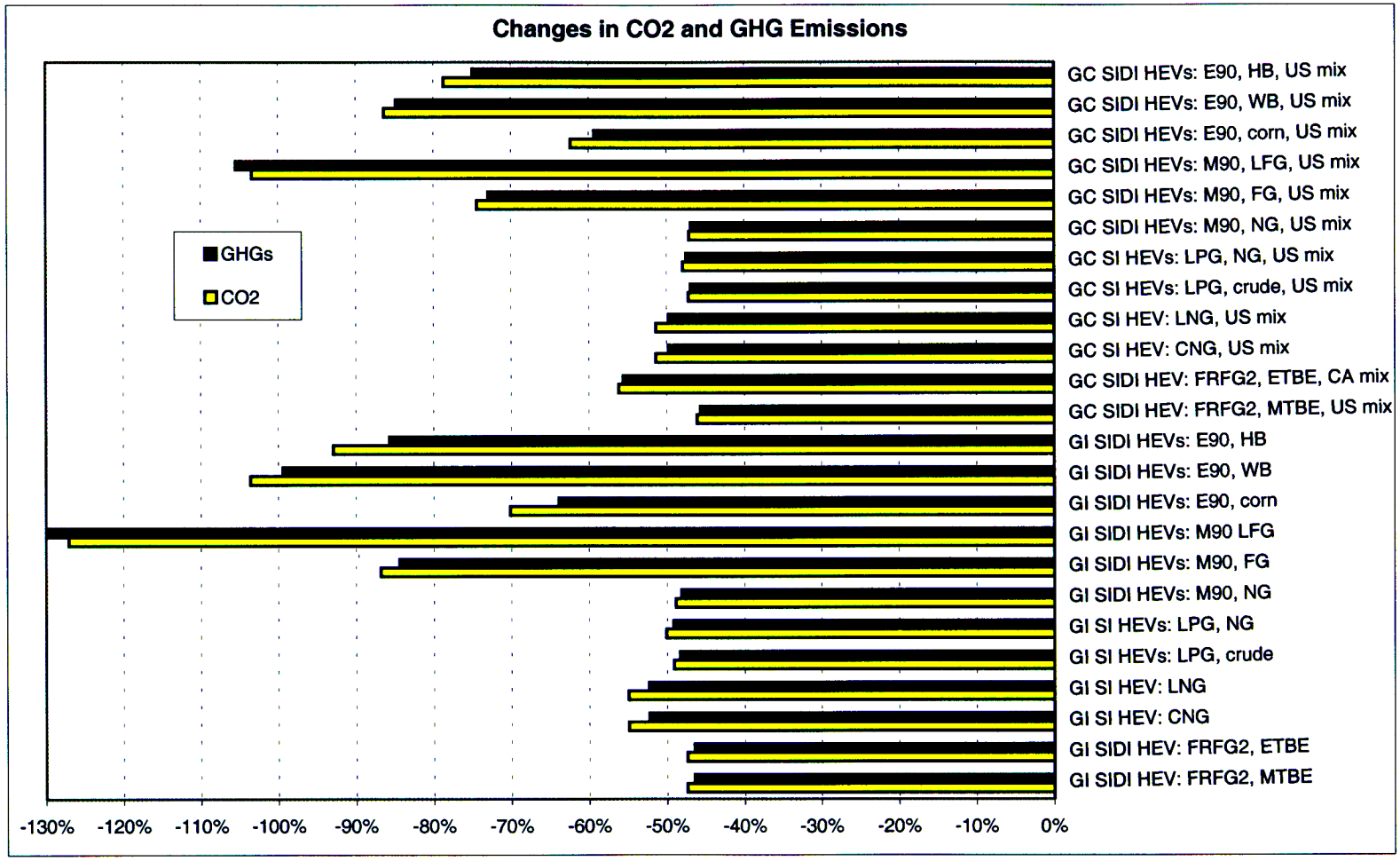

Figure C-2.14 Changes in Fuel-Cycle CO_2 and GHG Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Hybrid Electric Vehicles

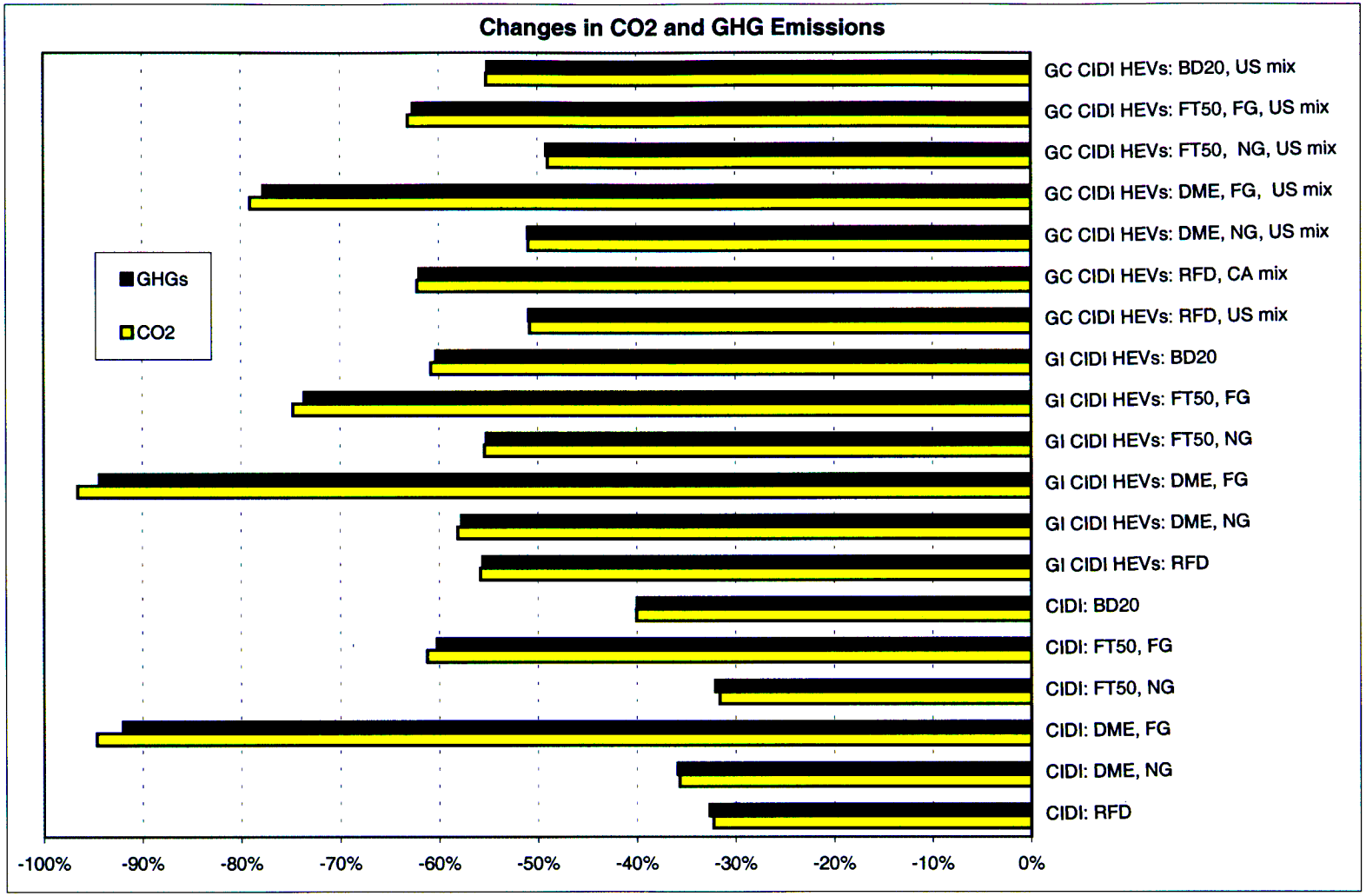

Figure C-2.15 Changes in Fuel-Cycle CO_2 and GHG Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

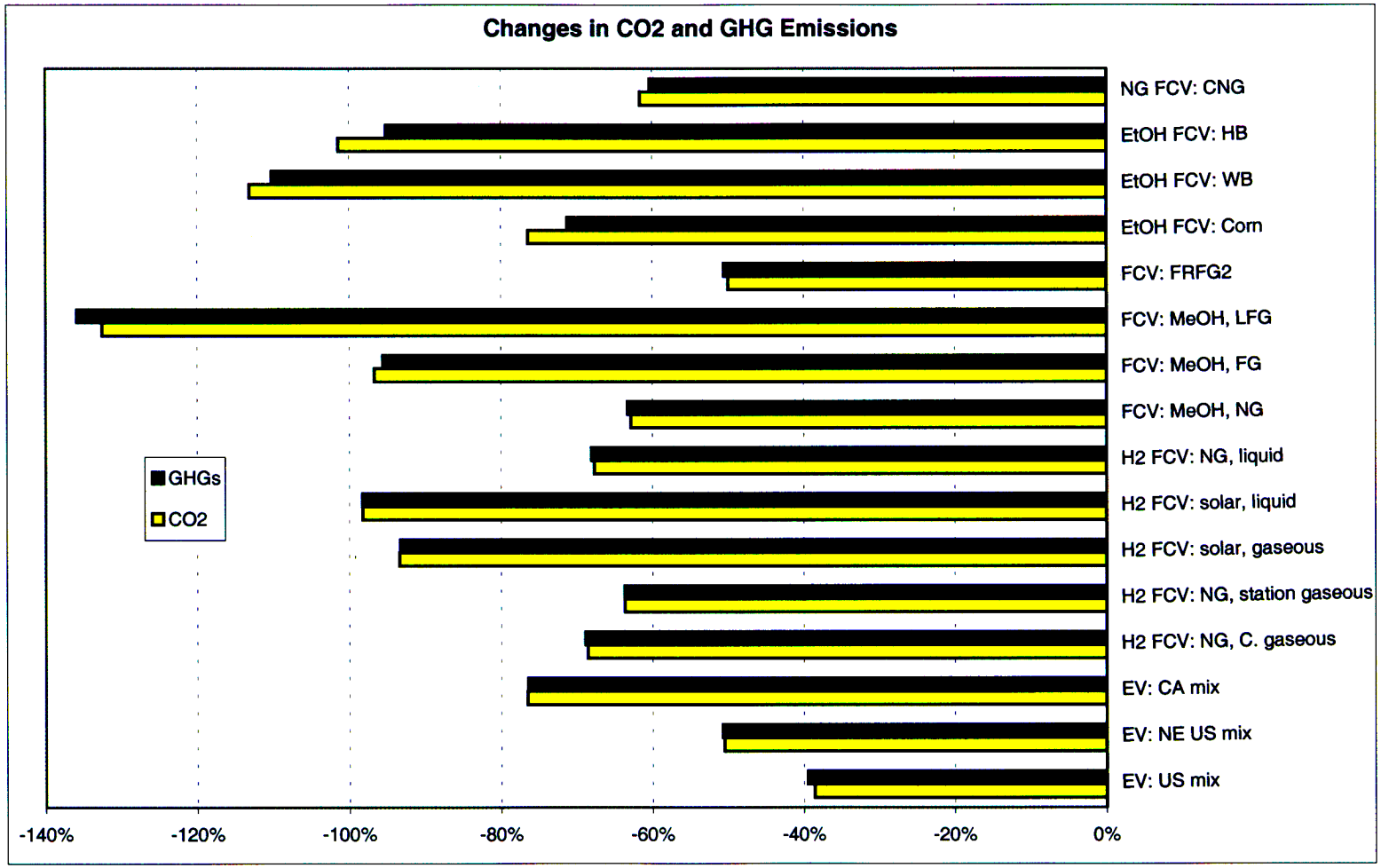

Figure C-2.16 Changes in Fuel-Cycle CO_2 and GHG Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term Electric Vehicles and Fuel-Cell Vehicles

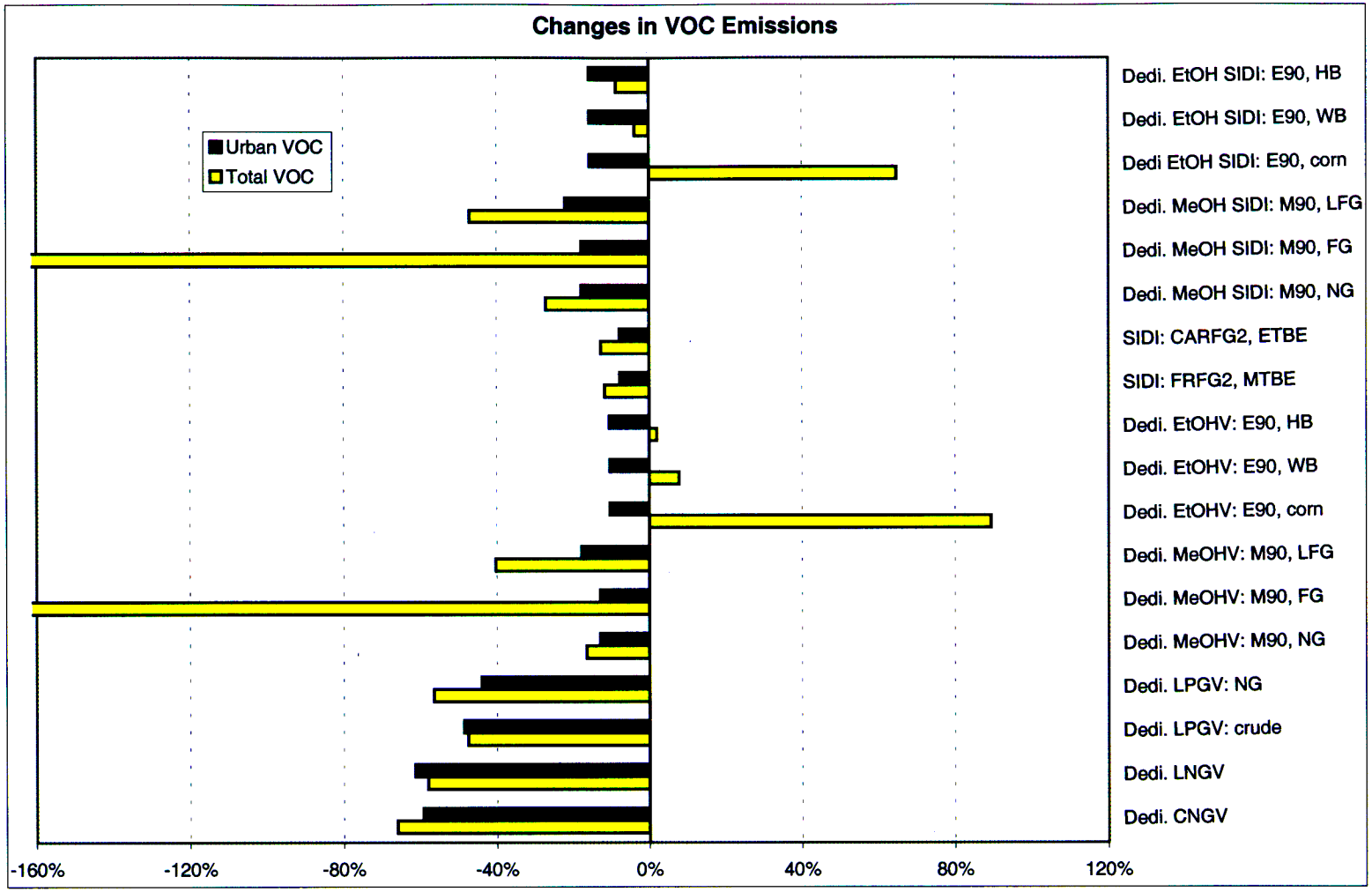

Figure C-2.17 Changes in Fuel-Cycle VOC Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Vehicles

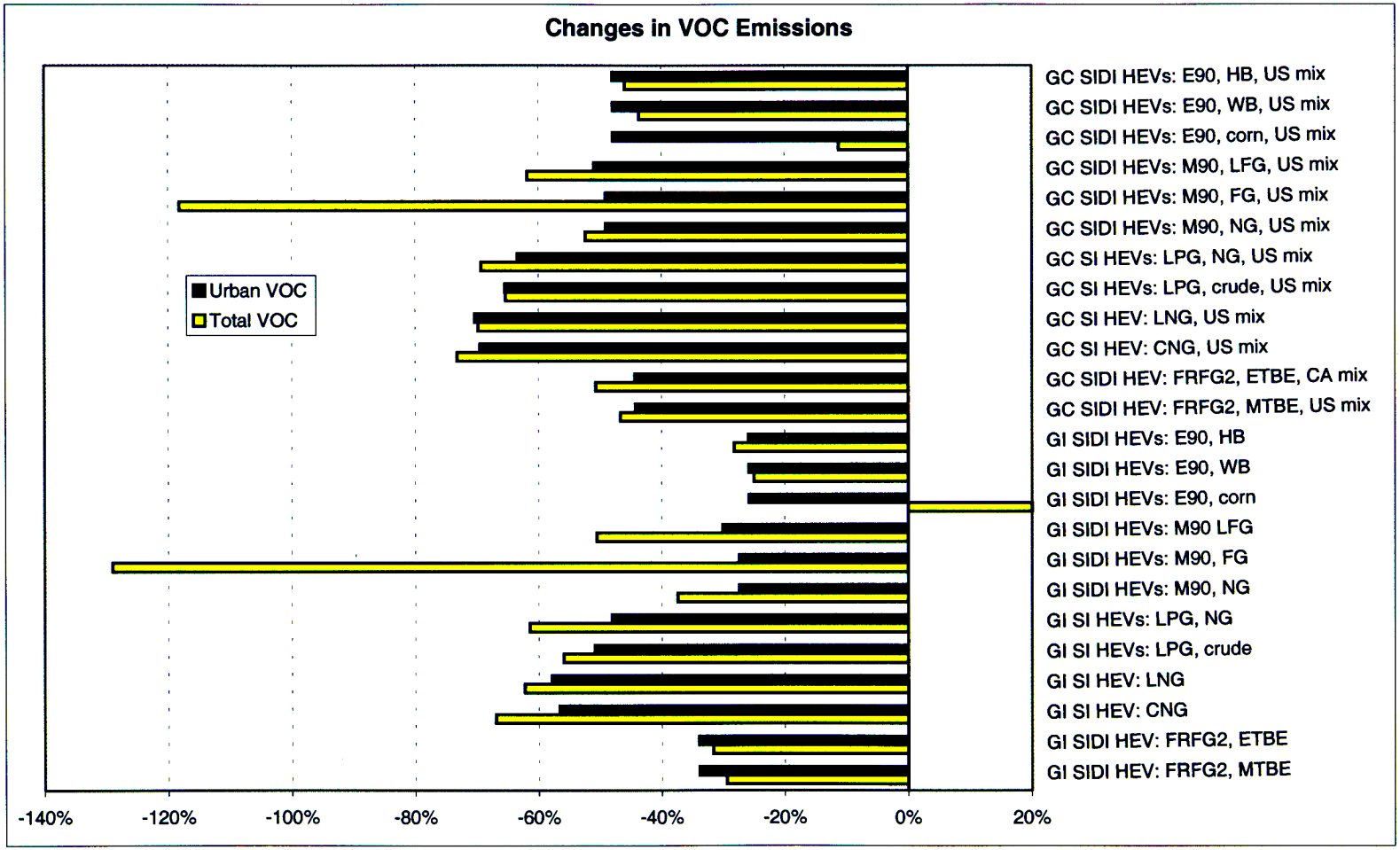

Figure C-2.18 Changes in Fuel-Cycle VOC Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Hybrid Electric Vehicles

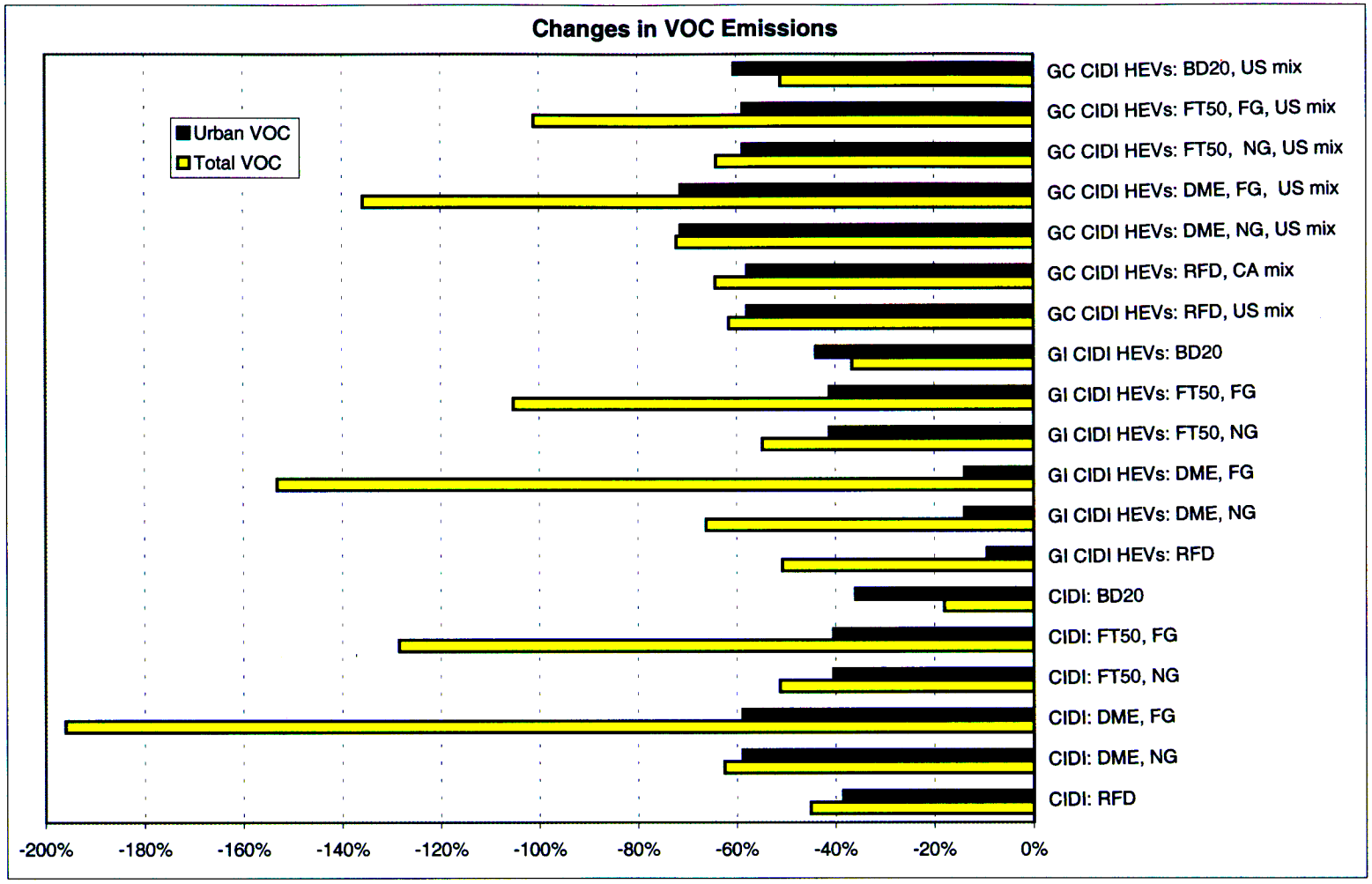

Figure C-2.19 Changes in Fuel-Cycle VOC Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

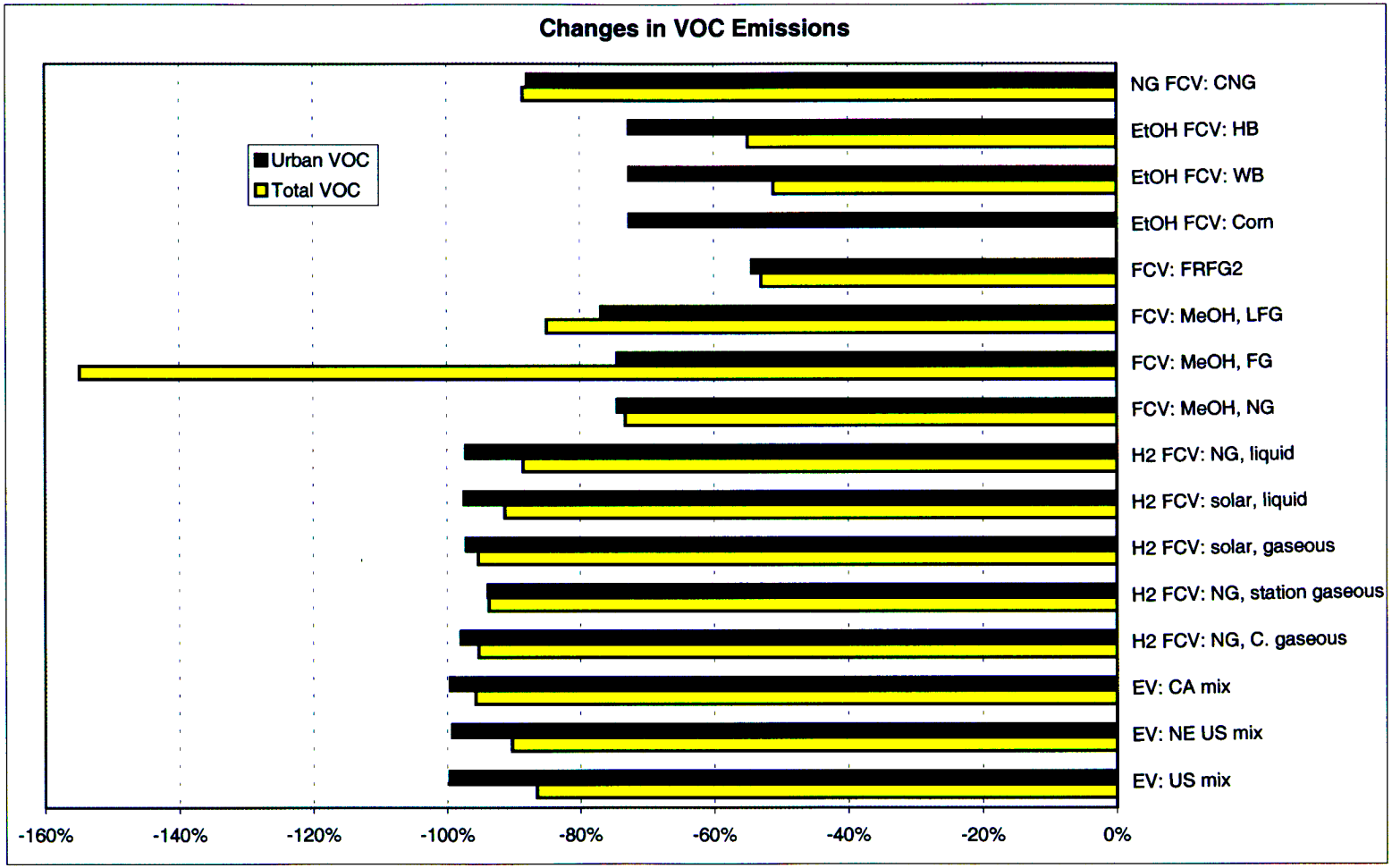

Figure C-2.20 Changes in Fuel-Cycle VOC Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term Electric Vehicles and Fuel-Cell Vehicles

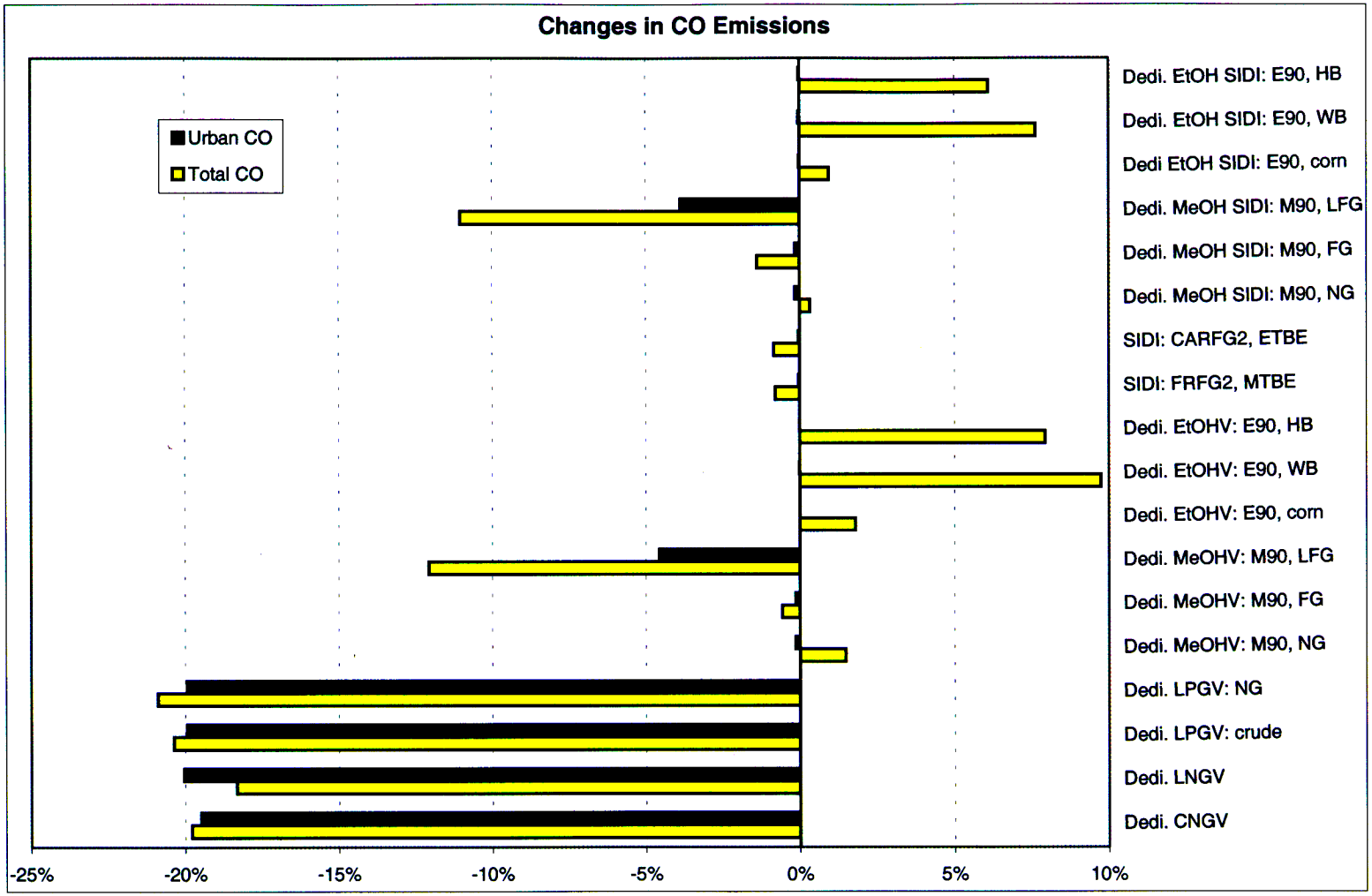

Figure C-2.21 Changes in Fuel-Cycle CO Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Vehicles

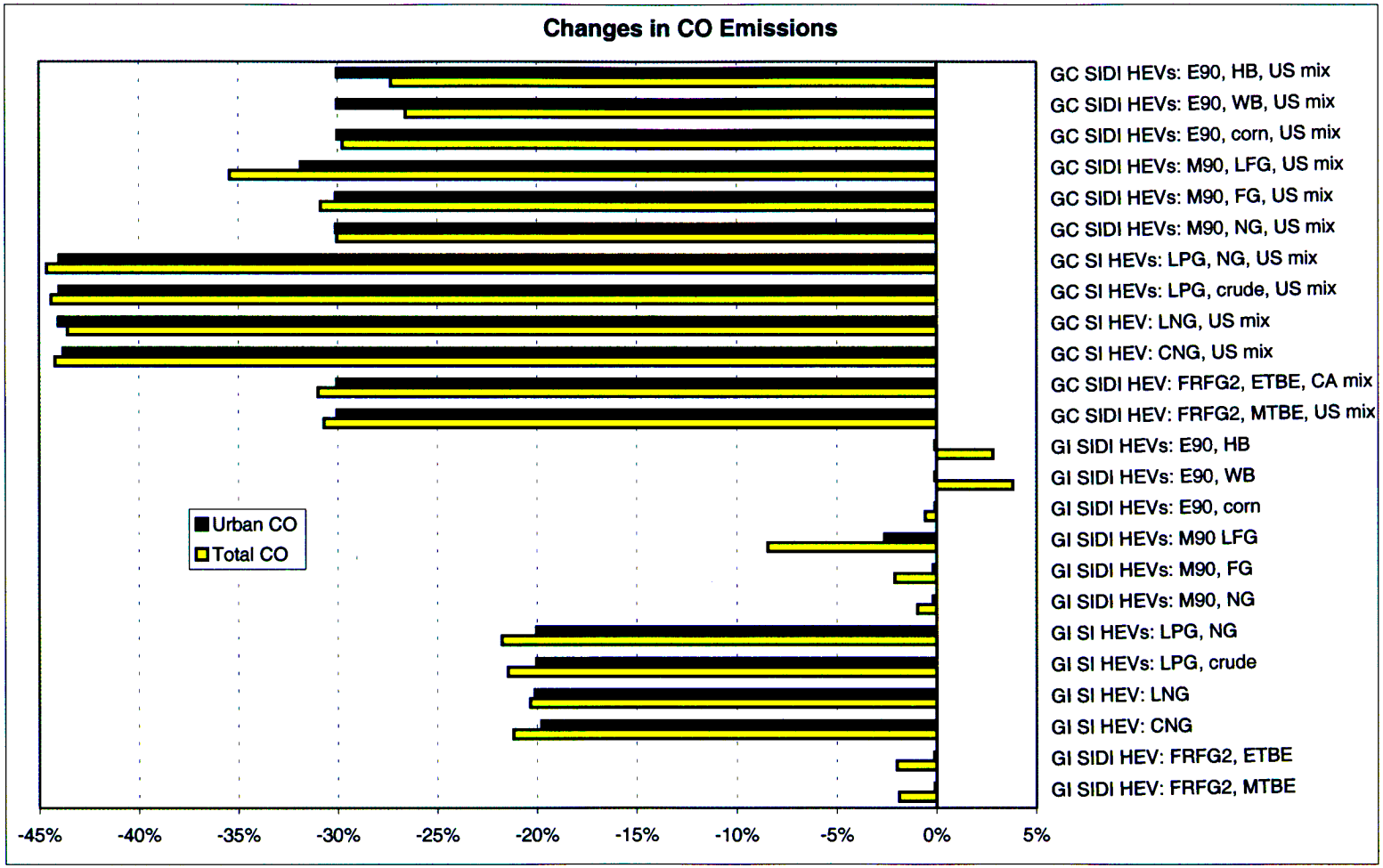

Figure C-2.22 Changes in Fuel-Cycle CO Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Hybrid Electric Vehicles

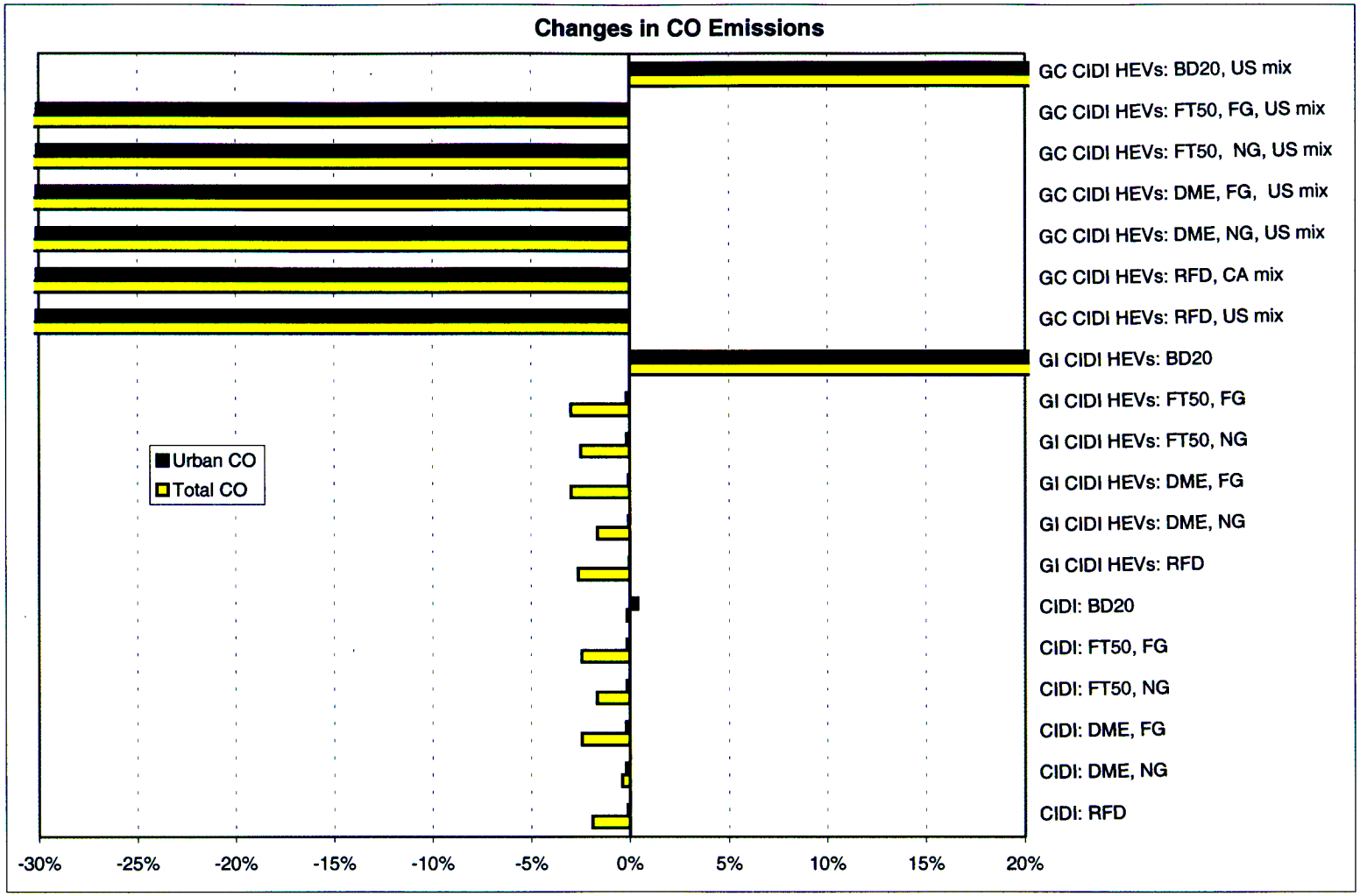

Figure C-2.23 Changes in Fuel-Cycle CO Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

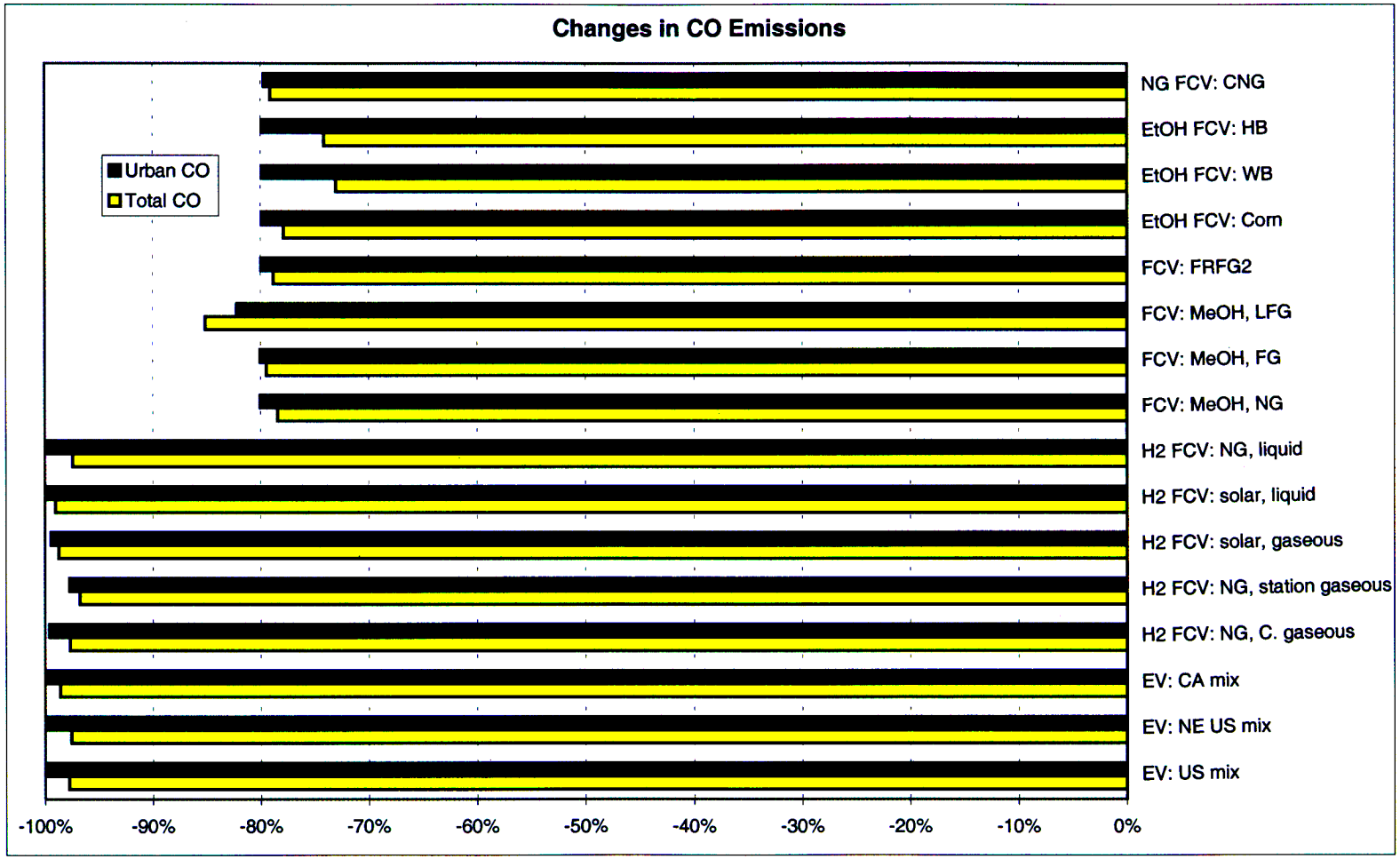

Figure C-2.24 Changes in Fuel-Cycle CO Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term Electric Vehicles and Fuel-Cell Vehicles

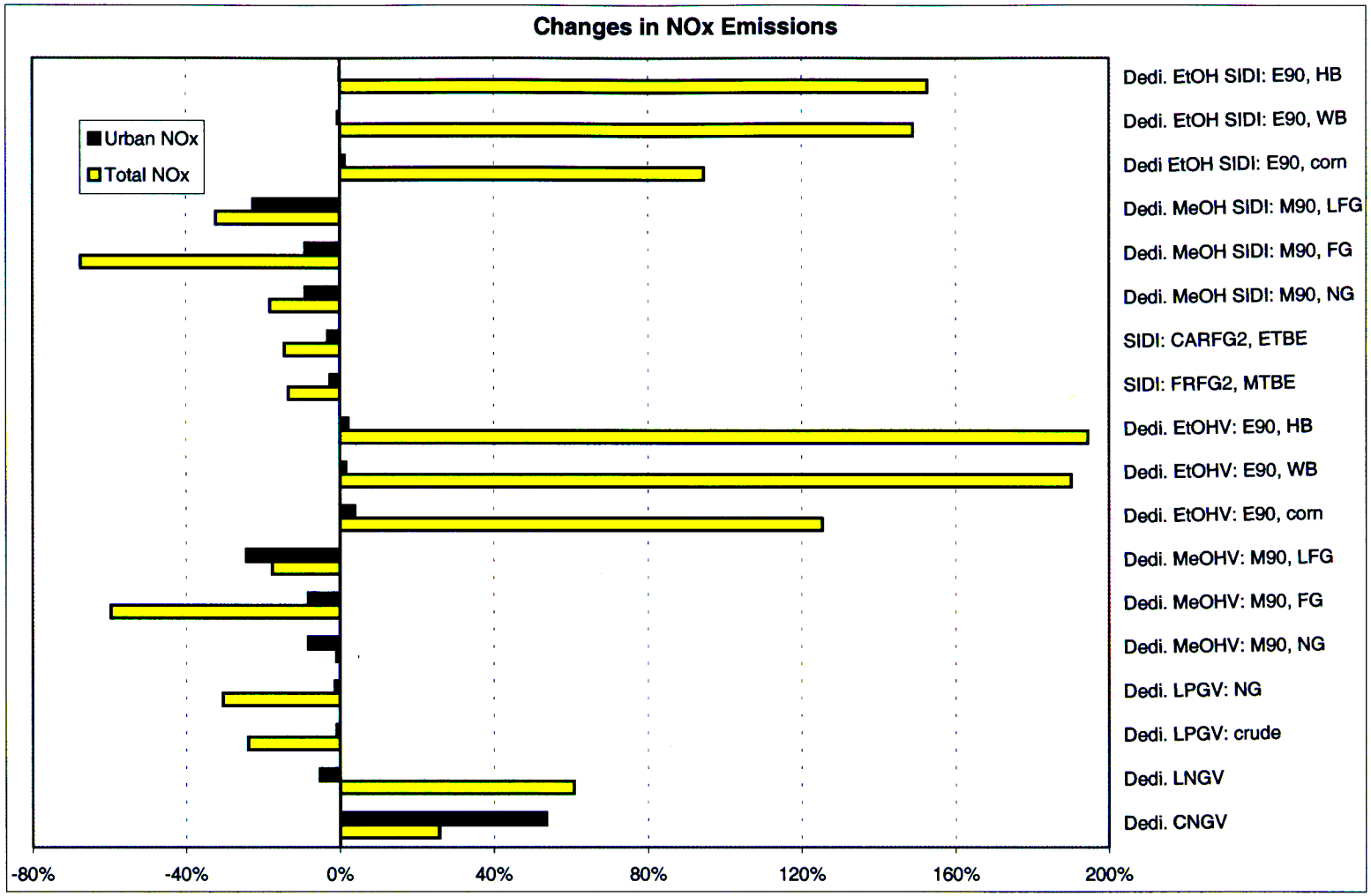

Figure C-2.25 Changes in Fuel-Cycle NO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Vehicles

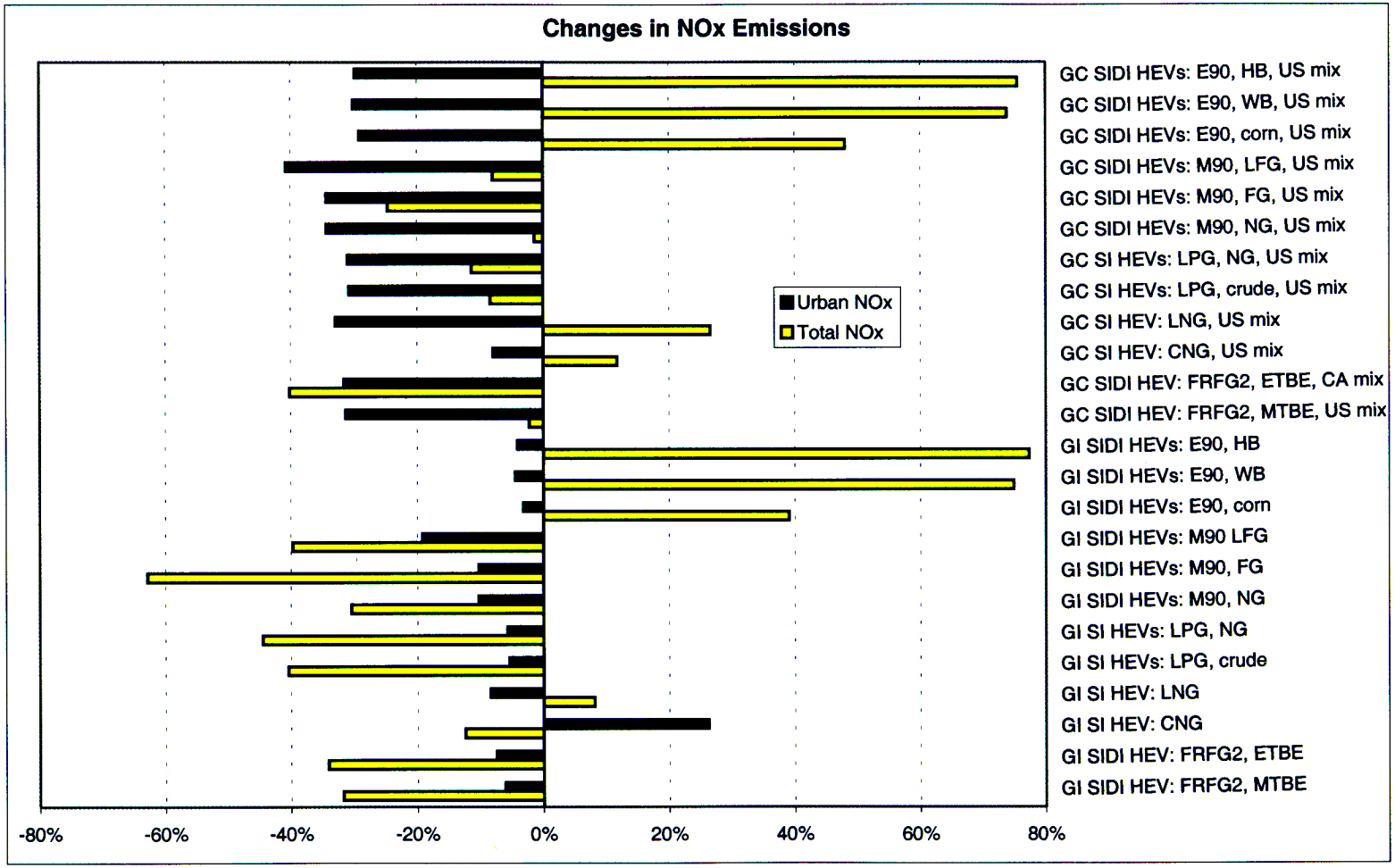

Figure C-2.26 Changes in Fuel-Cycle NO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Hybrid Electric Vehicles

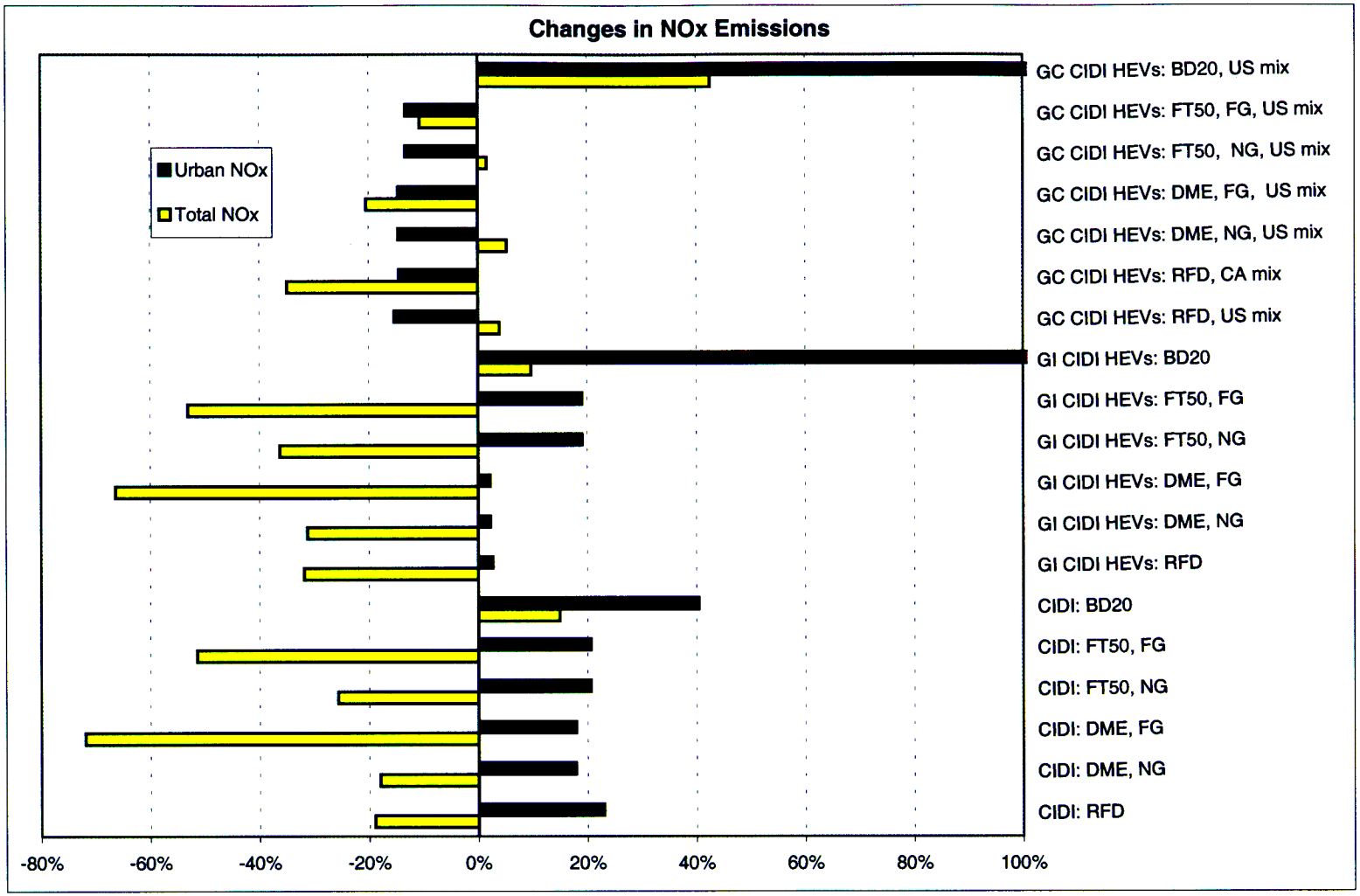

Figure C-2.27 Changes in Fuel-Cycle NO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

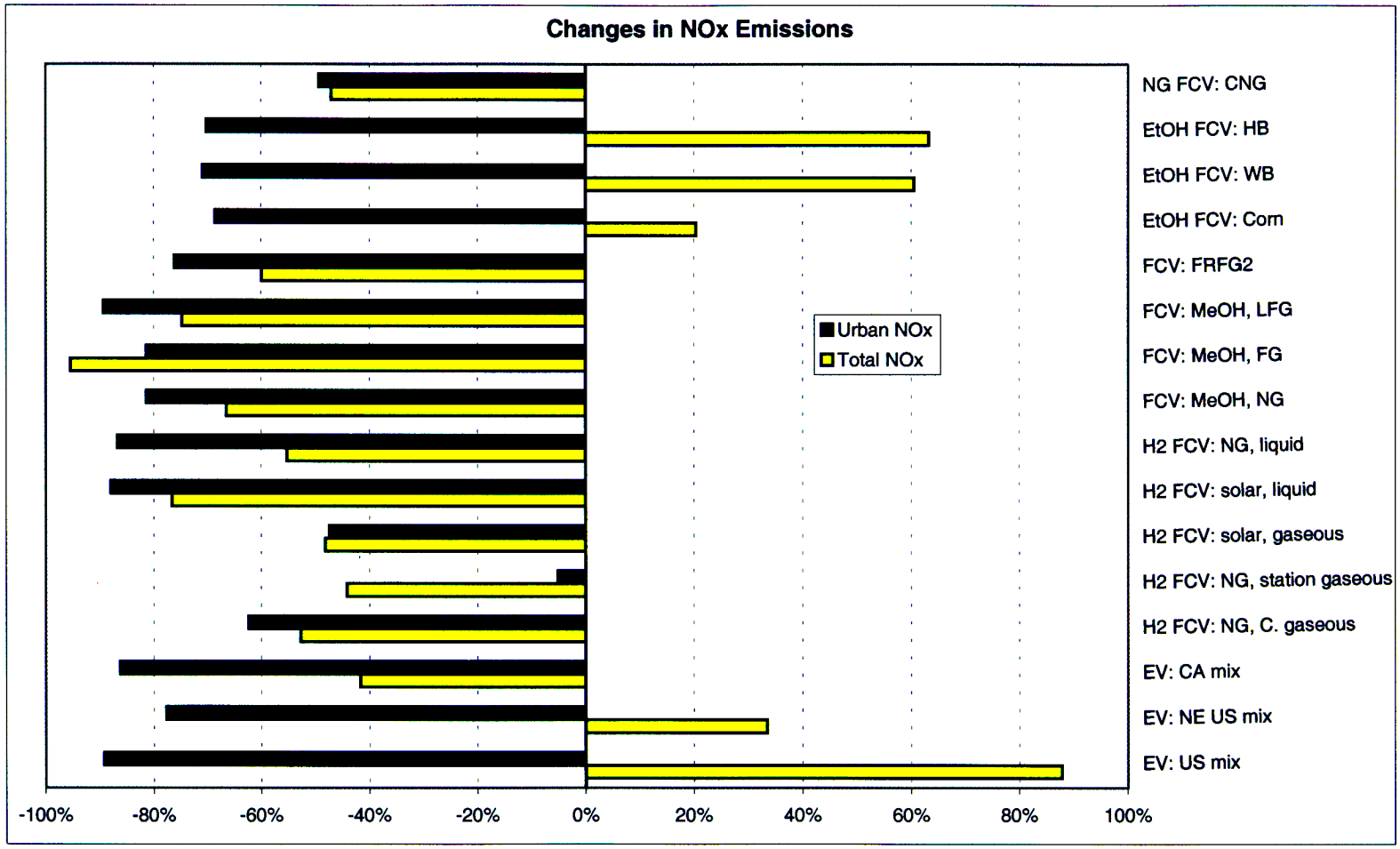

Figure C-2.28 Changes in Fuel-Cycle NO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term Electric Vehicles and Fuel-Cell Vehicles

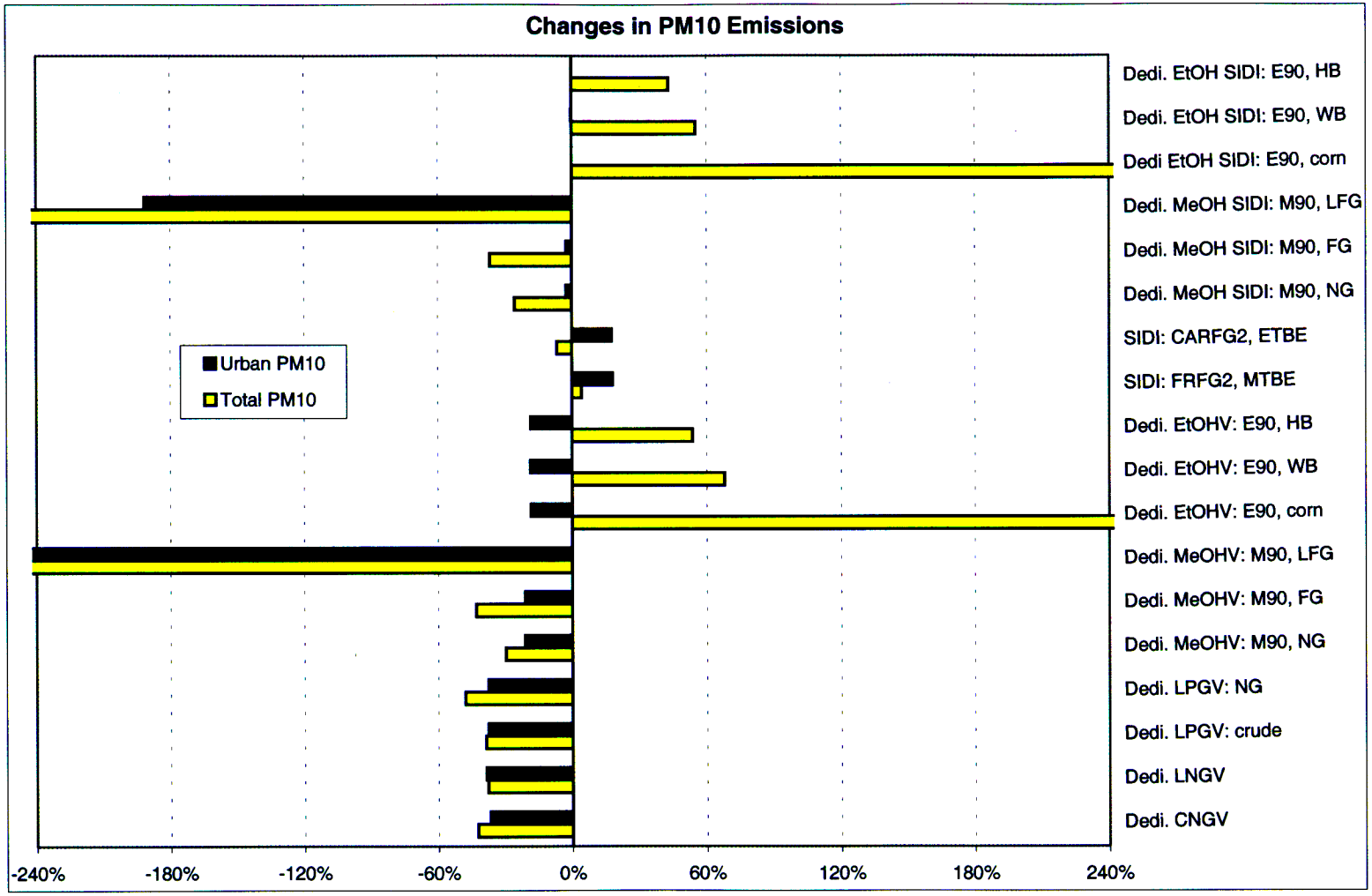

Figure C-2.29 Changes in Fuel-Cycle PM_{10} Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Vehicles

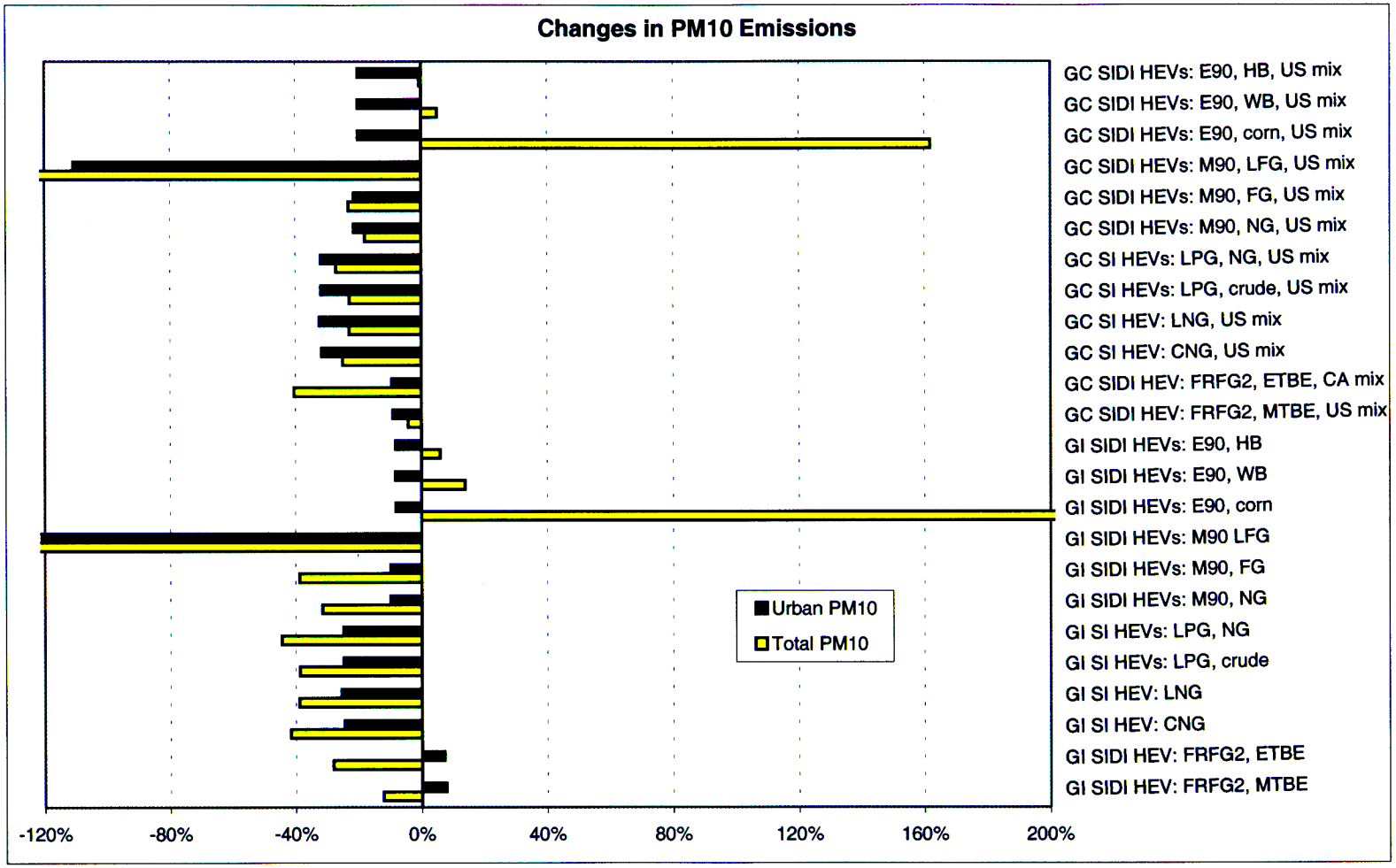

Figure C-2.30 Changes in Fuel-Cycle PM_{10} Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Hybrid Electric Vehicles

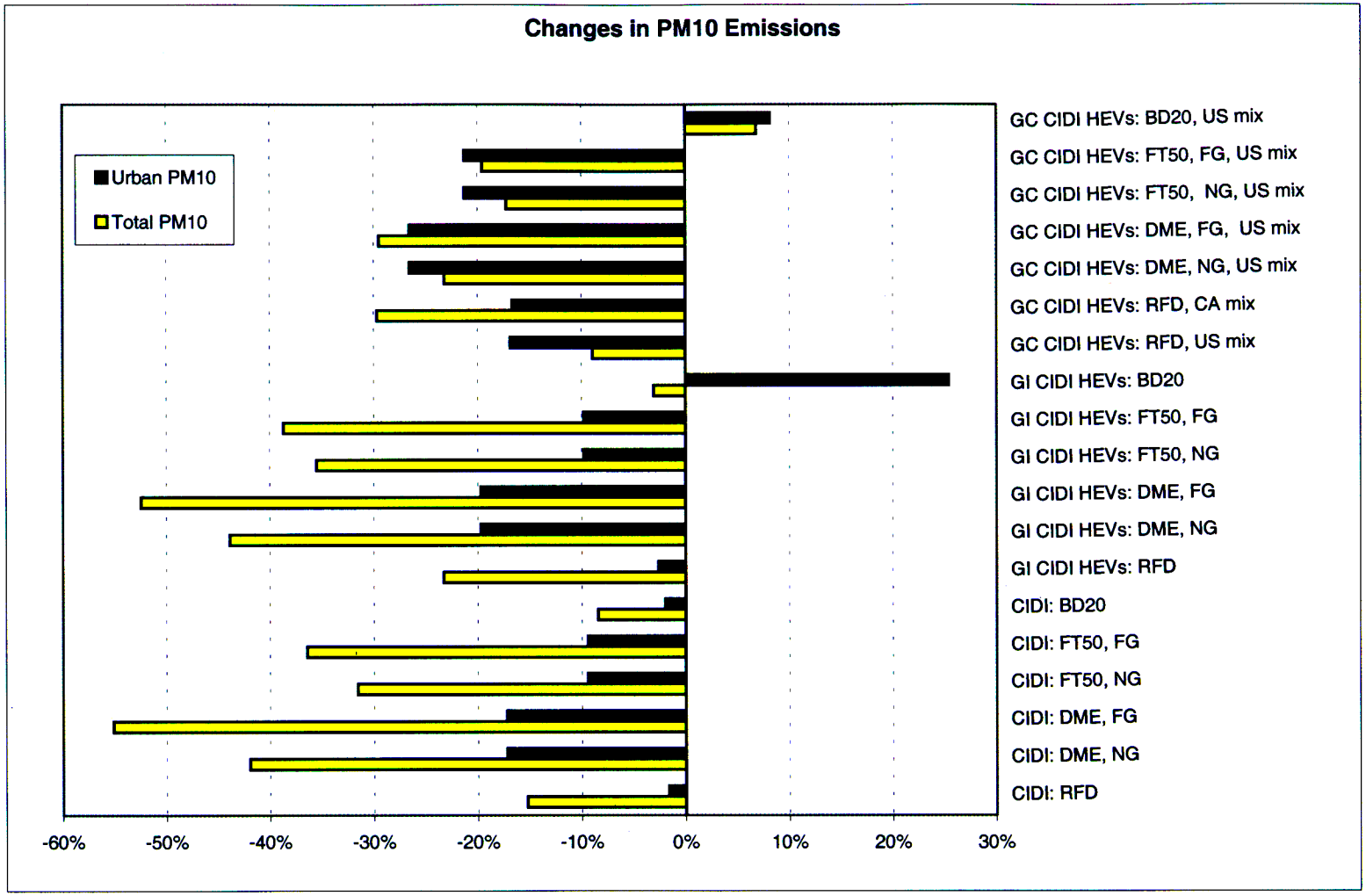

Figure C-2.31 Changes in Fuel-Cycle PM_{10} Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

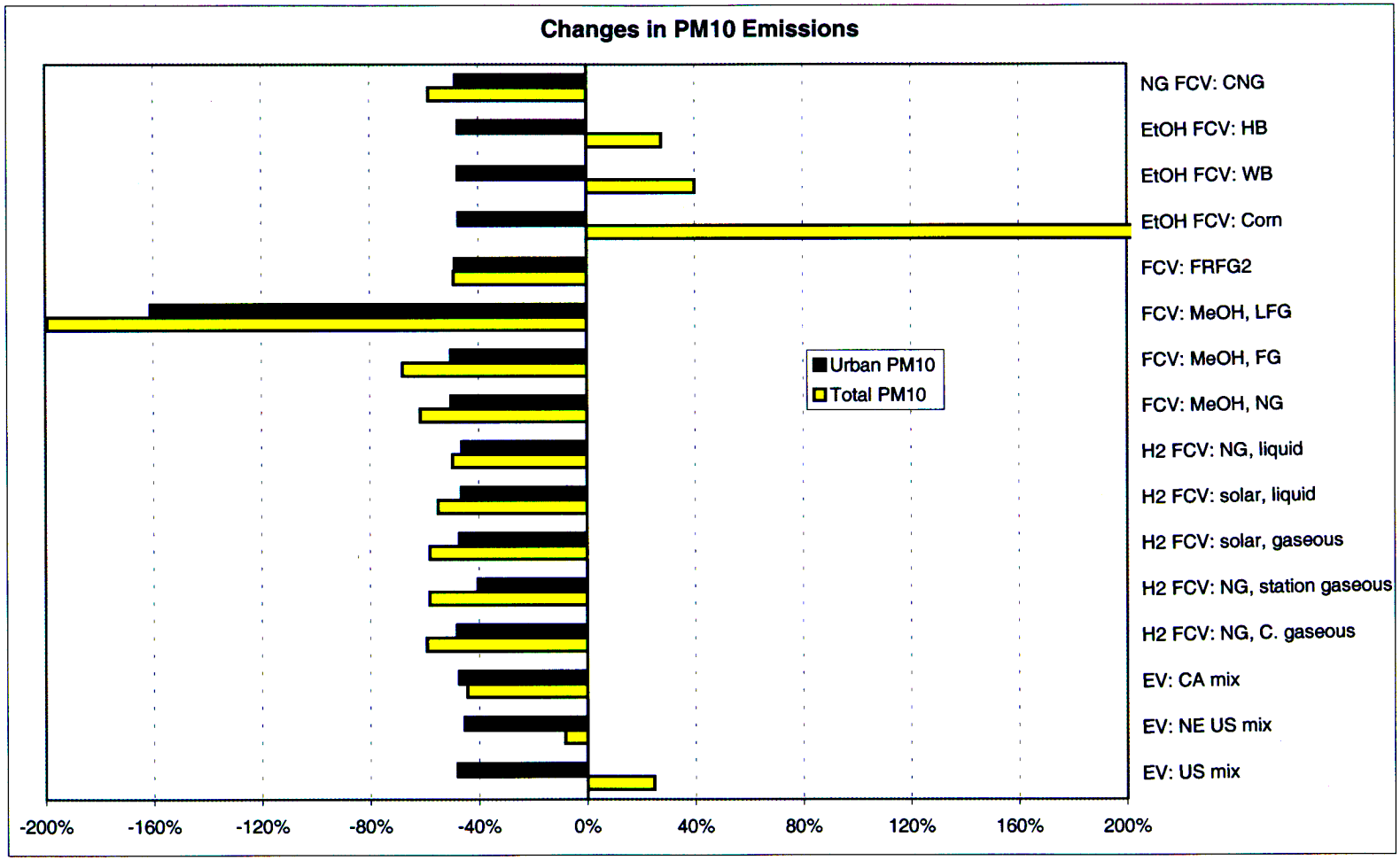

Figure C-2.32 Changes in Fuel-Cycle PM_{10} Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term Electric Vehicles and Fuel-Cell Vehicles

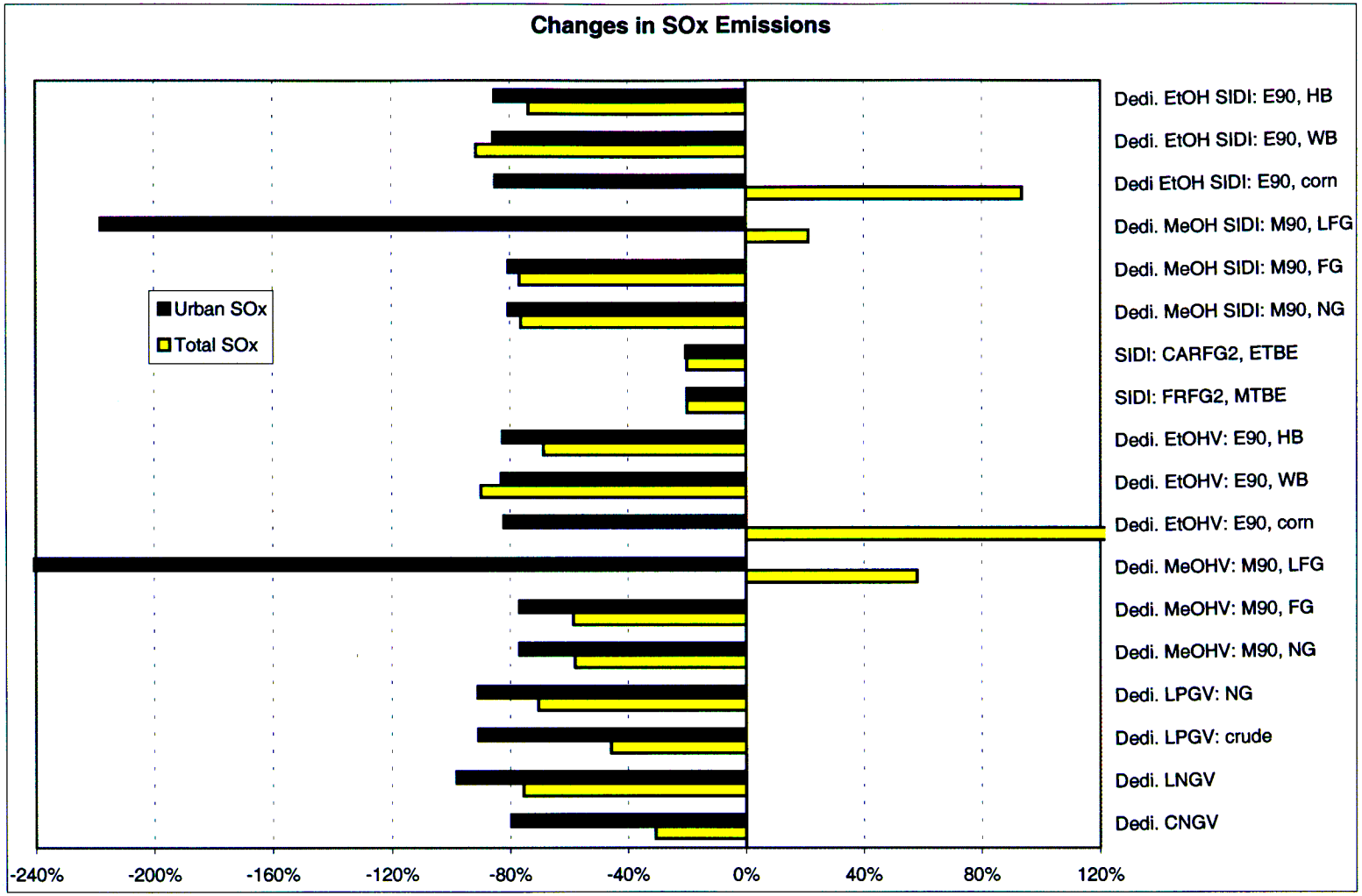

Figure C-2.33 Changes in Fuel-Cycle SO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Vehicles

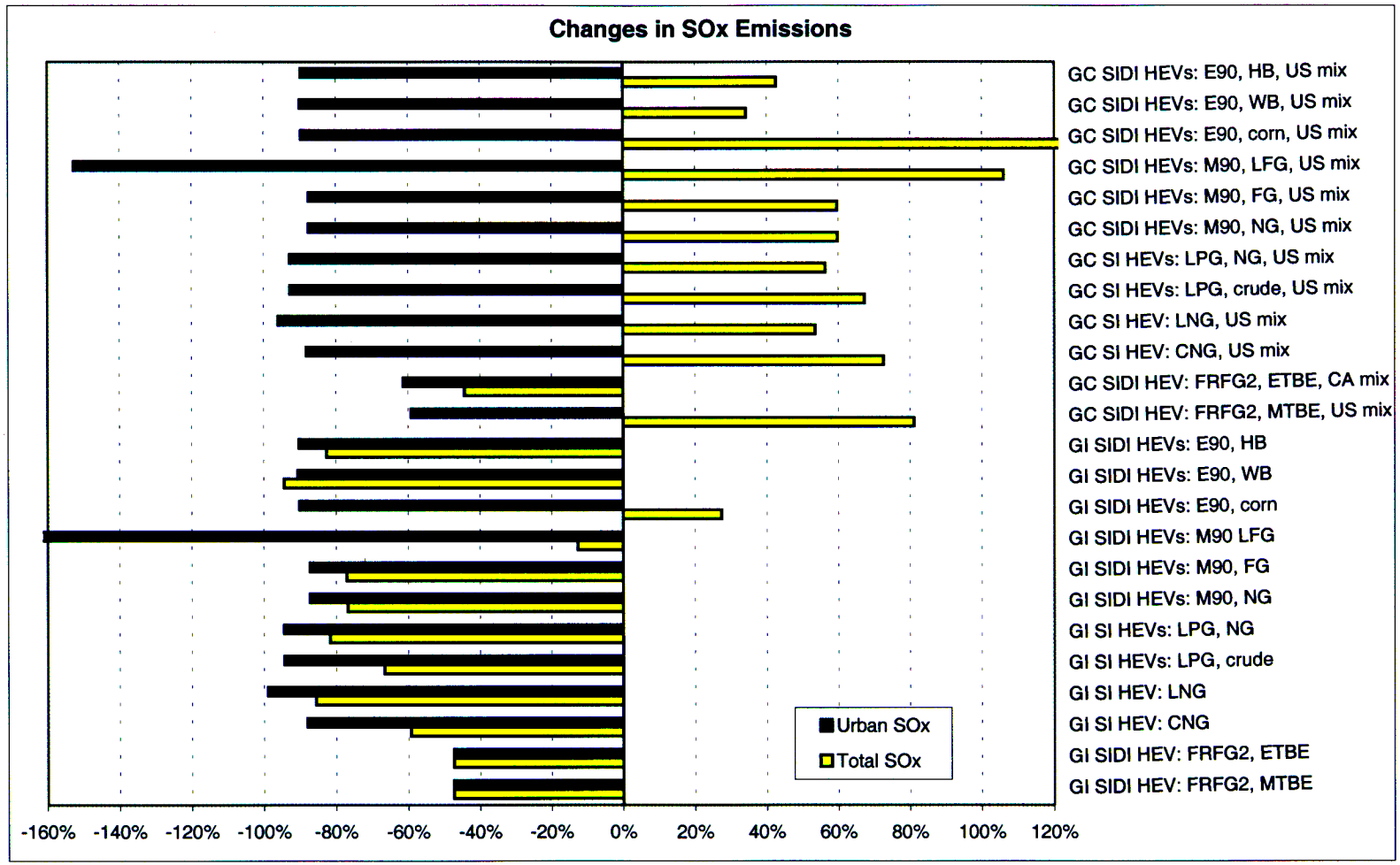

Figure C-2.34 Changes in Fuel-Cycle SO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term SI and SIDI Hybrid Electric Vehicles

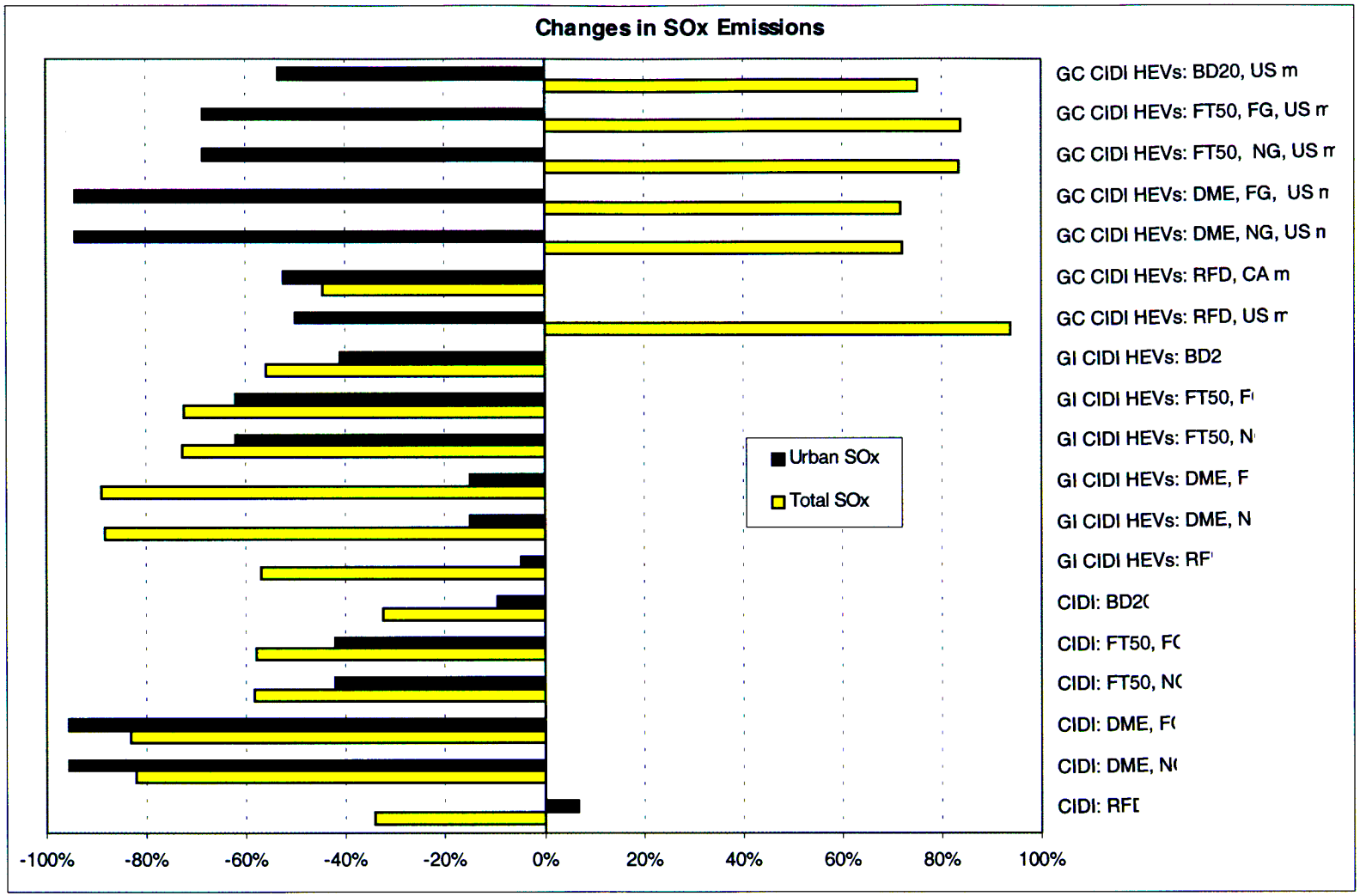

Figure C-2.35 Changes in Fuel-Cycle SO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

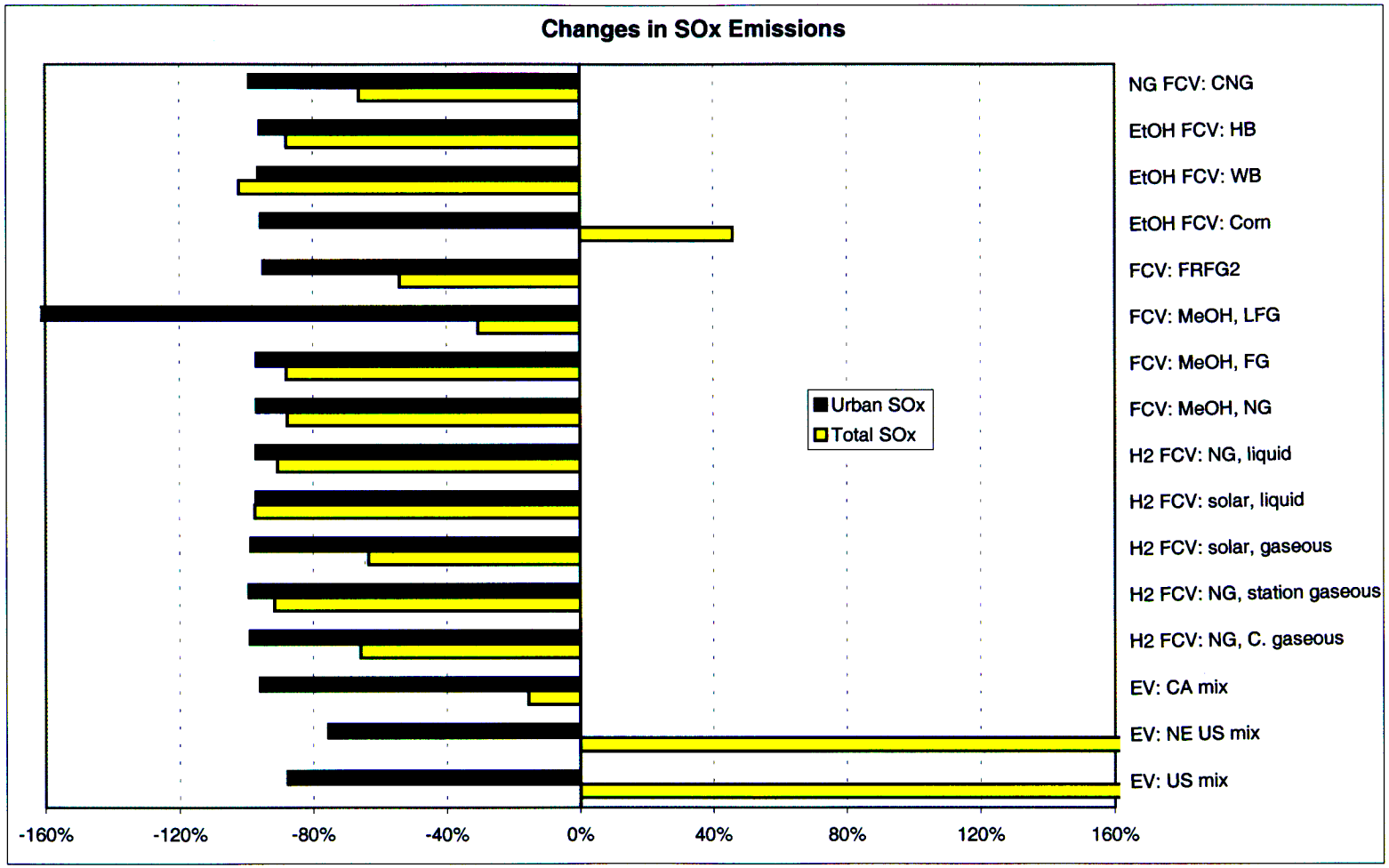

Figure C-2.36 Changes in Fuel-Cycle SO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 1: Long-Term Electric Vehicles and Fuel-Cell Vehicles

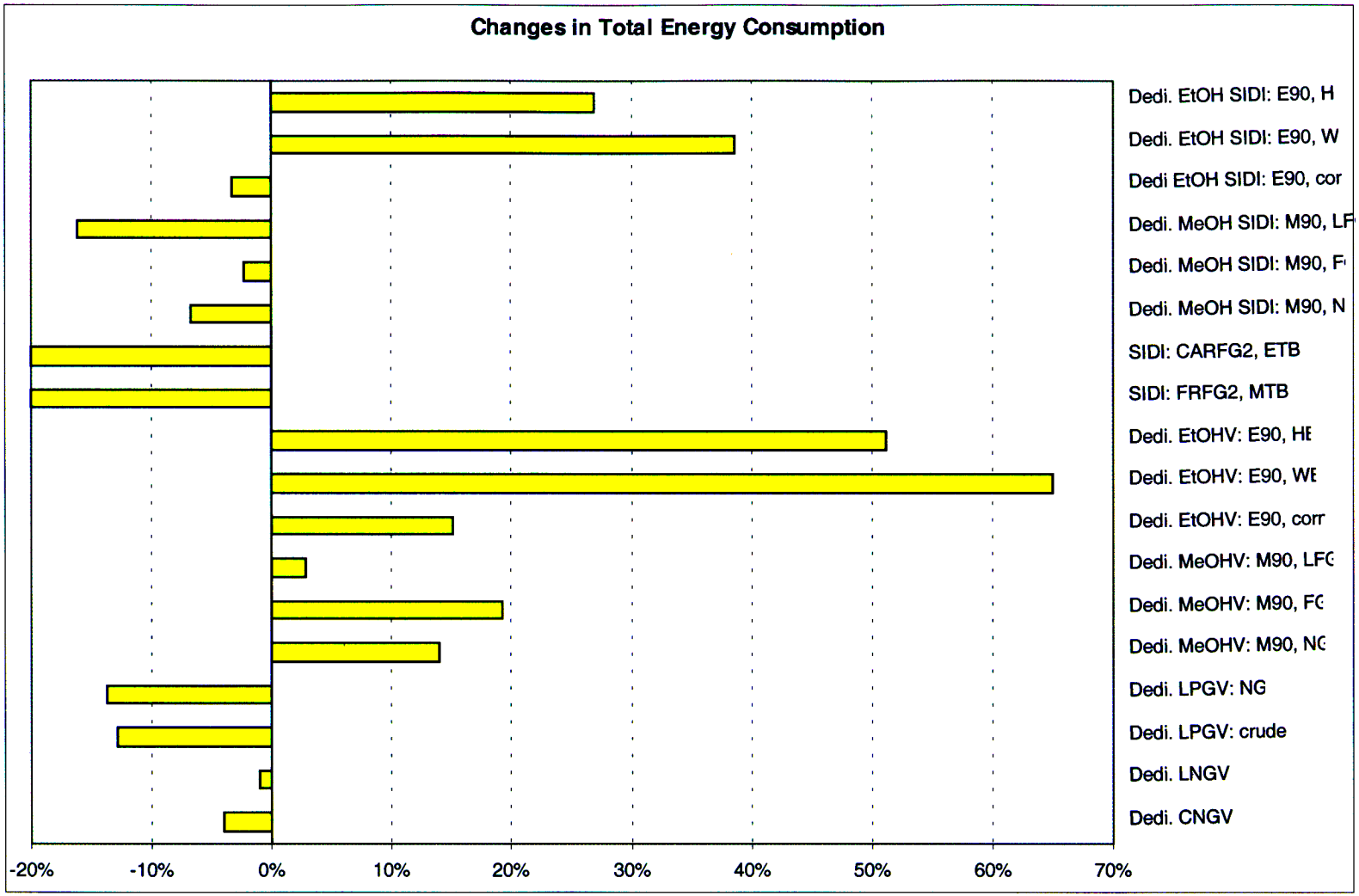

Figure C-2.37 Changes in Fuel-Cycle Total Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Vehicles

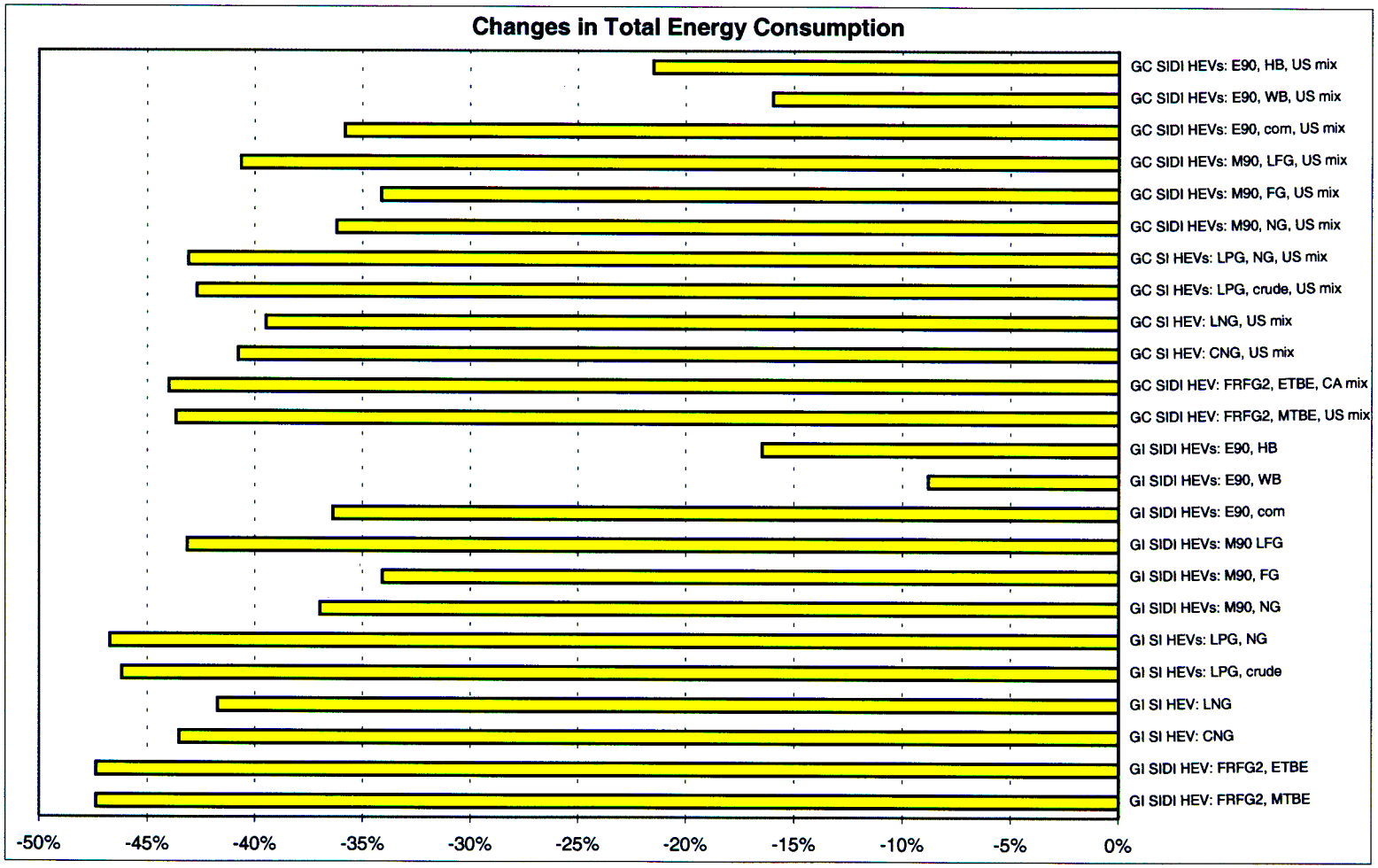

Figure C-2.38 Changes in Fuel-Cycle Total Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Hybrid Electric Vehicles

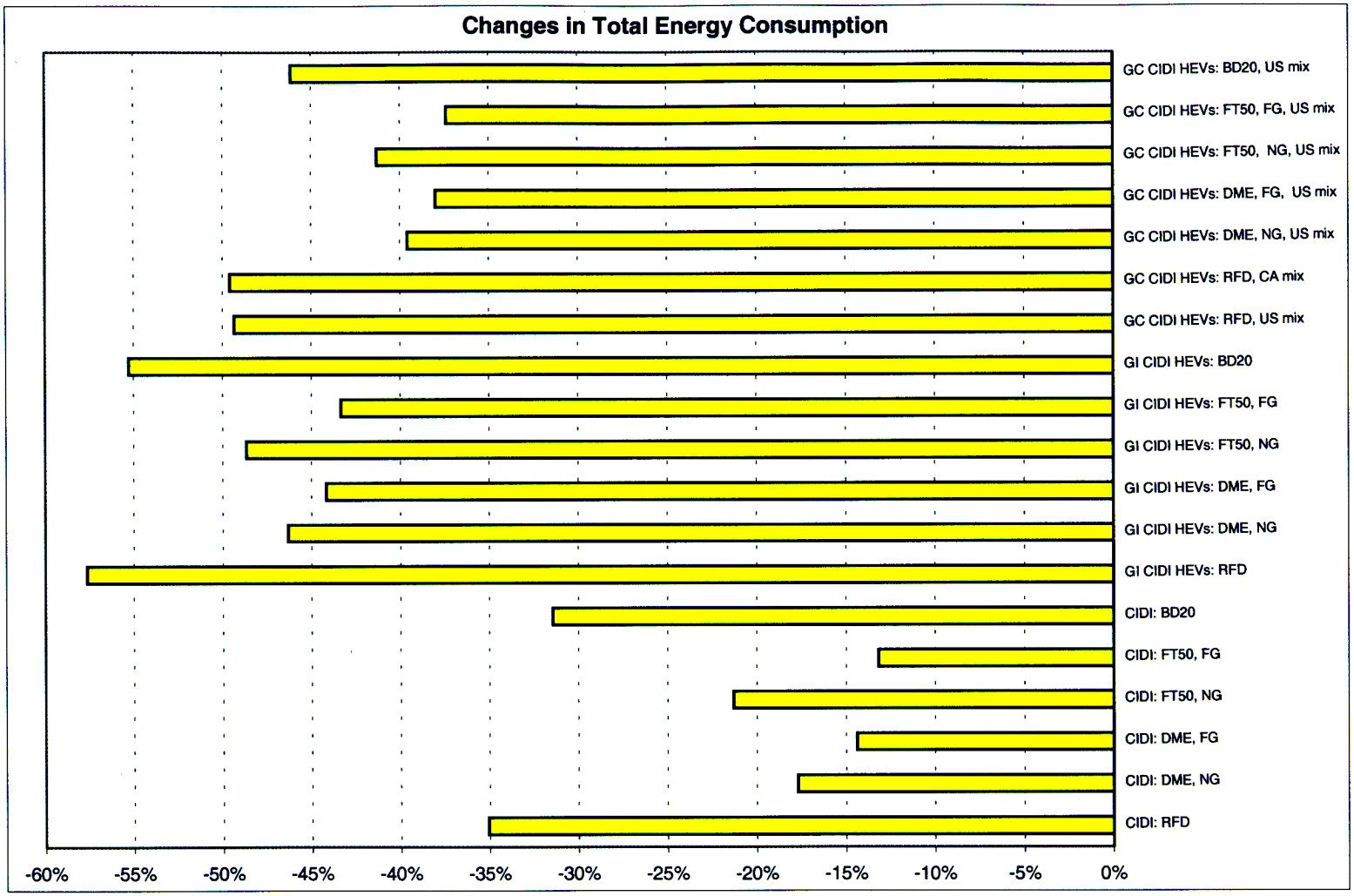

Figure C-2.39 Changes in Fuel-Cycle Total Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

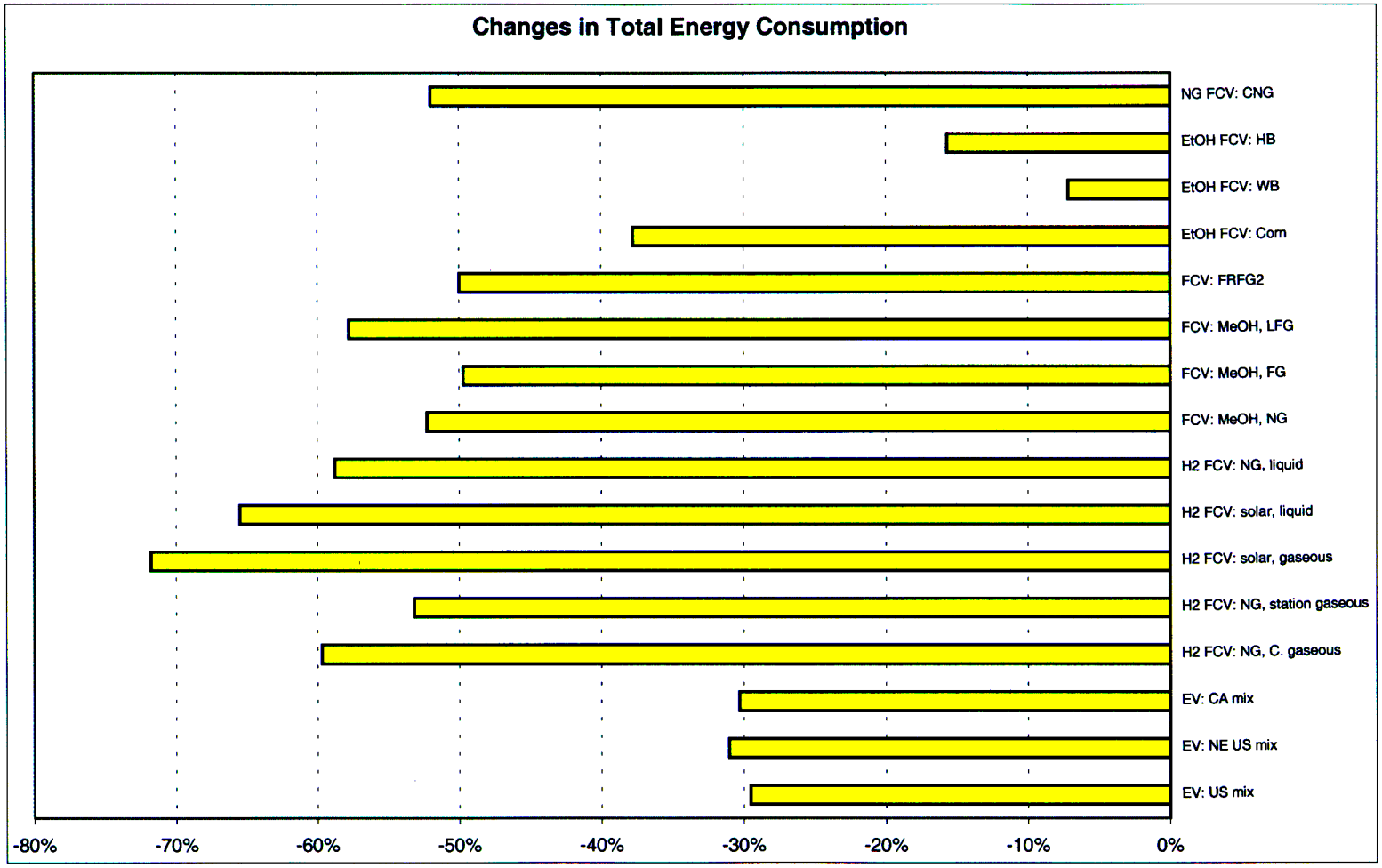

Figure C-2.40 Changes in Fuel-Cycle Total Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term Electric Vehicles and Fuel-Cell Vehicles

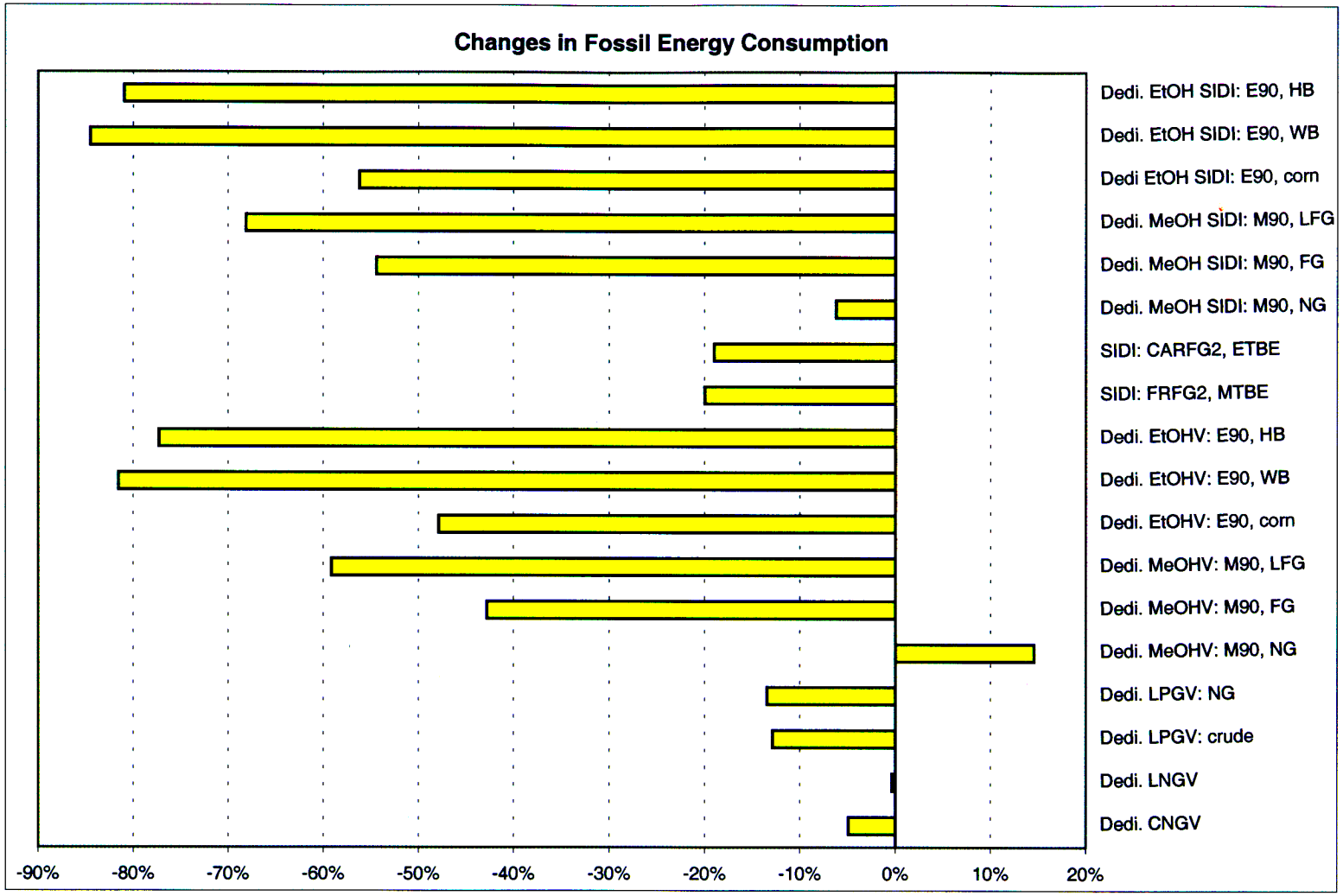

Figure C-2.41 Changes in Fuel-Cycle Fossil Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Vehicles

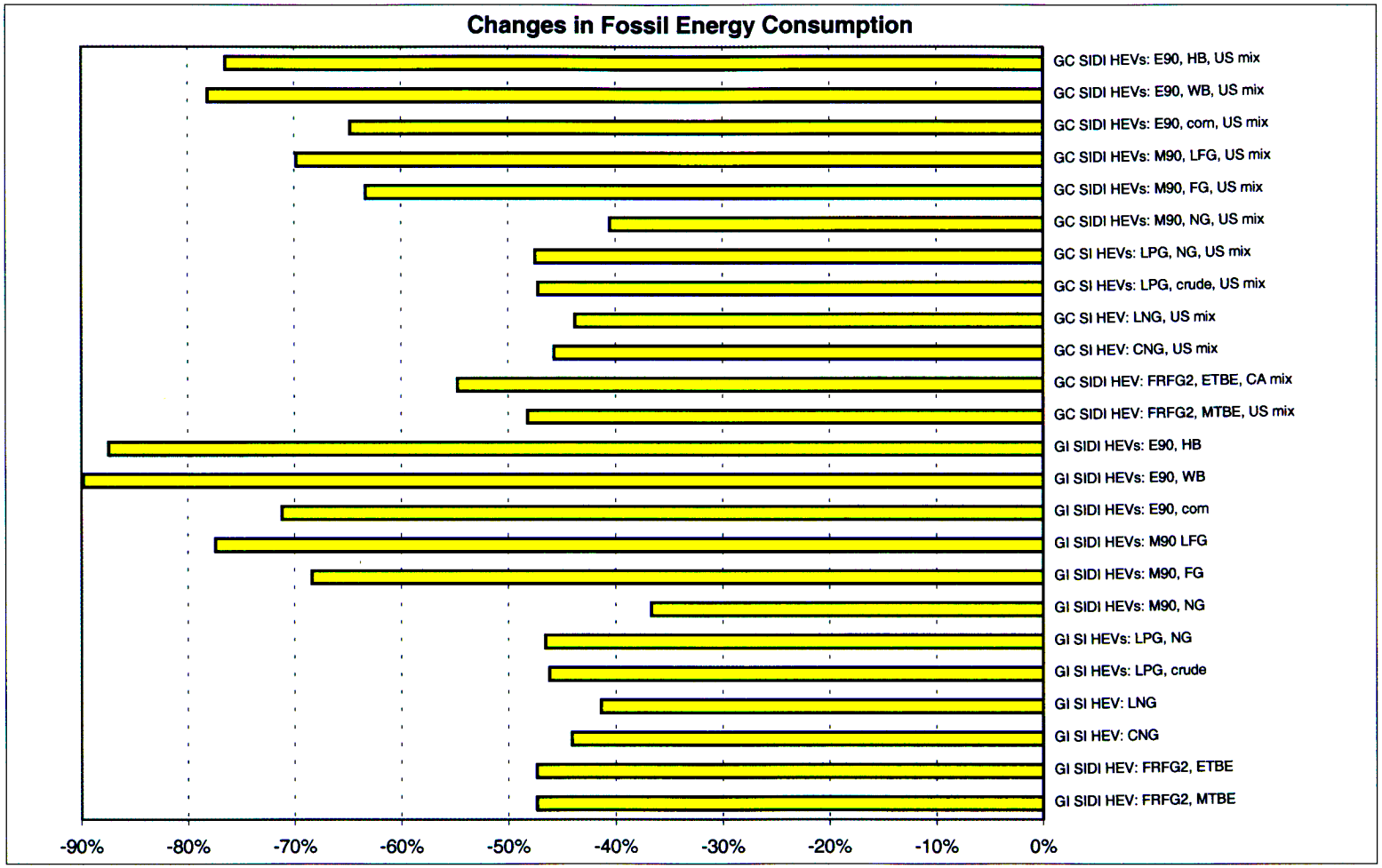

Figure C-2.42 Changes in Fuel-Cycle Fossil Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Hybrid Electric Vehicles

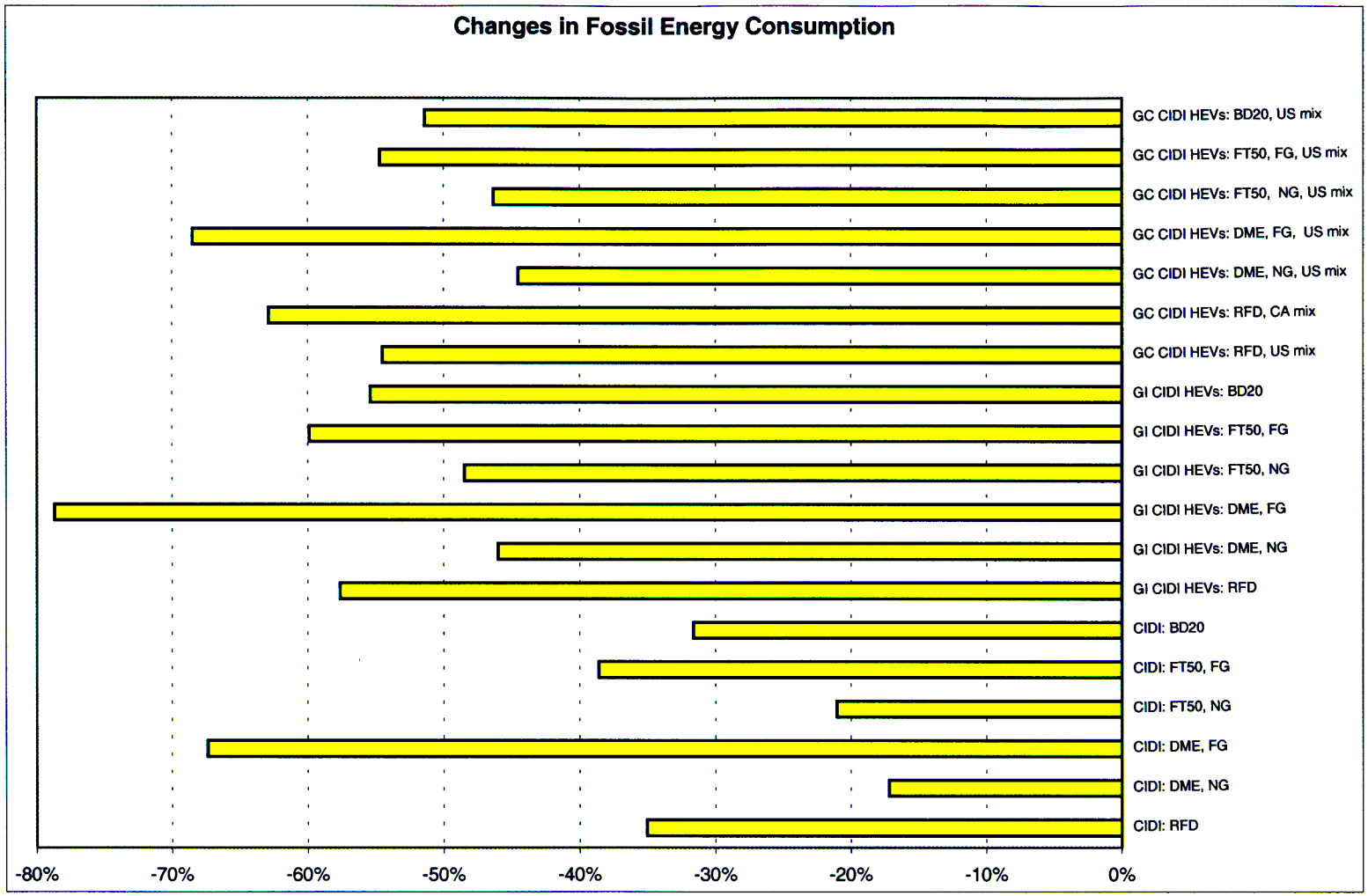

Figure C-2.43 Changes in Fuel-Cycle Fossil Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

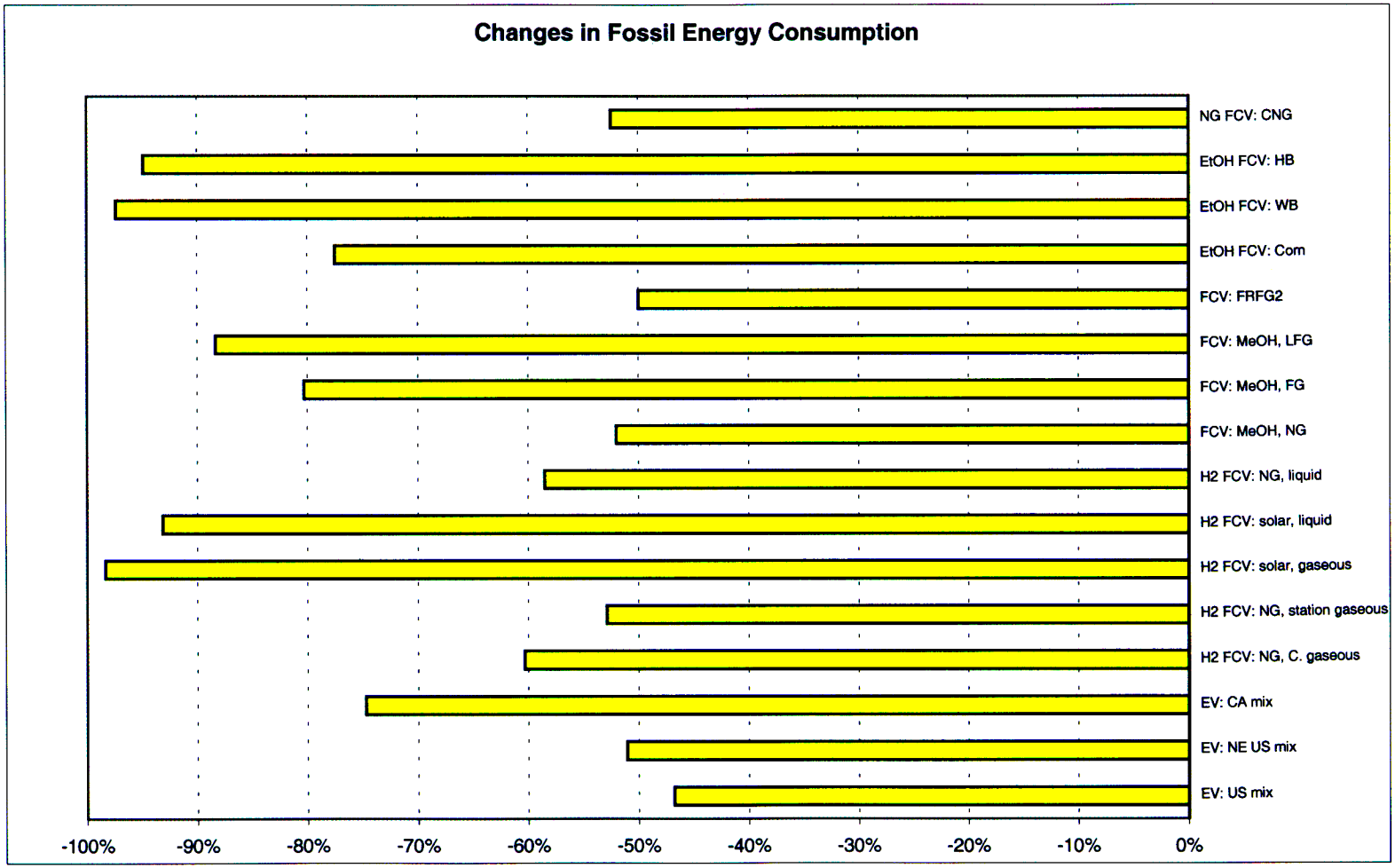

Figure C-2.44 Changes in Fuel-Cycle Fossil Energy Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term Electric Vehicles and Fuel-Cell Vehicles

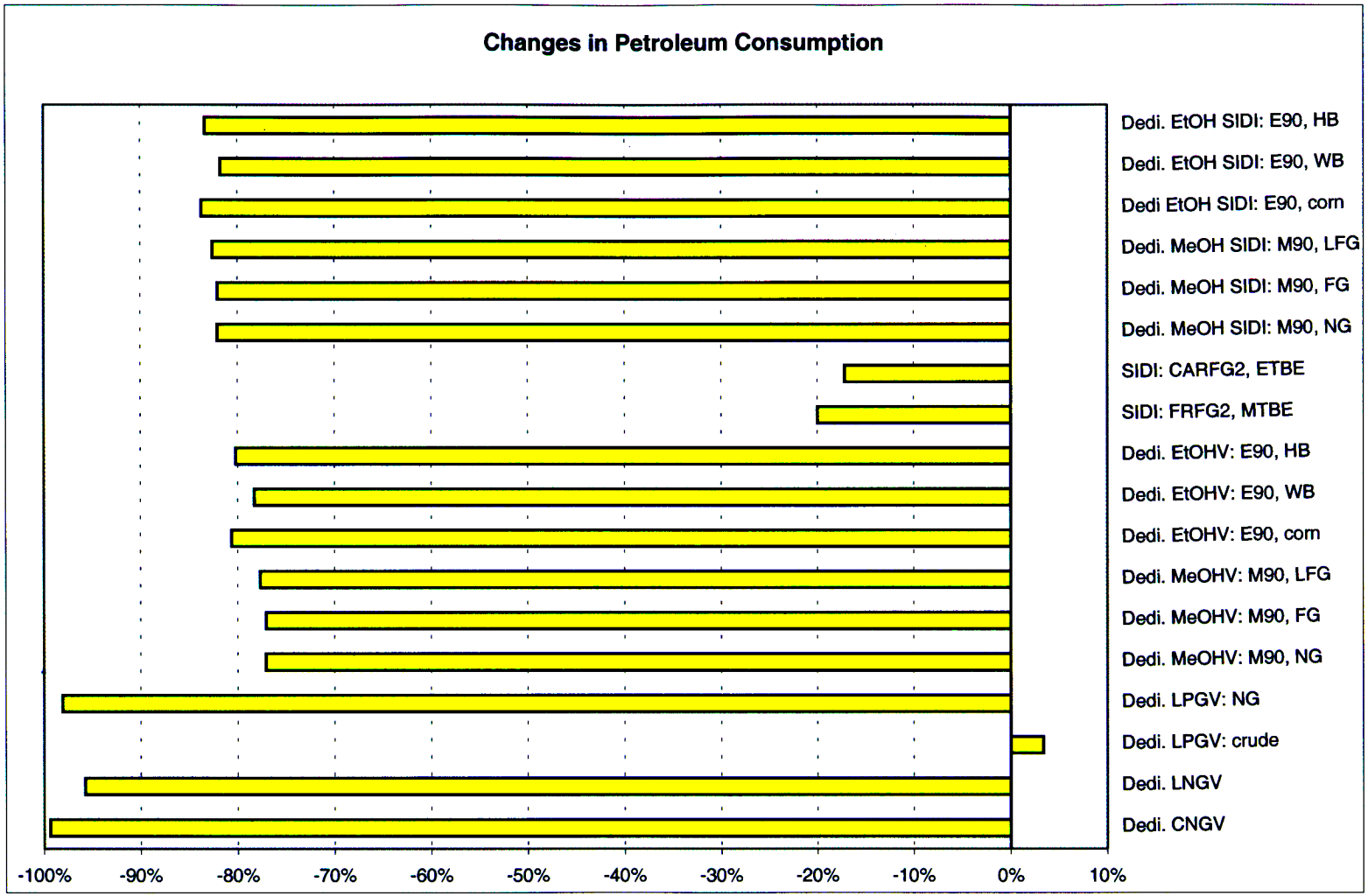

Figure C-2.45 Changes in Fuel-Cycle Petroleum Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Vehicles

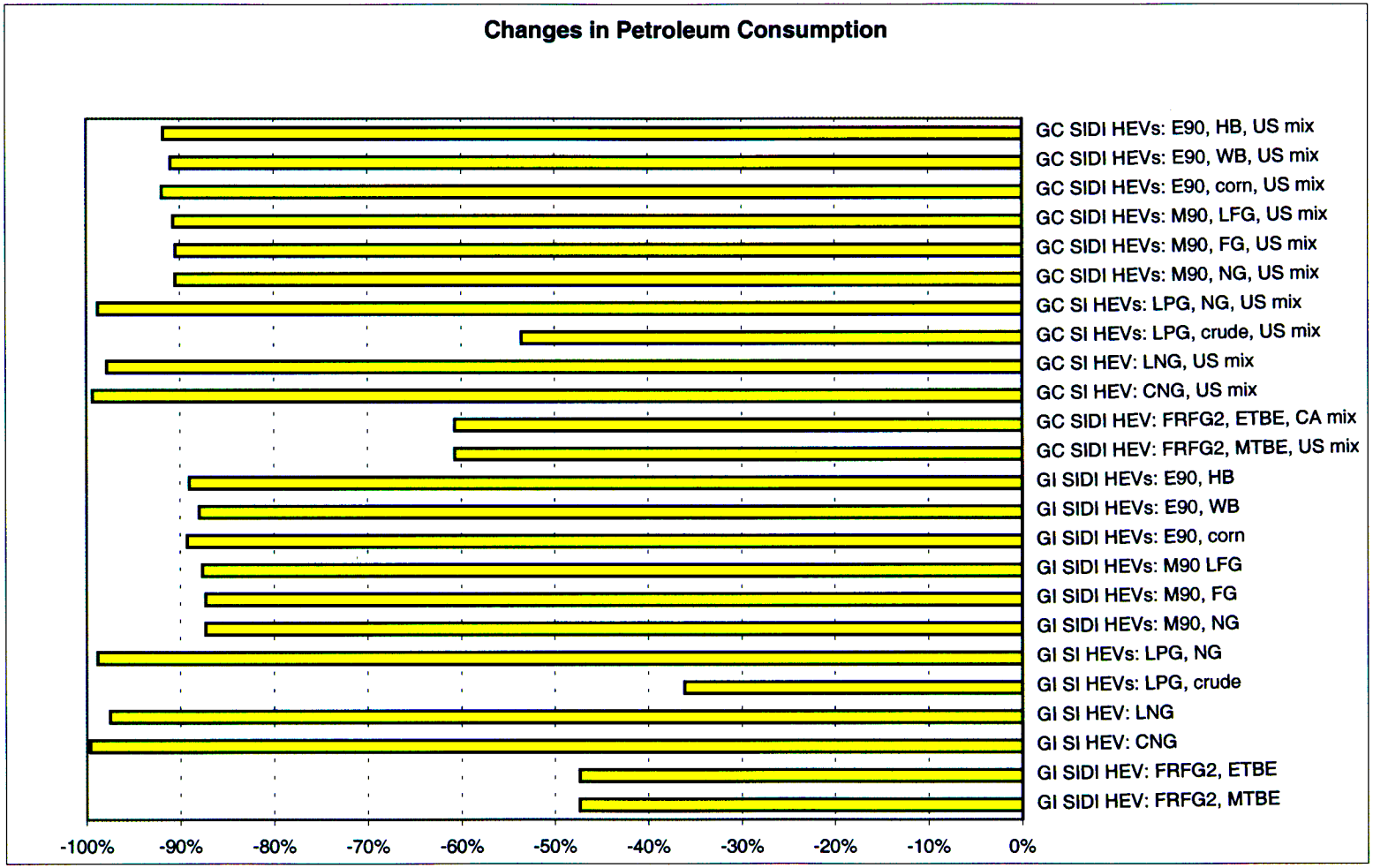

Figure C-2.46 Changes in Fuel-Cycle Petroleum Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Hybrid Electric Vehicles

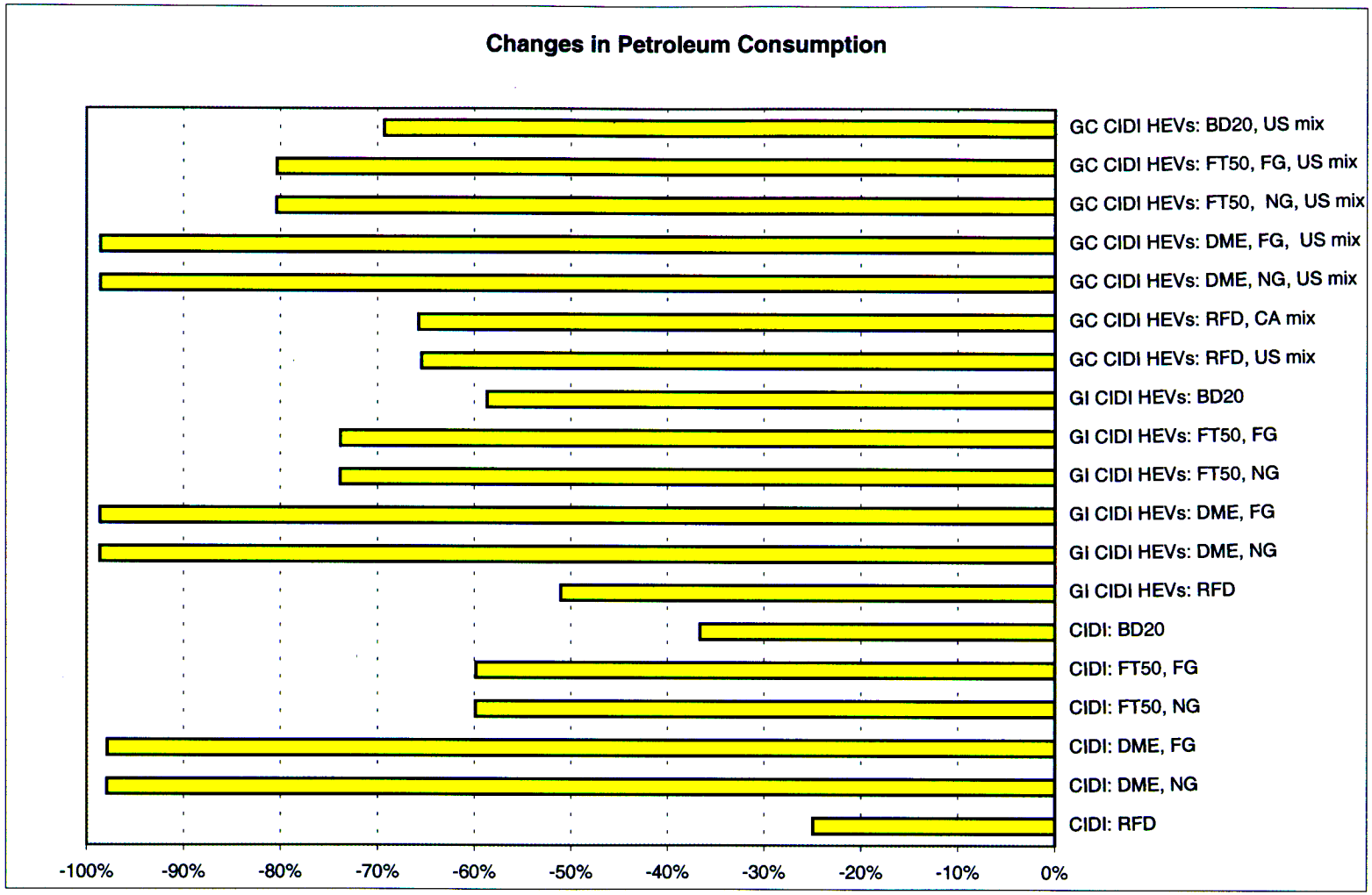

Figure C-2.47 Changes in Fuel-Cycle Petroleum Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

Figure C-2.48 Changes in Fuel-Cycle Petroleum Consumption Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term Electric Vehicles and Fuel-Cell Vehicles

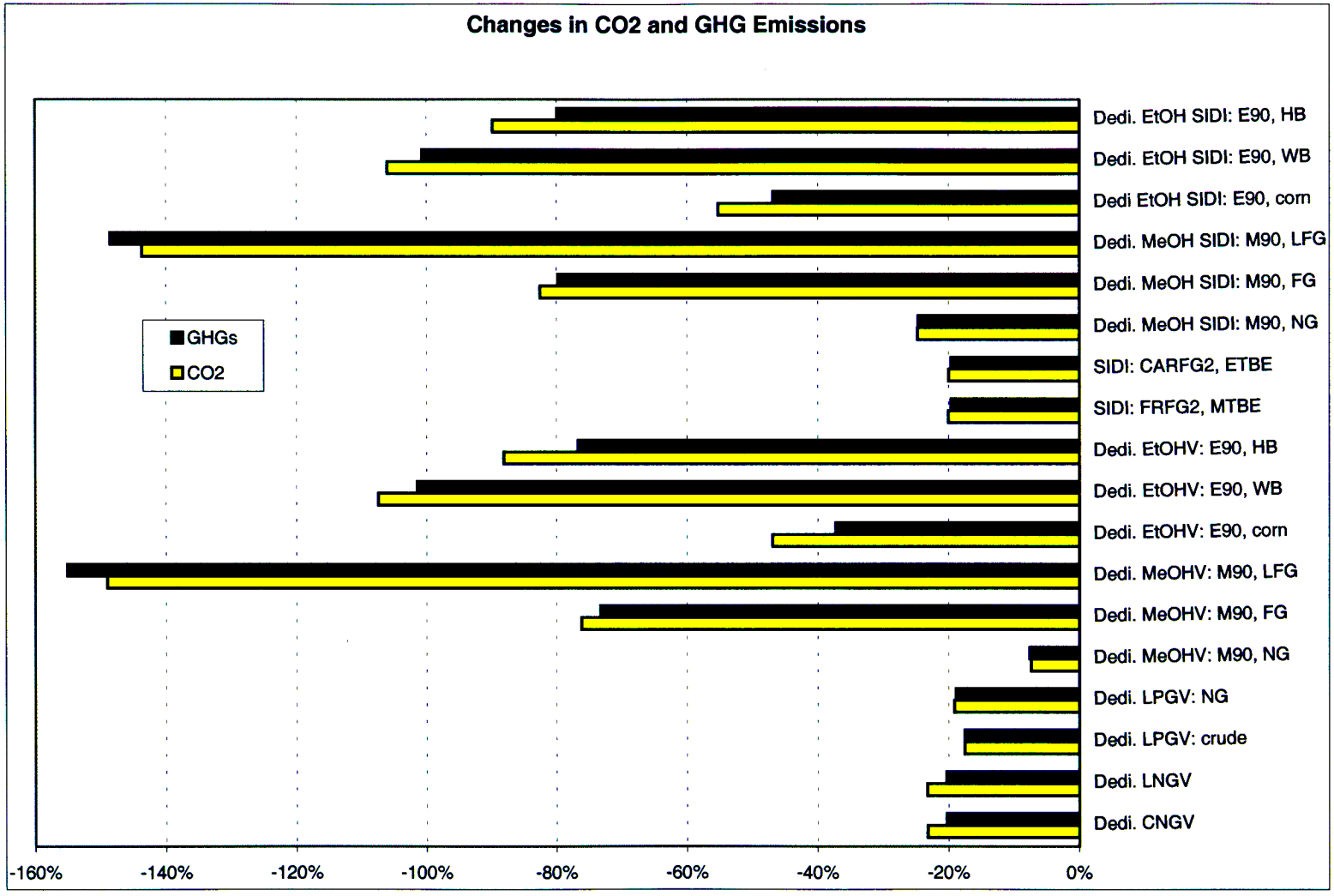

Figure C-2.49 Changes in Fuel-Cycle CO_2 and GHG Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Vehicles

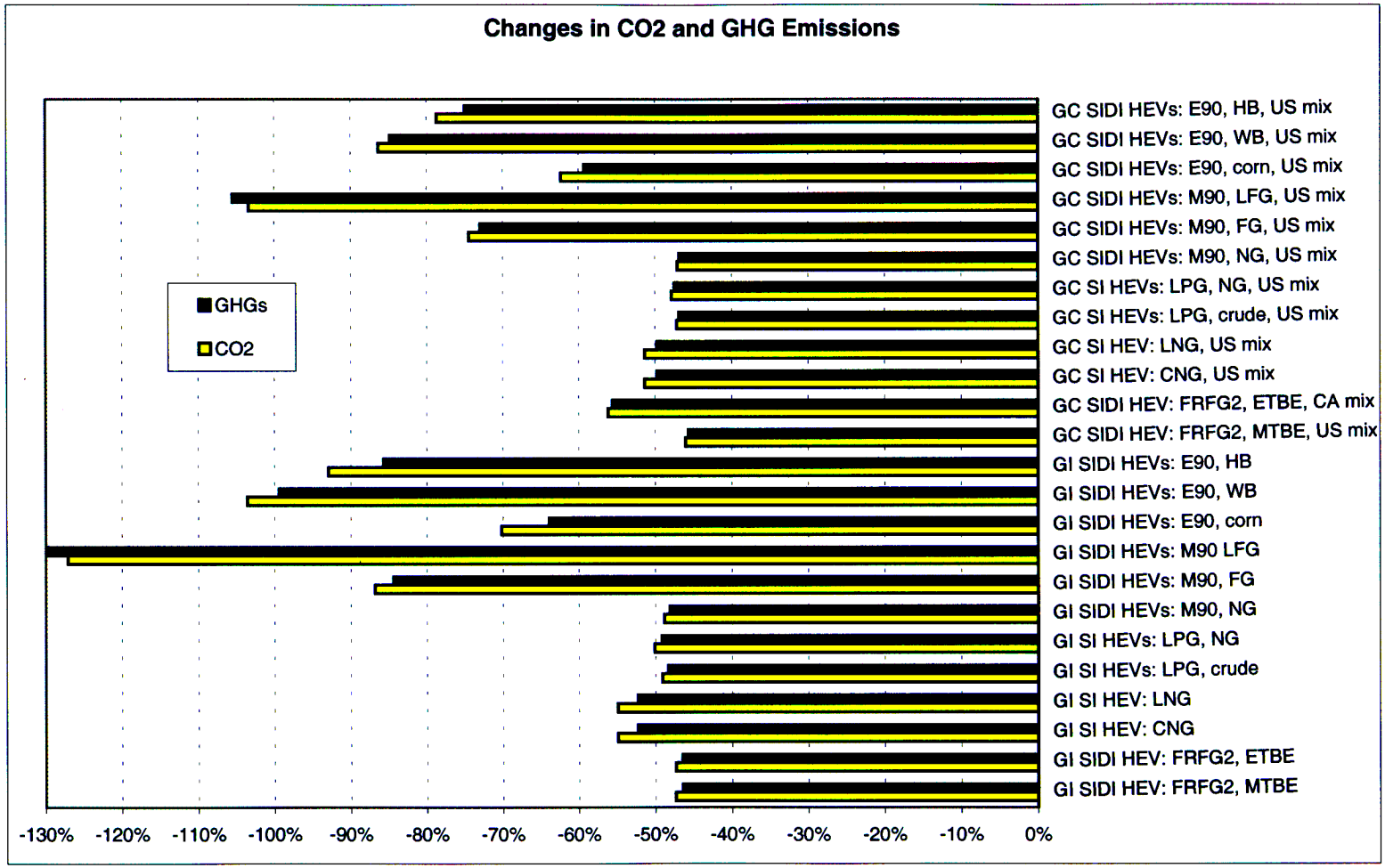

Figure C-2.50 Changes in Fuel-Cycle CO_2 and GHG Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Hybrid Electric Vehicles

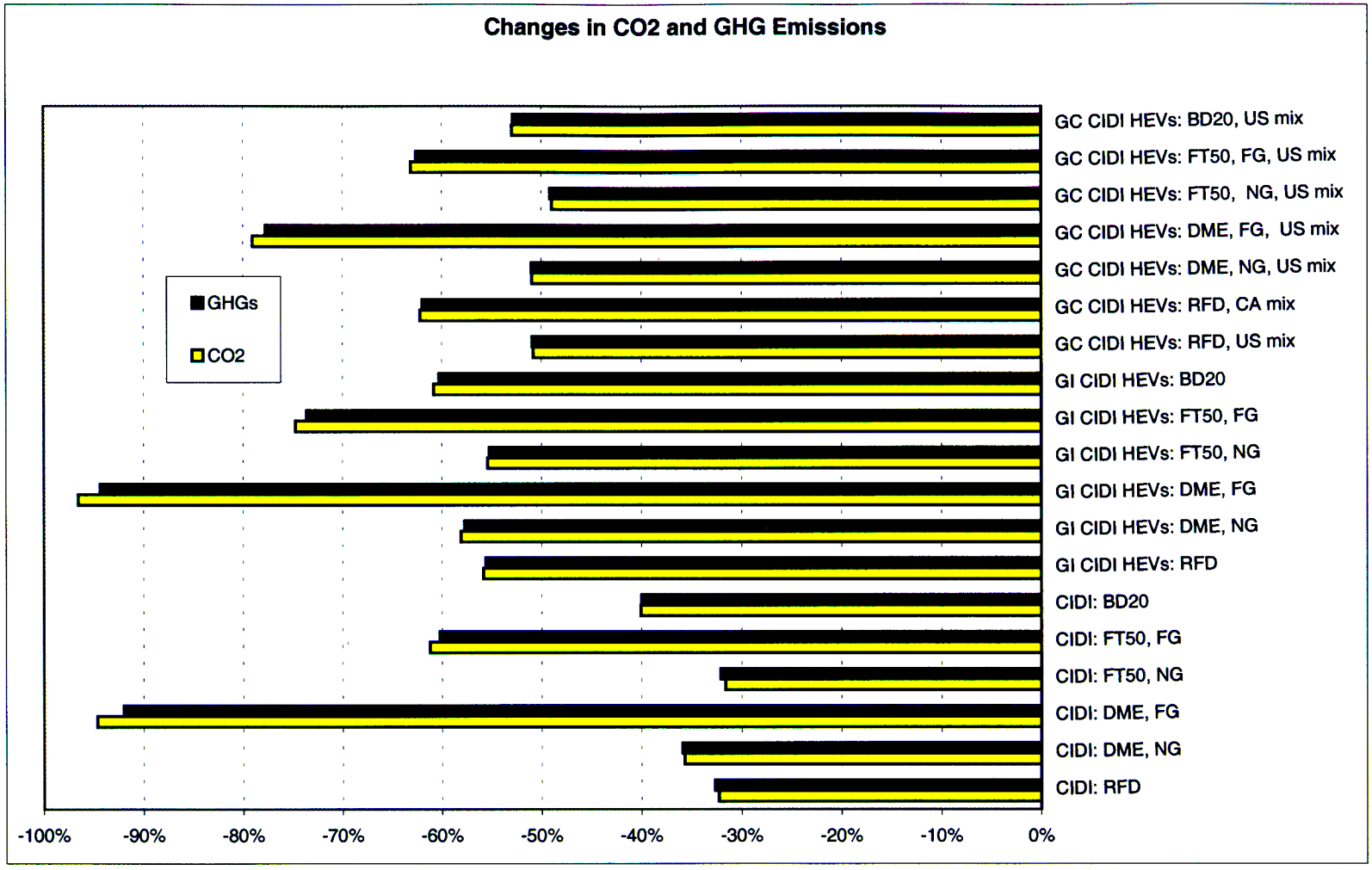

Figure C-2.51 Changes in Fuel-Cycle CO_2 and GHG Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

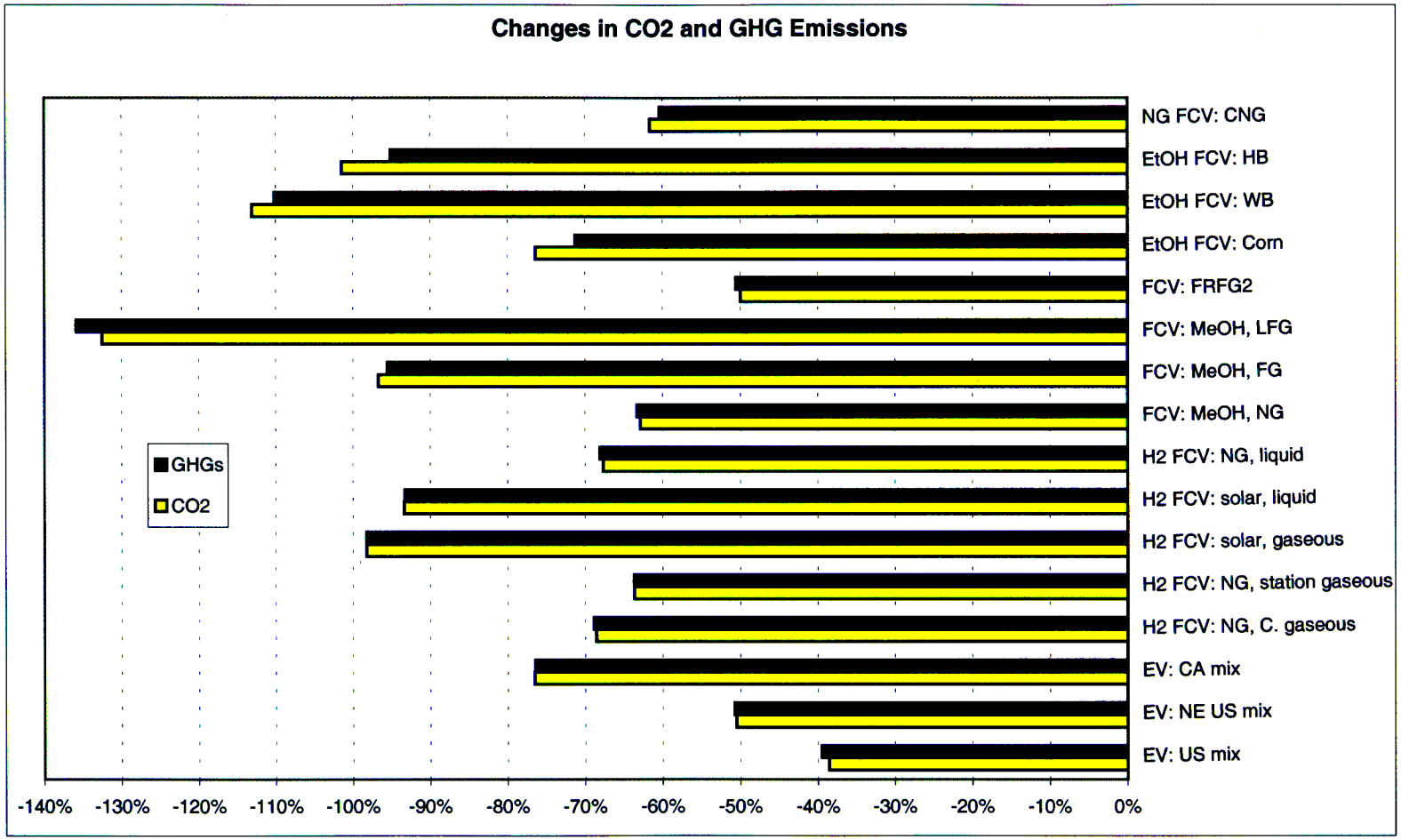

Figure C-2.52 Changes in Fuel-Cycle CO_2 and GHG Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term Electric Vehicles and Fuel-Cell Vehicles

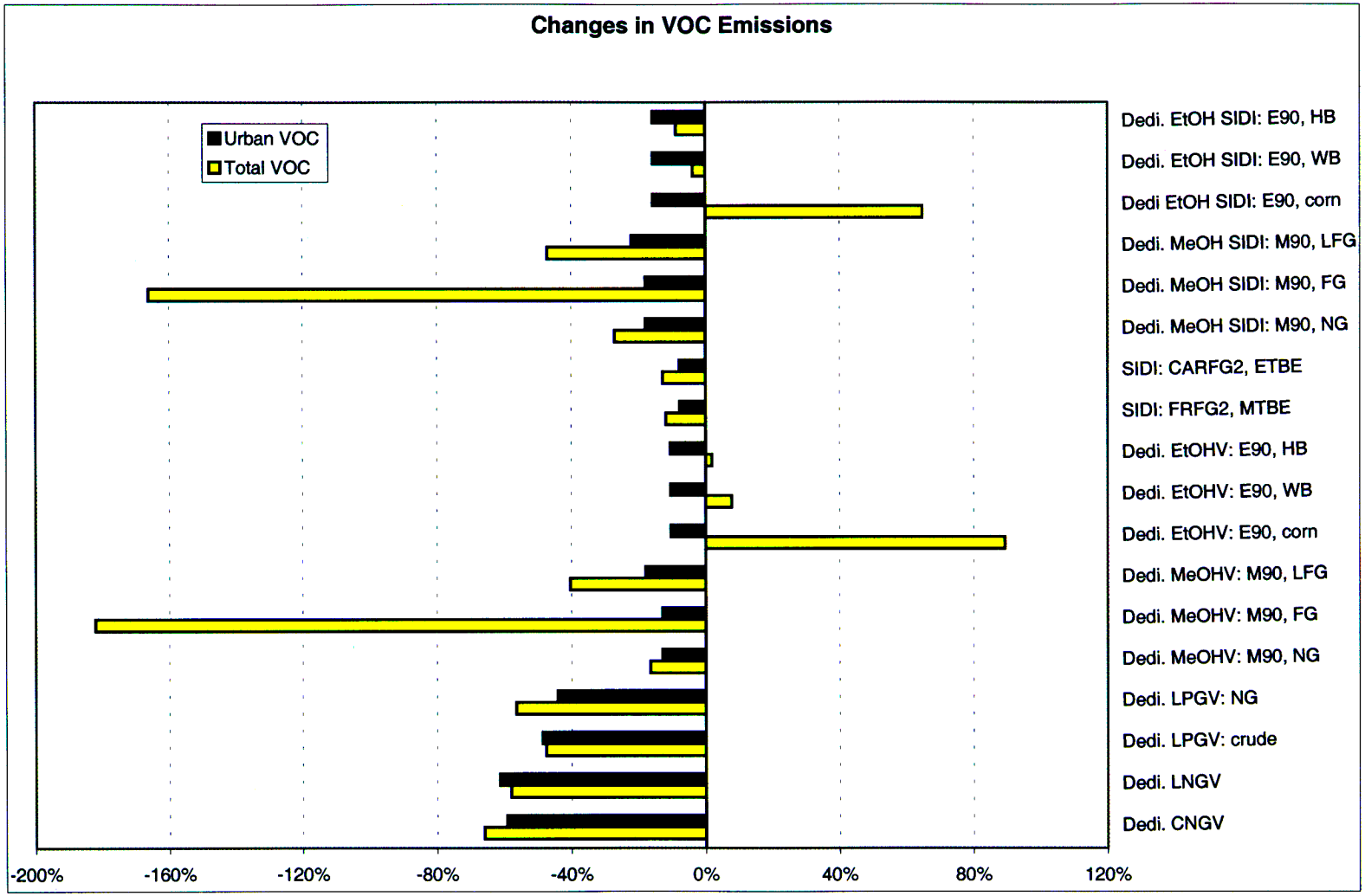

Figure C-2.53 Changes in Fuel-Cycle VOC Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Vehicles

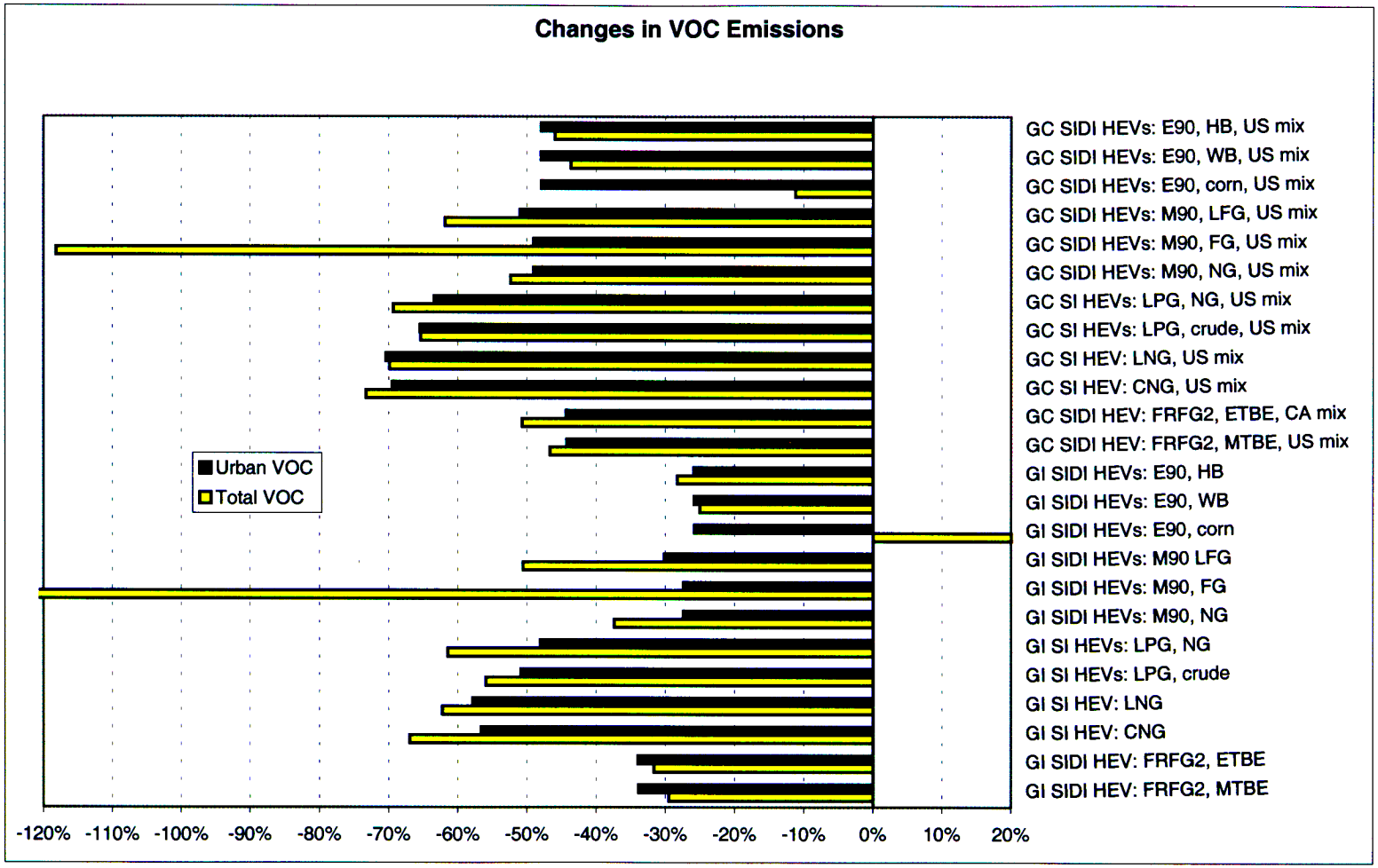

Figure C-2.54 Changes in Fuel-Cycle VOC Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Hybrid Electric Vehicles

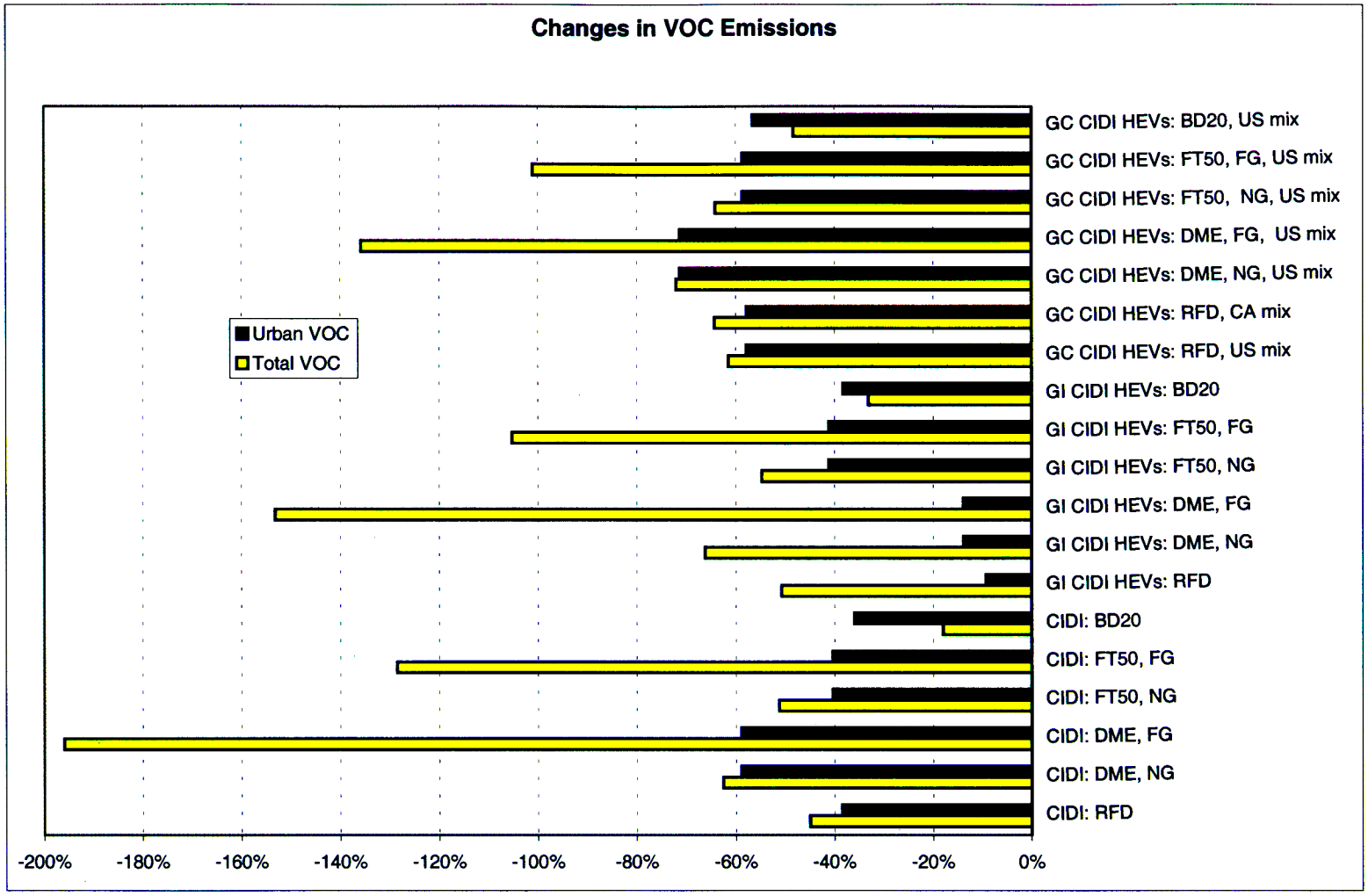

Figure C-2.55 Changes in Fuel-Cycle VOC Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

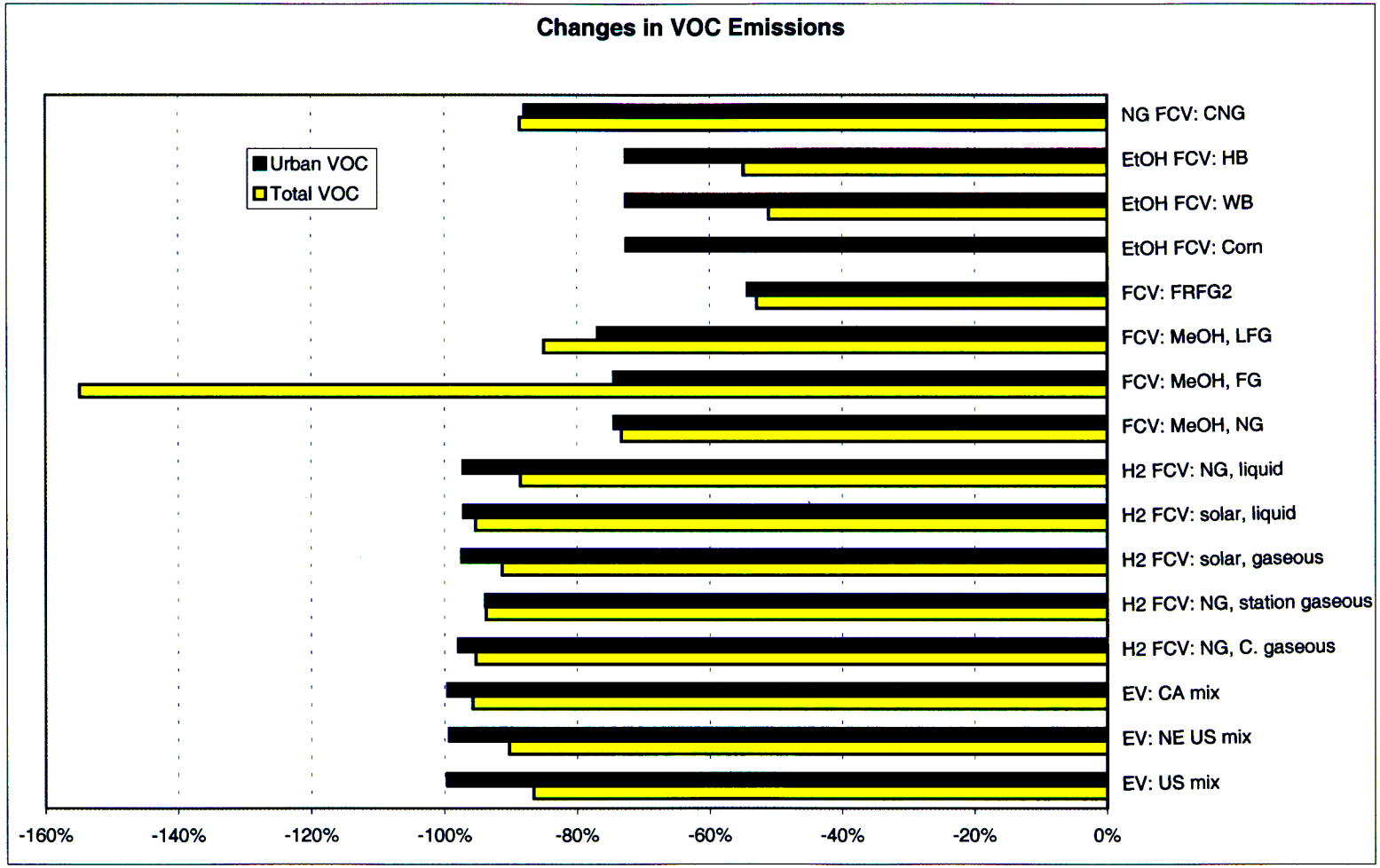

Figure C-2.56 Changes in Fuel-Cycle VOC Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term Electric Vehicles and Fuel-Cell Vehicles

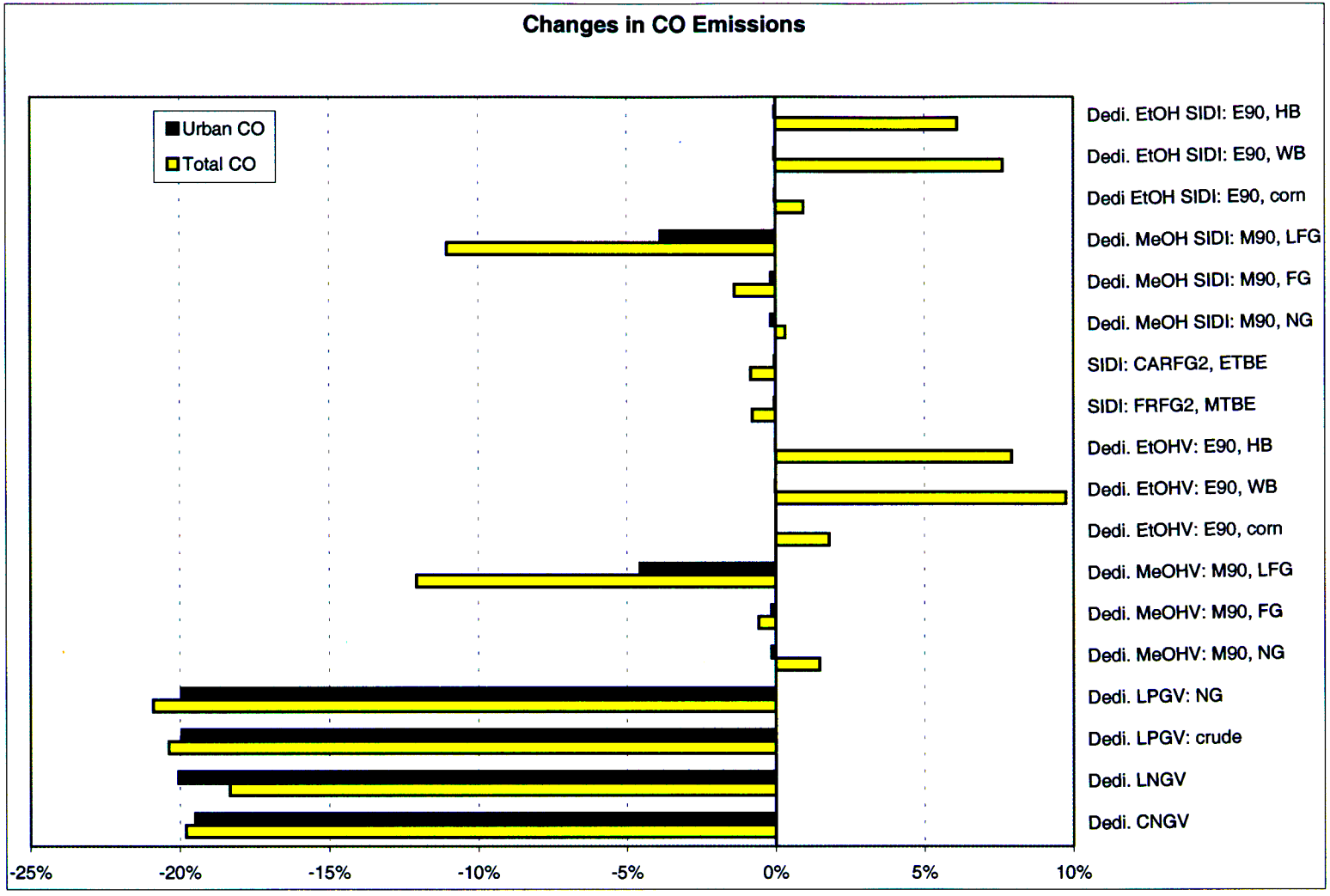

Figure C-2.57 Changes in Fuel-Cycle CO Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Vehicles

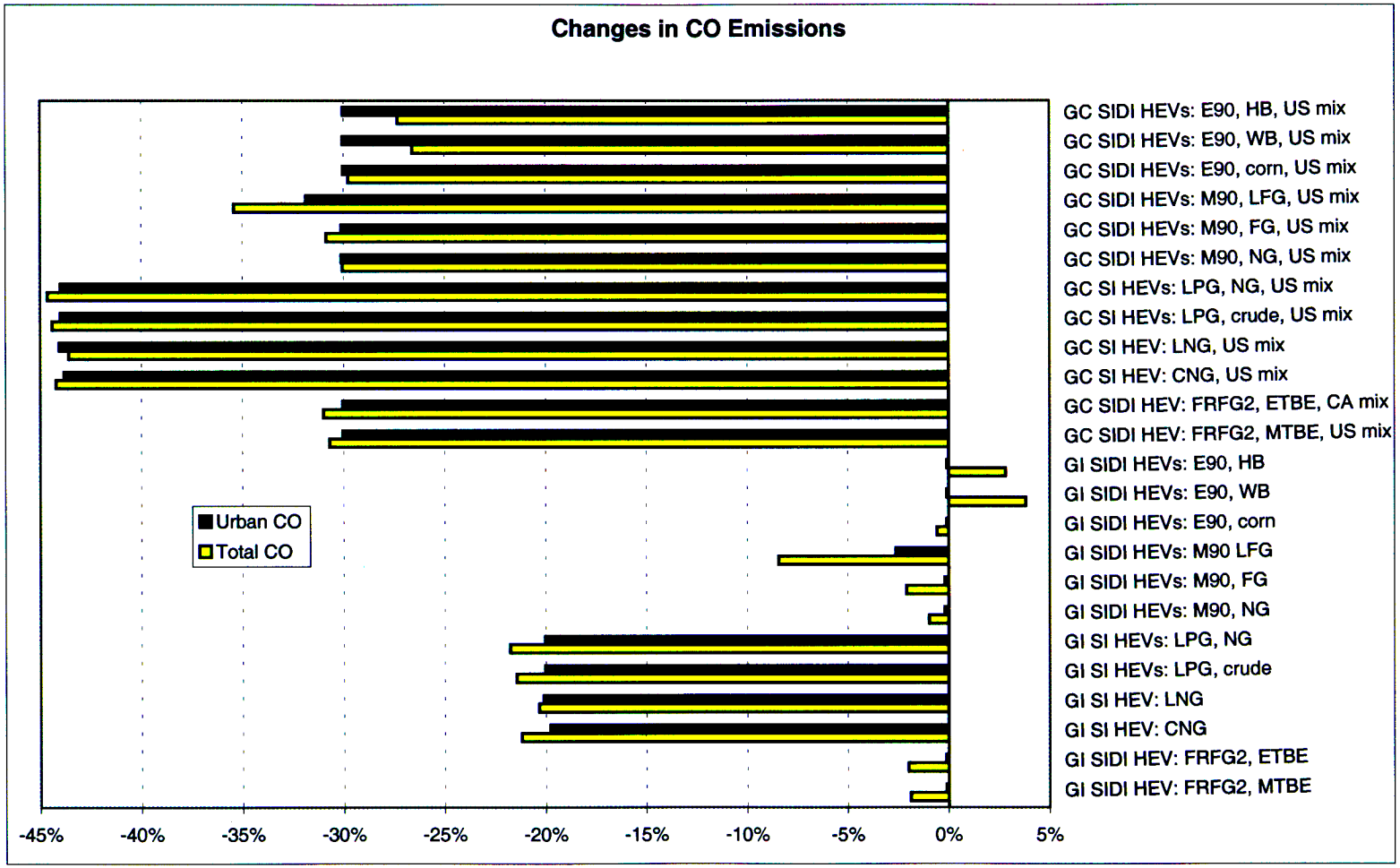

Figure C-2.58 Changes in Fuel-Cycle CO Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Hybrid Electric Vehicles

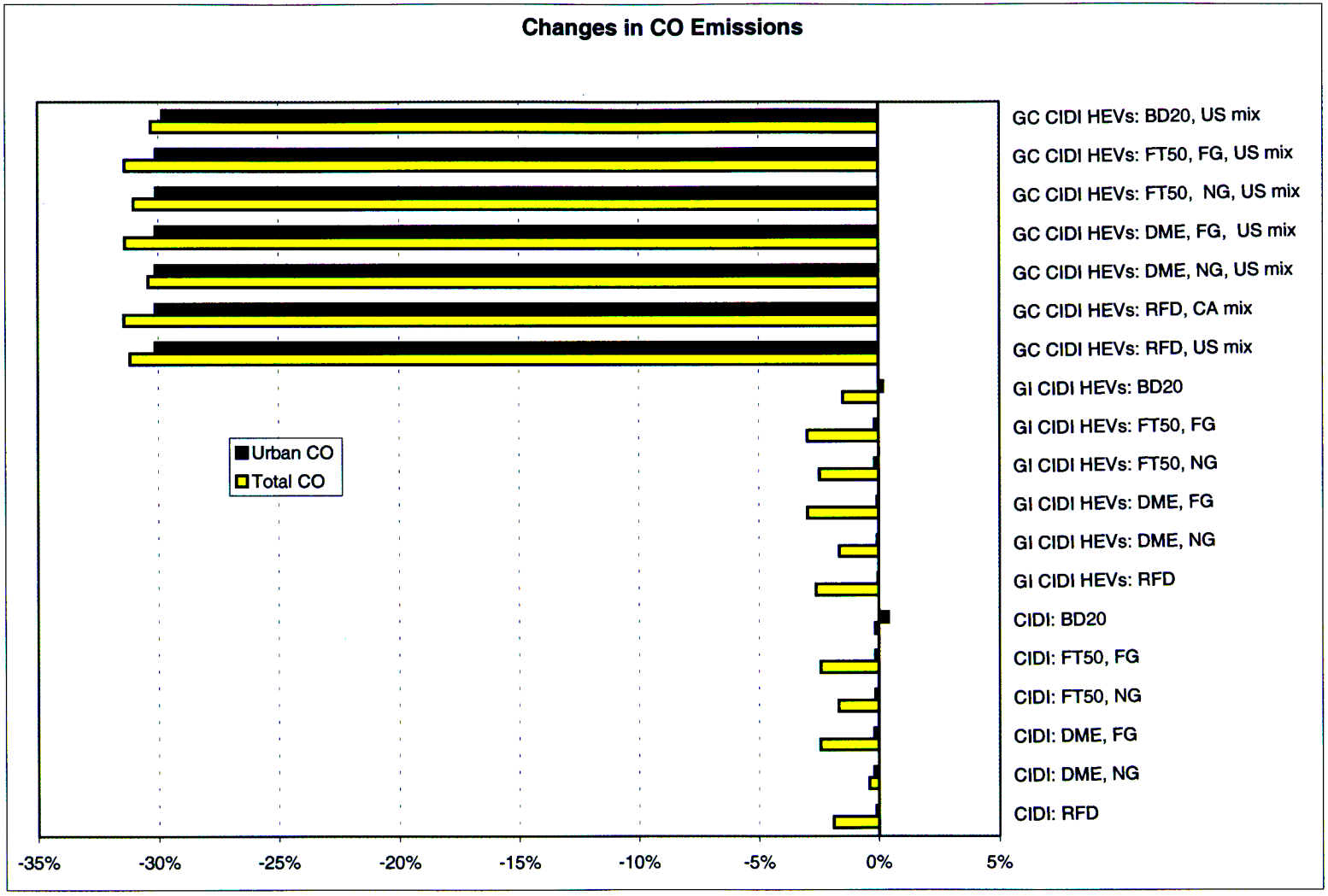

Figure C-2.59 Changes in Fuel-Cycle CO Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

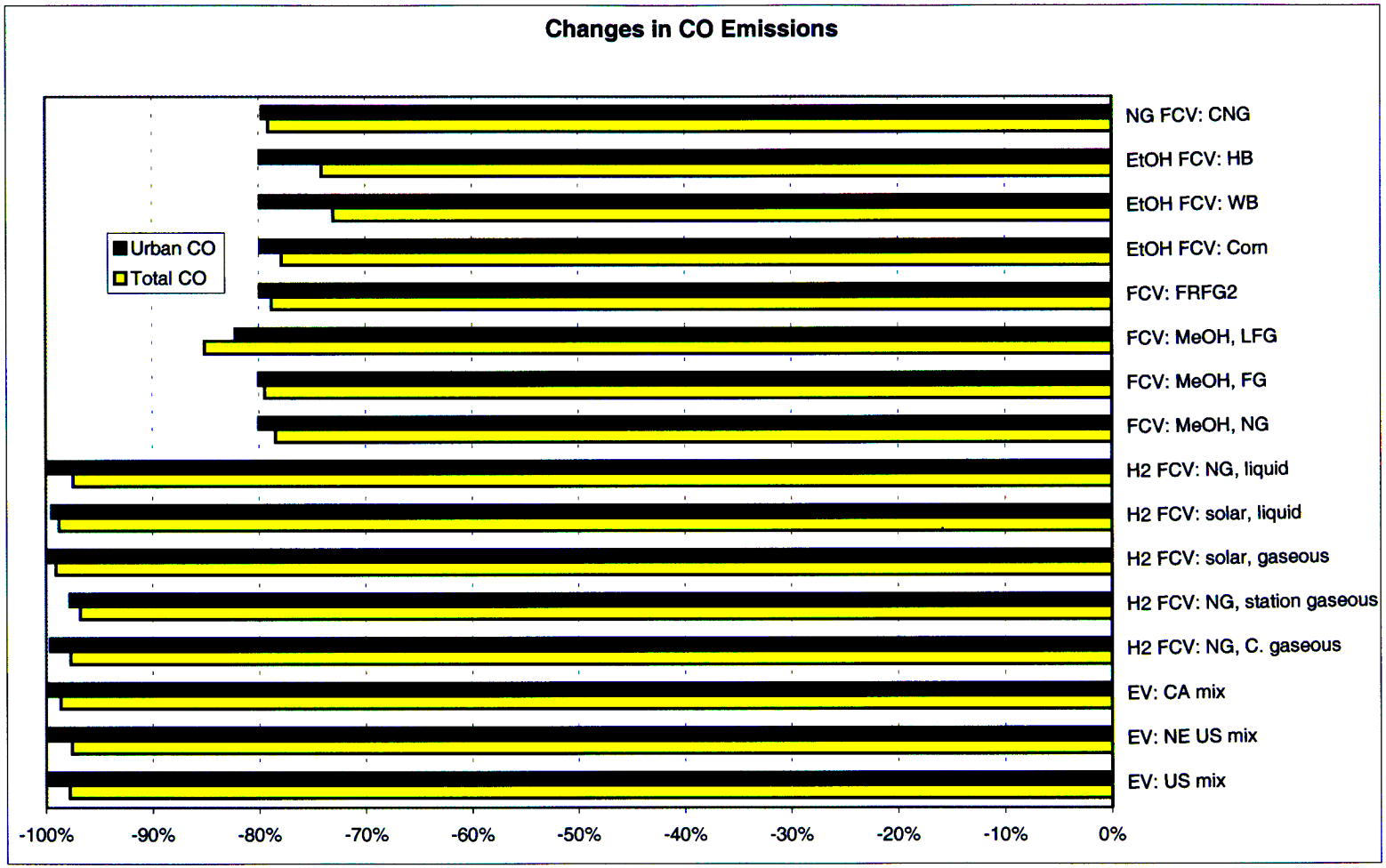

Figure C-2.60 Changes in Fuel-Cycle CO Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term Electric Vehicles and Fuel-Cell Vehicles

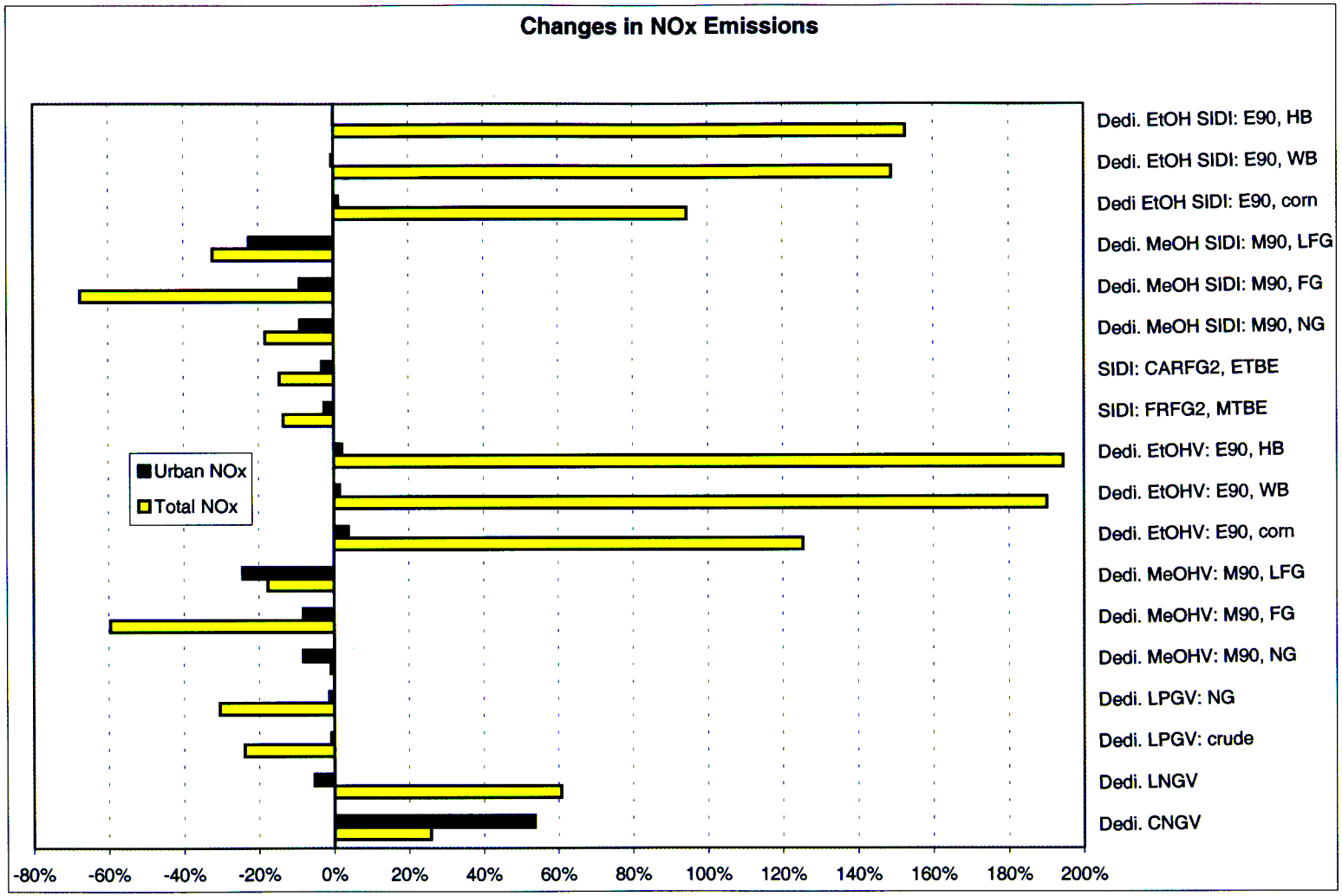

Figure C-2.61 Changes in Fuel-Cycle NO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Vehicles

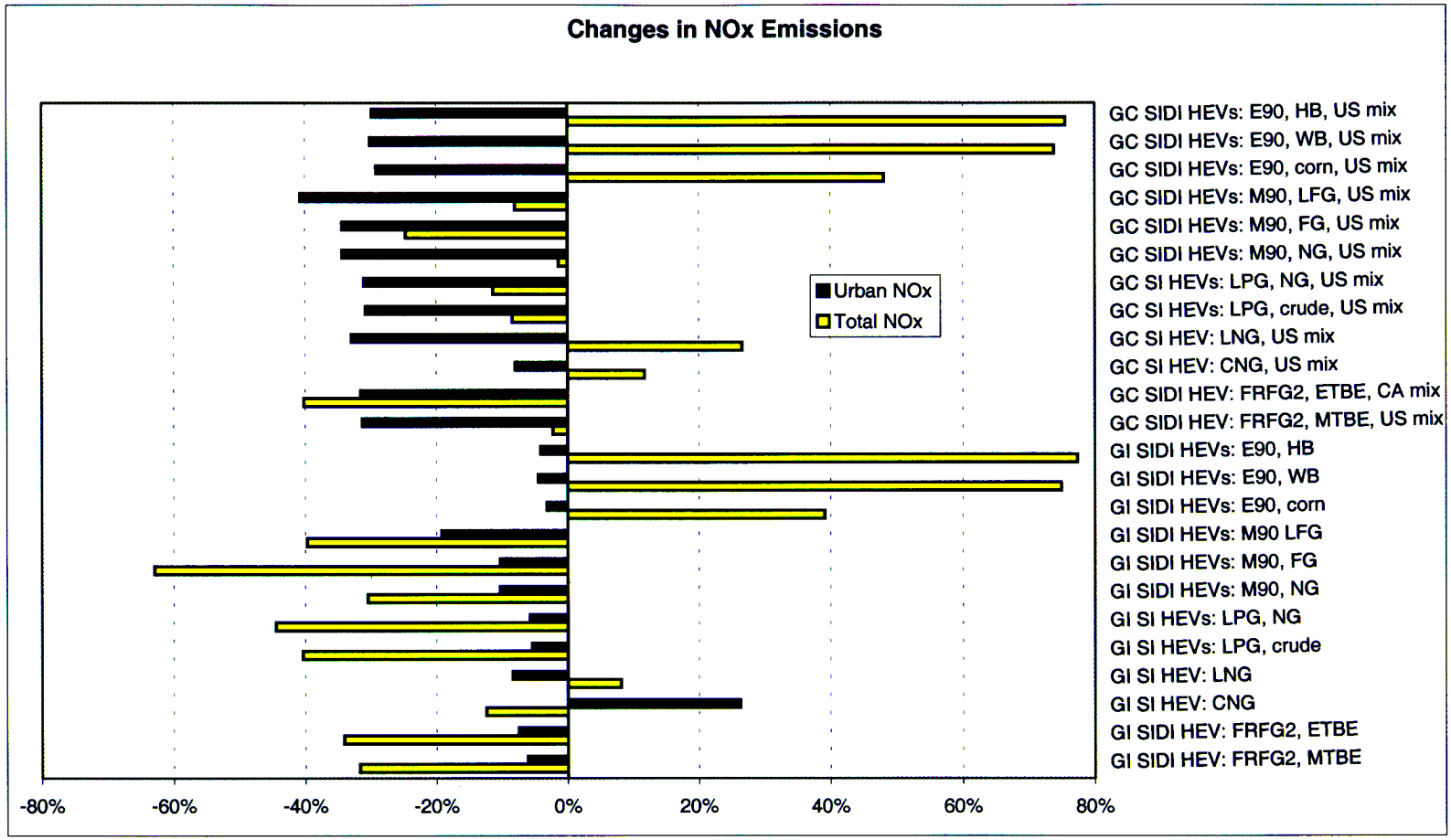

Figure C-2.62 Changes in Fuel-Cycle NO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Hybrid Electric Vehicles

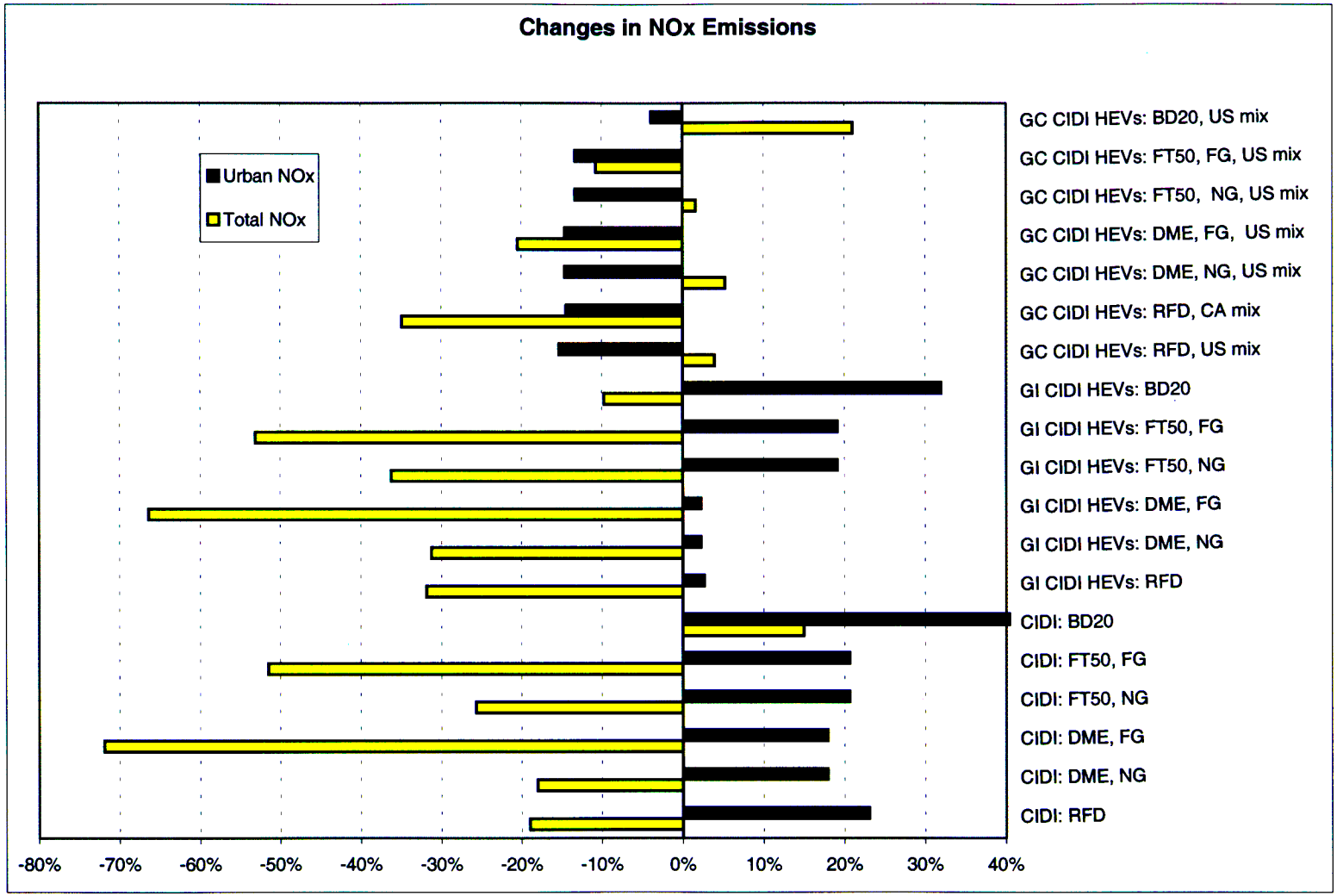

Figure C-2.63 Changes in Fuel-Cycle NO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

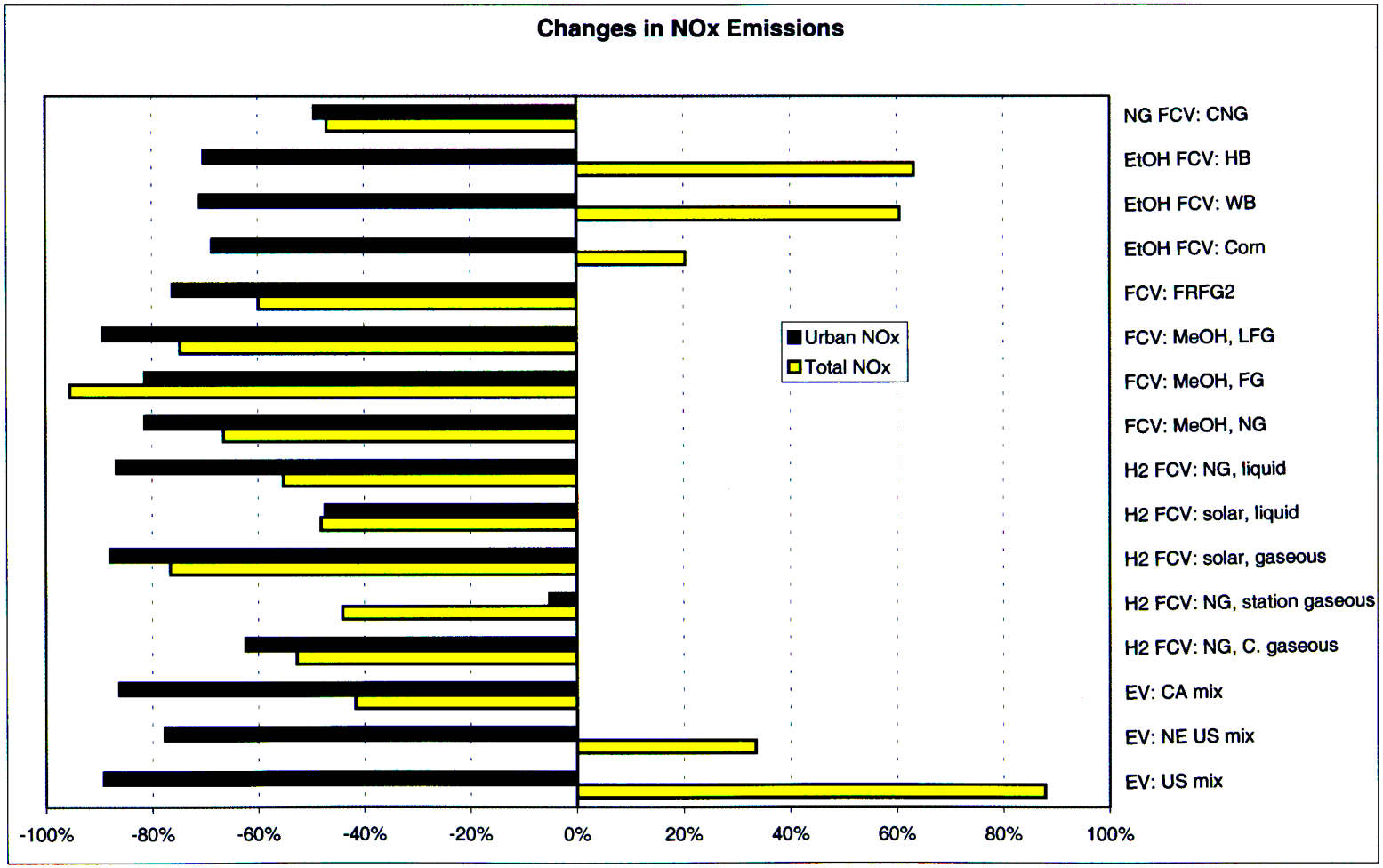

Figure C-2.64 Changes in Fuel-Cycle NO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term Electric Vehicles and Fuel-Cell Vehicles

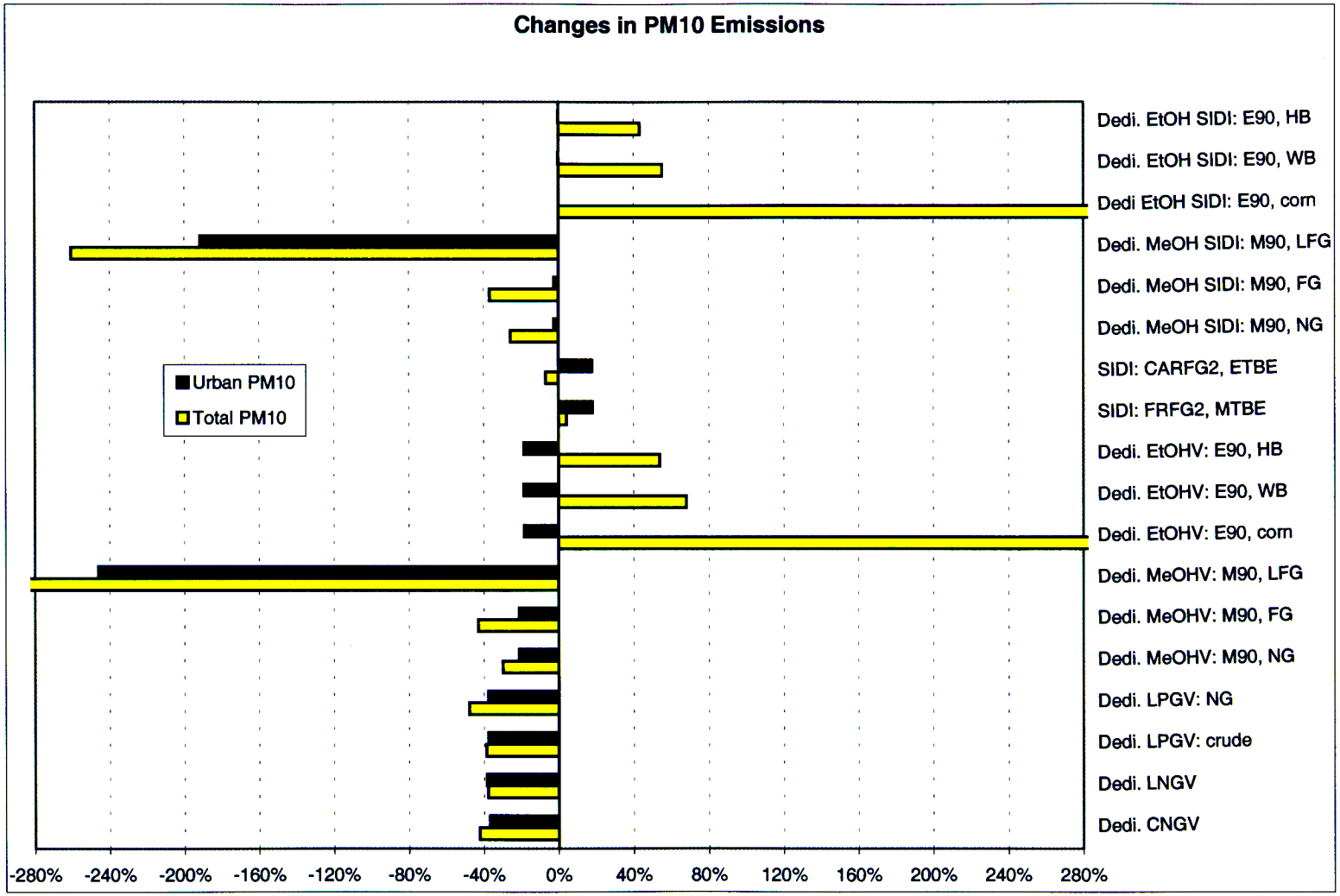

Figure C-2.65 Changes in Fuel-Cycle PM_{10} Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Vehicles

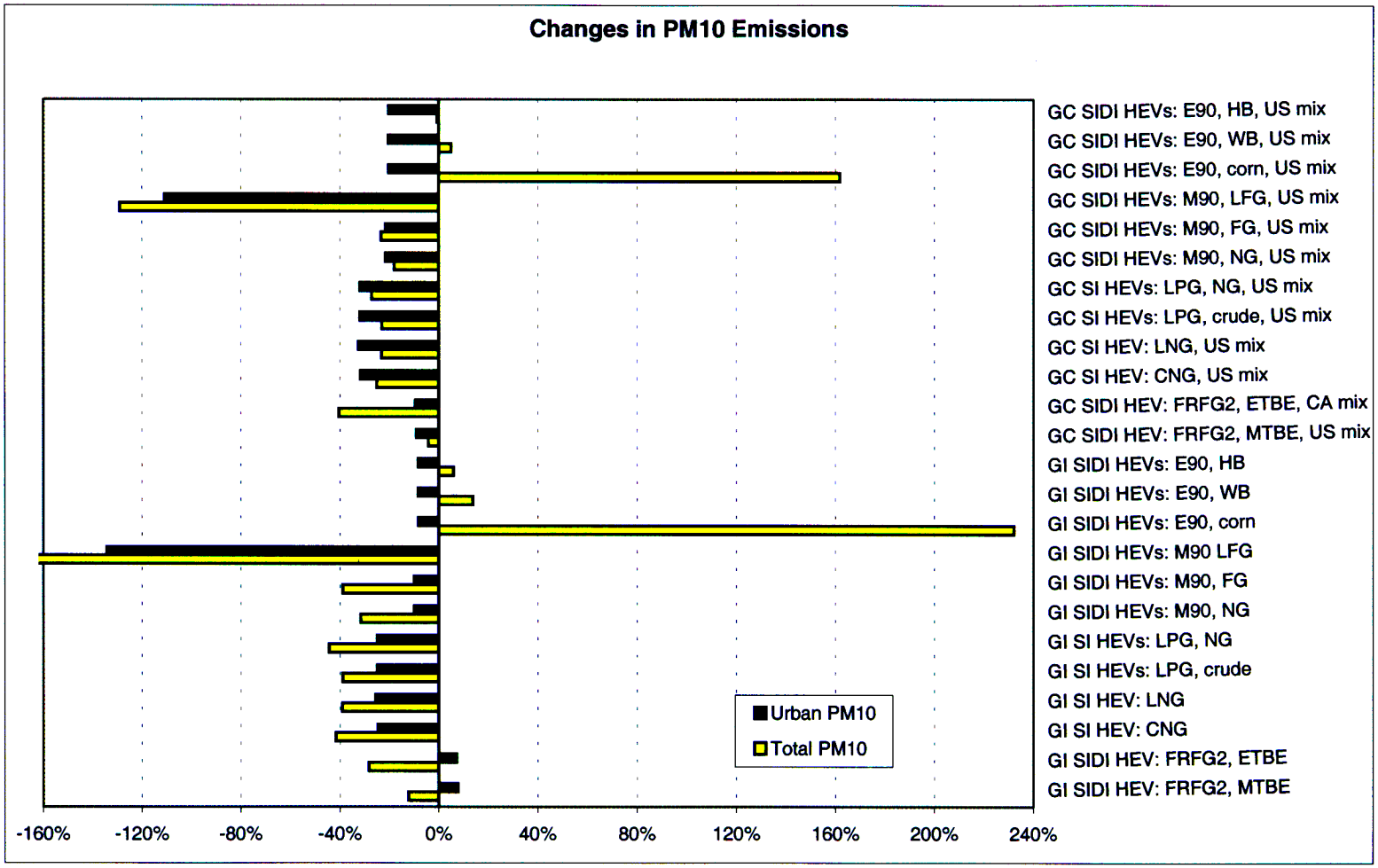

Figure C-2.66 Changes in Fuel-Cycle PM_{10} Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Hybrid Electric Vehicles

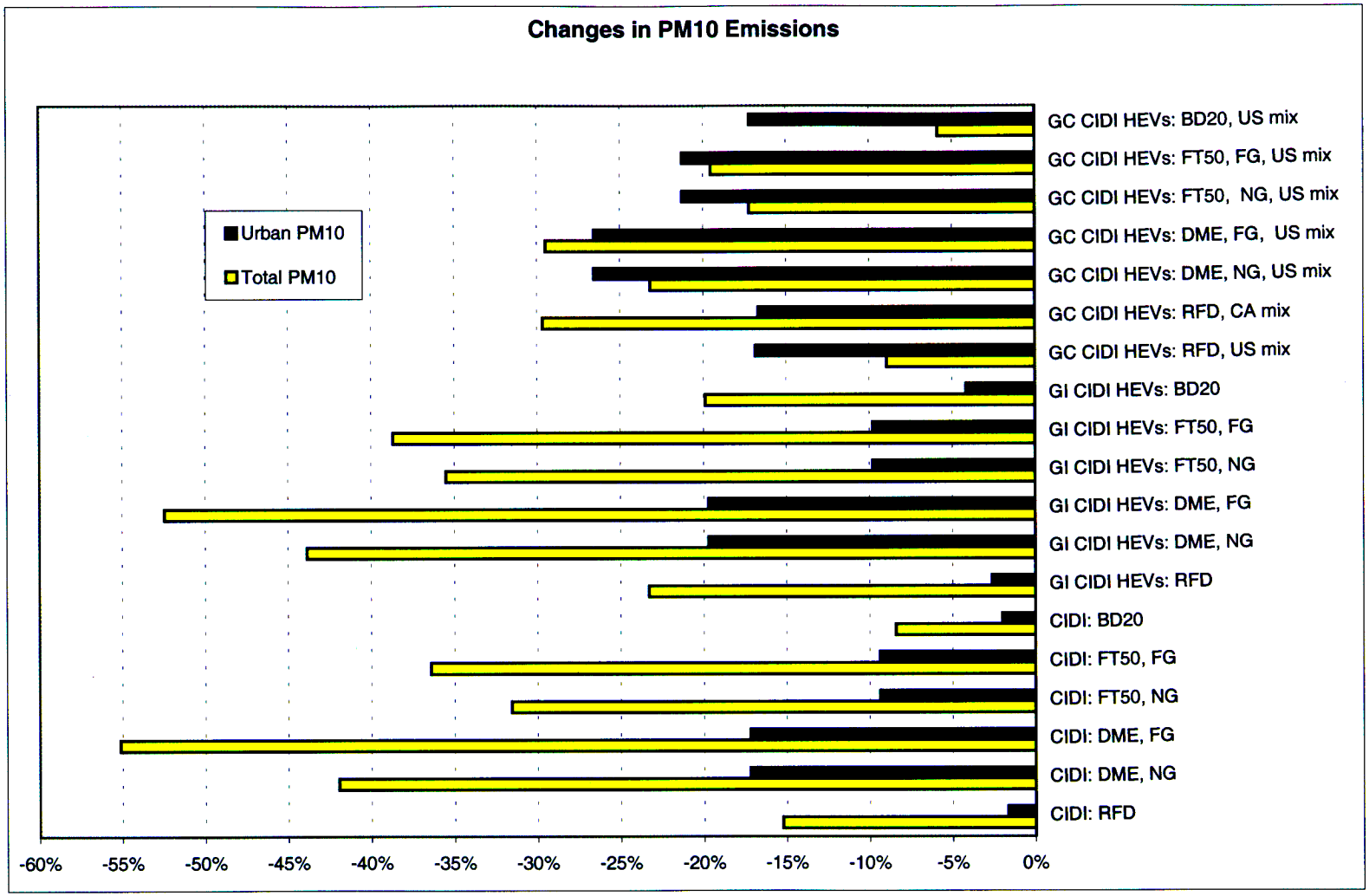

Figure C-2.67 Changes in Fuel-Cycle PM_{10} Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

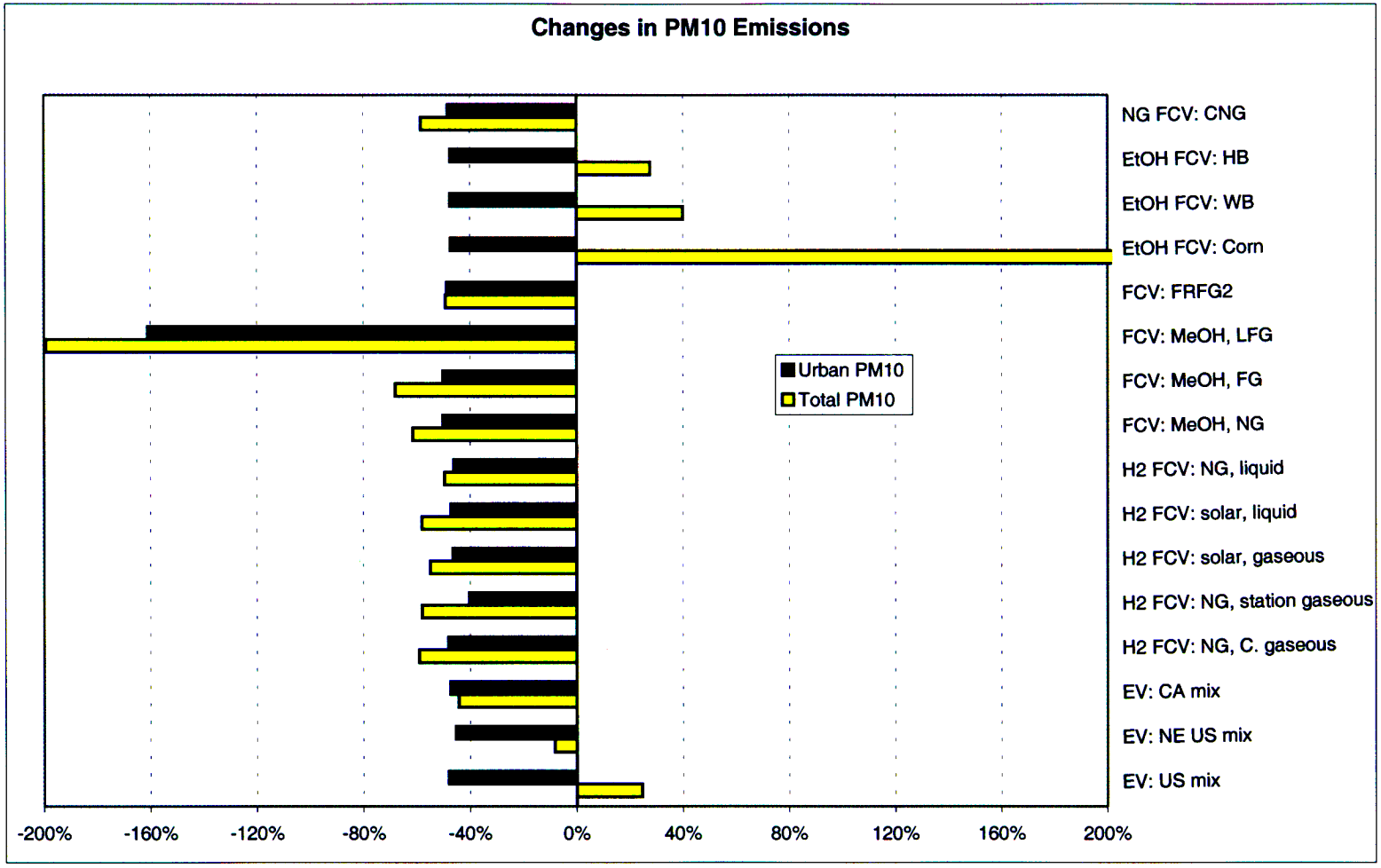

Figure C-2.68 Changes in Fuel-Cycle PM_{10} Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term Electric Vehicles and Fuel-Cell Vehicles

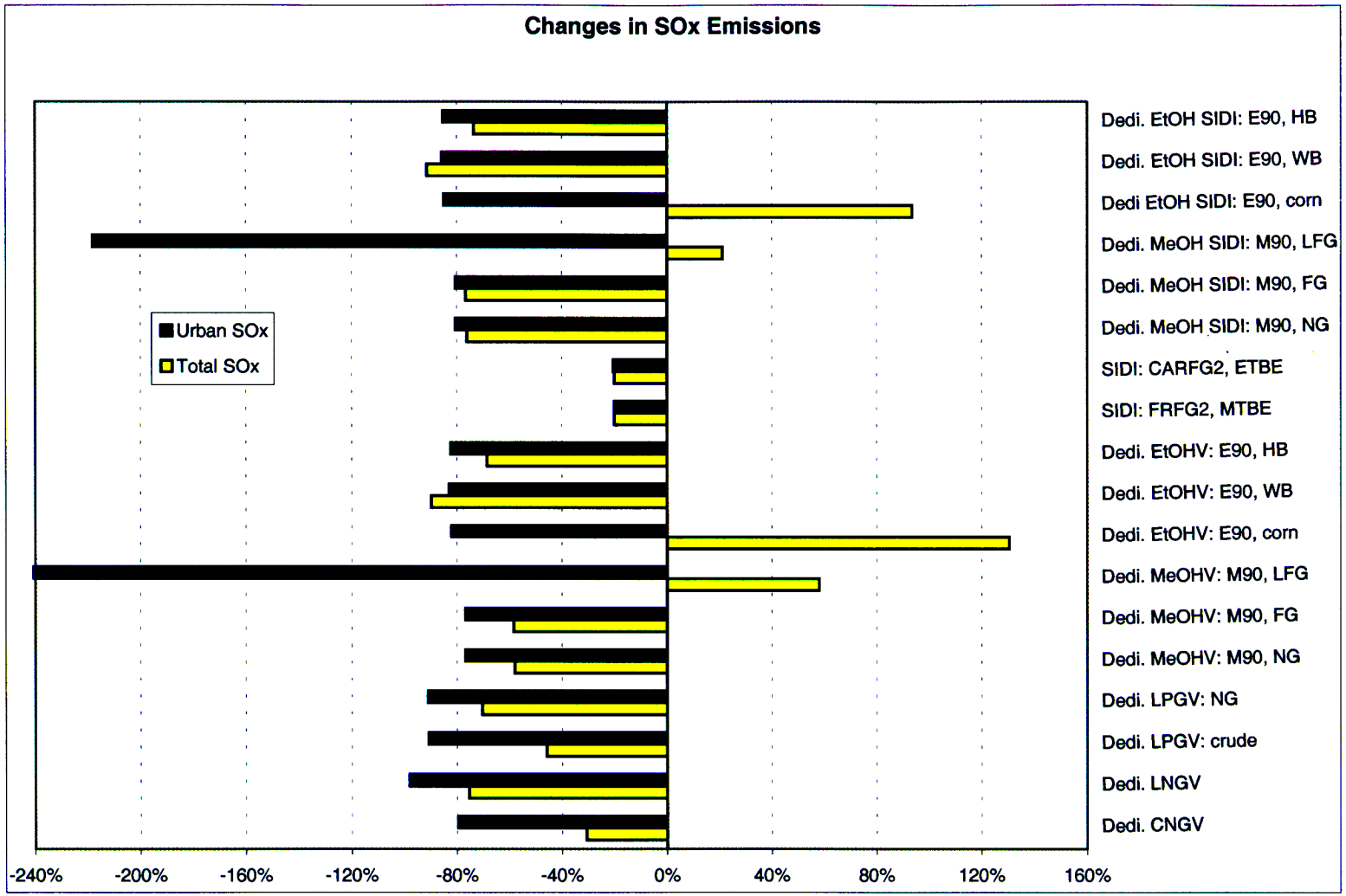

Figure C-2.69 Changes in Fuel-Cycle SO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Vehicles

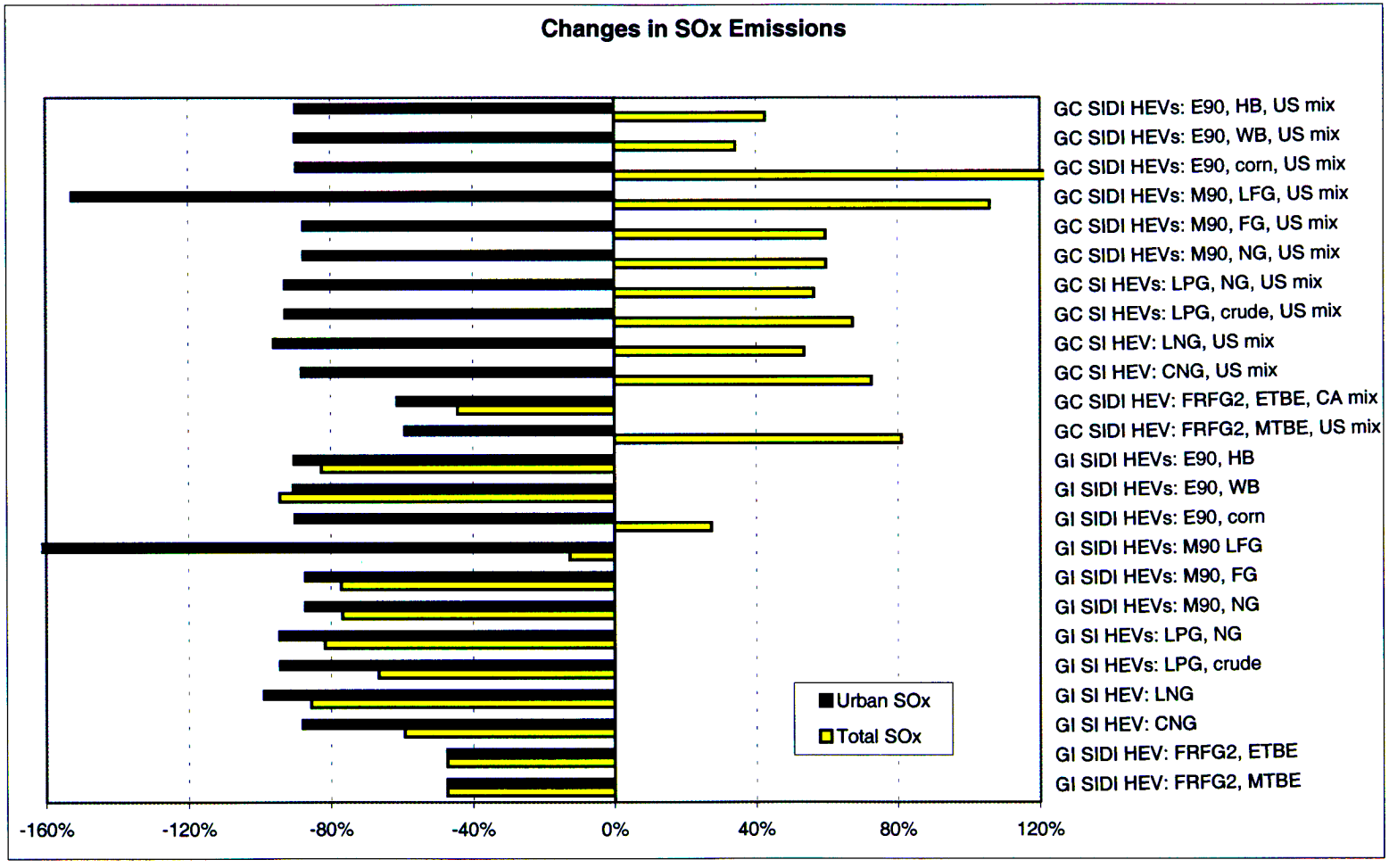

Figure C-2.70 Changes in Fuel-Cycle SO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term SI and SIDI Hybrid Electric Vehicles

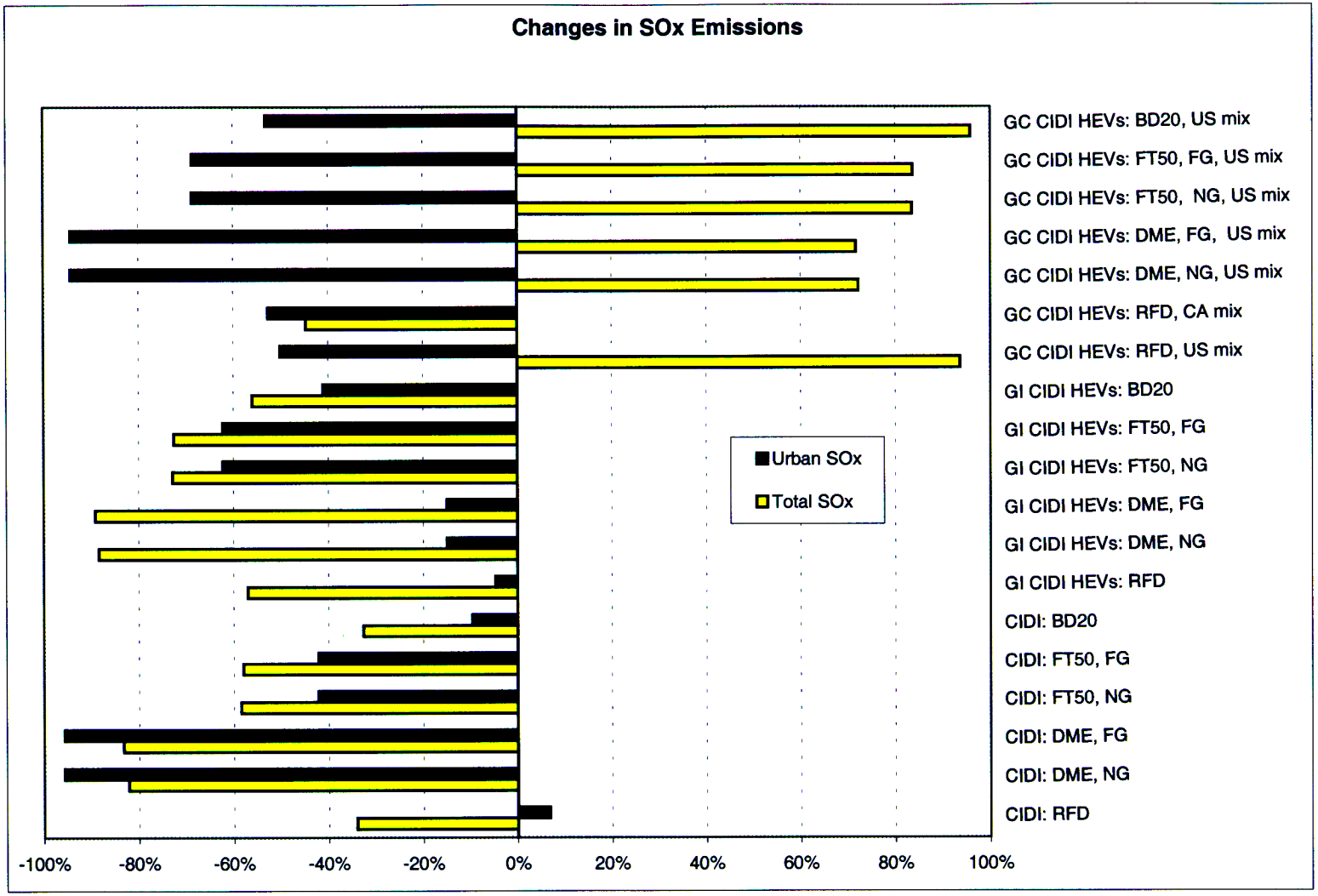

Figure C-2.71 Changes in Fuel-Cycle SO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term CIDI Vehicles and CIDI Hybrid Electric Vehicles

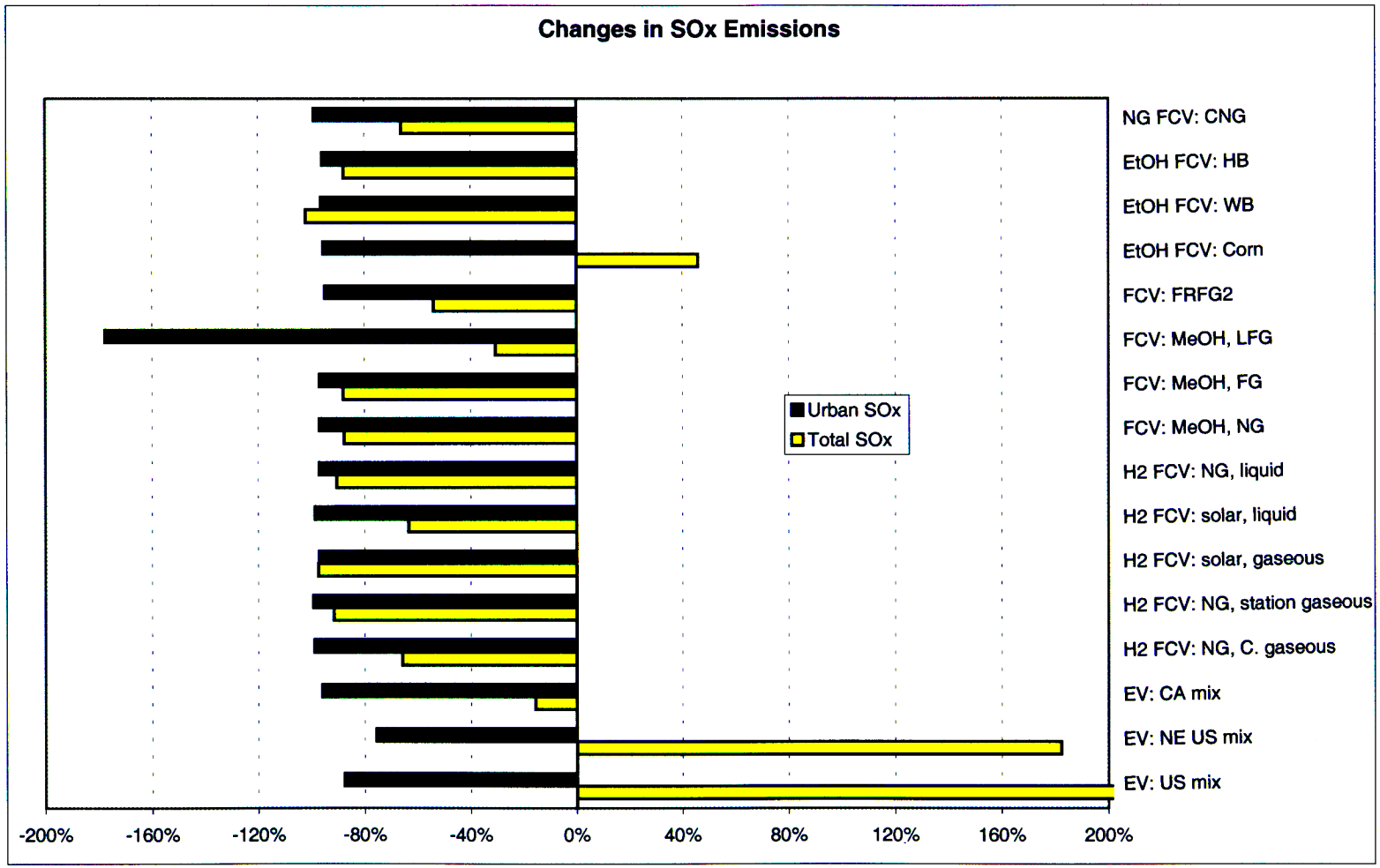

Figure C-2.72 Changes in Fuel-Cycle SO_x Emissions Relative to GVs Fueled with RFG, Light-Duty Trucks 2: Long-Term Electric Vehicles and Fuel-Cell Vehicles

Appendix D
Changes in Per-Mile Fuel-Cycle Energy Use and Emissions

This appendix presents numerical changes in fuel-cycle energy use and emissions by alternative transportation fuels and advanced vehicle technologies relative to baseline gasoline vehicles. The values presented in this appendix were used to generate the charts presented in Section 6 of Volume 1 and in Appendix C of Volume 2. Numerical changes are presented in the following order: near-term passenger cars, near-term LDT1, near-term LDT2, long-term passenger cars, long-term LDT1, and long-term LDT2.

Acronyms, initialisms, and abbreviations are defined on pages xv–xviii of Volume 1.

D-I Near-Term Technologies

D-I.1 Passenger Cars

Parameter	GV: FRFG2, MTBE	GV: CARFG2, ETBE	GV: CARFG2, EtOH	CIDI: CD	Bi-fuel CNGV	Dedi. CNGV	Dedi. LPGV: crude	Dedi. LPGV: NG	M85 FFV: NG	M85 FFV: FG	M85 FFV: LFG
Total energy	0.0%	0.8%	0.4%	-29.7%	6.7%	3.3%	-8.6%	-9.6%	14.5%	16.6%	2.7%
Fossil fuels	0.0%	-3.1%	-2.6%	-29.6%	5.7%	2.3%	-8.6%	-9.3%	15.0%	-39.0%	-52.8%
Petroleum	-11.0%	-10.1%	-2.5%	-26.7%	-99.4%	-99.4%	-3.4%	-98.2%	-72.6%	-72.6%	-73.1%
VOC: Total	-15.1%	-5.5%	8.6%	-60.9%	-48.7%	-71.2%	-58.2%	-64.1%	-19.8%	-120.3%	-35.3%
VOC: Urban	-19.7%	-19.4%	5.3%	-62.8%	-45.8%	-74.8%	-63.1%	-60.3%	-20.3%	-20.3%	-22.8%
CO: Total	-19.1%	-18.9%	-19.4%	-79.5%	-34.8%	-42.7%	-39.3%	-39.7%	-37.4%	-39.1%	-46.5%
CO: Urban	-20.0%	-19.9%	-20.0%	-80.5%	-35.5%	-43.5%	-39.9%	-39.9%	-40.0%	-40.0%	-42.8%
NOx: Total	0.4%	14.6%	2.6%	51.8%	26.6%	18.6%	-17.7%	-22.4%	0.5%	-36.2%	-9.0%
NOx: Urban	-4.2%	-2.9%	-4.2%	111.4%	25.2%	14.7%	-9.1%	-9.3%	-12.0%	-12.0%	-17.4%
PM10: Total	-1.8%	78.2%	38.5%	154.8%	-35.9%	-37.8%	-34.1%	-43.0%	-26.5%	-40.3%	-255.9%
PM10: Urban	-1.4%	-0.4%	-1.3%	258.5%	-30.4%	-32.3%	-31.3%	-31.3%	-22.8%	-22.8%	-201.8%
SOx: Total	-28.9%	-0.4%	-16.3%	-31.4%	-37.5%	-39.5%	-57.3%	-77.4%	-58.7%	-59.5%	45.3%
SOx: Urban	-82.7%	-82.8%	-83.0%	-3.9%	-96.1%	-96.2%	-98.0%	-98.1%	-73.7%	-73.7%	-98.7%
CH4	18.2%	18.8%	-2.4%	-38.8%	211.0%	205.1%	-5.7%	2.8%	1.0%	-12.7%	-434.3%
N2O	0.4%	62.5%	32.4%	-42.6%	-38.4%	-19.4%	-1.8%	-1.8%	1.6%	-2.3%	-0.3%
CO2	1.2%	-0.9%	-5.1%	-25.8%	-13.9%	-16.7%	-12.6%	-14.3%	-4.7%	-69.4%	-134.6%
GHGs	1.6%	0.7%	-4.4%	-26.5%	-8.2%	-10.7%	-12.2%	-13.6%	-4.4%	-66.7%	-140.4%

D-I.1 Passenger Cars (Cont.)

Parameter	E10 GV: corn	E85 FFV: corn	E85 FFV: WB	E85 FFV: HB	EV: US mix	EV: NE US mix	EV: CA mix	GC SIDI HEV: CARFG2, ETBE, CA mix	GC SIDI HEV: CARFG2, EtOH, CA mix	GI SIDI HEV: FRFG2, MTBE	GI CIDI HEV: CD
Total energy	2.1%	17.9%	90.4%	79.1%	-14.7%	-14.0%	-16.9%	-35.9%	-36.0%	-47.4%	-52.5%
Fossil fuels	-3.4%	-41.8%	-81.8%	-72.7%	-34.7%	-46.0%	-68.6%	-52.9%	-52.7%	-47.4%	-52.5%
Petroleum	-6.3%	-73.8%	-71.2%	-73.2%	-98.4%	-96.9%	-99.5%	-64.9%	-62.0%	-53.2%	-50.6%
VOC: Total	14.4%	54.0%	4.5%	0.4%	-88.0%	-90.6%	-95.2%	-48.2%	-36.7%	-34.3%	-65.0%
VOC: Urban	10.7%	-16.0%	-16.1%	-16.1%	-99.6%	-99.4%	-99.5%	-50.8%	-33.3%	-30.4%	-63.7%
CO: Total	-35.0%	-37.4%	-30.3%	-31.7%	-98.0%	-98.0%	-98.7%	-54.7%	-54.9%	-36.0%	-80.0%
CO: Urban	-35.9%	-39.8%	-39.8%	-39.8%	-99.9%	-99.9%	-99.9%	-55.2%	-55.2%	-36.0%	-80.6%
NOx: Total	9.9%	101.9%	125.7%	139.8%	64.5%	11.5%	-51.3%	-21.6%	-26.3%	-18.1%	43.7%
NOx: Urban	0.8%	-1.1%	-2.4%	-1.7%	-94.7%	-90.9%	-93.2%	-28.6%	-29.1%	-1.8%	110.5%
PM10: Total	57.2%	615.2%	139.9%	124.4%	48.5%	10.5%	-31.7%	13.3%	-2.1%	-12.9%	148.0%
PM10: Urban	0.6%	-15.0%	-15.5%	-15.2%	-35.4%	-33.4%	-34.7%	-5.8%	-6.1%	6.0%	257.9%
SOx: Total	15.7%	168.8%	-151.8%	-95.8%	462.8%	217.2%	-13.9%	-35.4%	-41.6%	-62.6%	-53.7%
SOx: Urban	-6.7%	-78.6%	-79.1%	-78.9%	-96.9%	-90.7%	-99.0%	-93.0%	-93.1%	-90.9%	-35.2%
CH4	-1.5%	-14.3%	-62.9%	-48.9%	-15.5%	-23.5%	-49.2%	-34.3%	-42.5%	-31.3%	-58.1%
N2O	45.4%	500.3%	187.1%	607.8%	-89.9%	-90.2%	-92.9%	-4.9%	-16.6%	-1.9%	-43.4%
CO2	-2.9%	-36.4%	-113.1%	-85.5%	-24.3%	-42.8%	-70.7%	-50.4%	-51.9%	-46.8%	-49.9%
GHGs	-2.0%	-26.3%	-106.4%	-72.2%	-25.3%	-43.1%	-70.5%	-49.1%	-51.1%	-45.6%	-50.0%

D-I Near-Term Technologies

D-I.1 Light-Duty Truck 1

Parameter	GV: FRFG2, MTBE	GV: CARFG2, ETBE	GV: CARFG2, EtOH	CIDI: CD	Bi-fuel CNGV	Dedi. CNGV	Dedi LPGV: crude	Dedi. LPGV: NG	M85 FFV: NG	M85 FFV: FG	M85 FFV: LFG
Total energy	0.0%	0.8%	0.4%	-29.7%	6.7%	3.3%	-8.6%	-9.6%	14.5%	16.6%	2.7%
Fossil fuels	0.0%	-3.1%	-2.6%	-29.6%	5.7%	2.3%	-8.6%	-9.3%	15.0%	-41.8%	-52.8%
Petroleum	-11.0%	-10.1%	-2.5%	-26.7%	-99.4%	-99.4%	-3.4%	-98.2%	-72.6%	-72.6%	-73.1%
VOC: Total	-12.4%	-0.6%	8.8%	-56.4%	-48.8%	-68.1%	-53.9%	-61.3%	-20.9%	-145.5%	-40.2%
VOC: Urban	-17.6%	-17.1%	4.4%	-57.0%	-45.1%	-71.7%	-58.8%	-55.0%	-22.0%	-22.0%	-25.5%
CO: Total	-19.2%	-19.0%	-19.5%	-85.1%	-34.9%	-42.8%	-39.4%	-39.8%	-37.7%	-39.2%	-45.8%
CO: Urban	-20.0%	-19.9%	-20.0%	-86.1%	-35.6%	-43.6%	-39.9%	-39.9%	-40.0%	-40.0%	-42.5%
NOx: Total	0.3%	14.2%	2.5%	17.4%	26.0%	18.0%	-17.5%	-22.1%	0.3%	-35.6%	-9.0%
NOx: Urban	-4.2%	-3.0%	-4.2%	53.6%	24.3%	13.8%	-9.1%	-9.3%	-11.9%	-11.9%	-17.1%
PM10: Total	-2.0%	88.5%	43.6%	122.1%	-39.2%	-41.2%	-37.1%	-47.2%	-29.0%	-44.6%	-288.5%
PM10: Urban	-1.5%	-0.4%	-1.5%	227.2%	-34.5%	-36.6%	-35.5%	-35.6%	-26.1%	-26.1%	-243.5%
SOx: Total	-28.9%	-0.4%	-16.3%	-31.4%	-37.5%	-39.5%	-57.3%	-77.4%	-58.7%	-59.5%	45.3%
SOx: Urban	-82.7%	-82.8%	-83.0%	-3.9%	-96.1%	-96.2%	-98.0%	-98.1%	-73.7%	-73.7%	-98.7%
CH4	18.8%	19.4%	-2.3%	-37.3%	193.5%	187.4%	-6.6%	2.1%	2.3%	-11.8%	-433.7%
N2O	0.5%	70.3%	36.4%	-28.1%	-38.2%	-19.3%	-2.1%	-2.0%	1.7%	-2.6%	-0.3%
CO2	1.2%	-0.9%	-5.1%	-25.8%	-13.8%	-16.6%	-12.6%	-14.3%	-4.7%	-69.4%	-134.6%
GHGs	1.6%	0.8%	-4.4%	-26.2%	-8.7%	-11.2%	-12.2%	-13.7%	-4.4%	-66.8%	-140.4%

D-I.1 Light-Duty Truck 1 (Cont.)

Parameter	E10 GV: corn	E85 FFV: corn	E85 FFV: WB	E85 FFV: HB	EV: US mix	EV: NE US mix	EV: CA mix	GC SIDI HEV: CARFG2, ETBE, CA mix	GC SIDI HEV: CARFG2, EtOH, CA mix	GI SIDI HEV: FRFG2, MTBE	GI CIDI HEV: CD
Total energy	2.1%	17.9%	90.4%	79.1%	-14.7%	-14.0%	-16.9%	-35.9%	-36.0%	-47.4%	-52.5%
Fossil fuels	-3.4%	-41.8%	-81.8%	-72.7%	-34.7%	-46.0%	-68.6%	-52.9%	-52.7%	-47.4%	-52.5%
Petroleum	-6.3%	-73.8%	-71.2%	-73.2%	-98.4%	-96.9%	-99.5%	-64.9%	-62.0%	-53.2%	-50.6%
VOC: Total	14.0%	70.6%	9.1%	4.1%	-85.2%	-88.4%	-94.0%	-46.9%	-38.3%	-34.4%	-61.5%
VOC: Urban	9.0%	-16.3%	-16.5%	-16.5%	-99.5%	-99.3%	-99.4%	-49.8%	-34.4%	-29.2%	-58.2%
CO: Total	-35.1%	-37.6%	-31.3%	-32.6%	-98.2%	-98.2%	-98.8%	-54.8%	-55.0%	-36.0%	-85.5%
CO: Urban	-35.9%	-39.8%	-39.8%	-39.8%	-99.9%	-99.9%	-99.9%	-55.2%	-55.2%	-36.0%	-86.2%
NOx: Total	9.7%	99.4%	122.6%	136.5%	60.9%	9.1%	-52.3%	-21.8%	-26.3%	-17.7%	9.5%
NOx: Urban	0.8%	-1.4%	-2.7%	-2.0%	-94.9%	-91.2%	-93.4%	-28.6%	-29.1%	-1.7%	52.7%
PM10: Total	64.7%	696.9%	159.2%	141.8%	56.5%	13.6%	-34.3%	15.3%	-2.1%	-14.9%	114.4%
PM10: Urban	0.7%	-16.6%	-17.2%	-16.9%	-40.3%	-37.8%	-39.4%	-6.6%	-7.0%	6.8%	226.5%
SOx: Total	15.7%	168.8%	-151.8%	-95.8%	462.8%	217.2%	-13.9%	-35.4%	-41.6%	-62.6%	-53.7%
SOx: Urban	-6.7%	-78.6%	-79.1%	-78.9%	-96.9%	-90.7%	-99.0%	-93.0%	-93.1%	-90.9%	-35.2%
CH4	-1.5%	-15.9%	-65.8%	-51.5%	-13.3%	-21.5%	-47.9%	-34.4%	-42.8%	-32.1%	-57.1%
N2O	51.1%	562.8%	210.4%	683.7%	-88.7%	-88.9%	-92.1%	-1.8%	-15.0%	-2.1%	-29.0%
CO2	-2.9%	-36.4%	-113.0%	-85.4%	-24.3%	-42.8%	-70.7%	-50.4%	-51.9%	-46.8%	-49.9%
GHGs	-2.0%	-26.4%	-106.6%	-72.4%	-25.1%	-43.0%	-70.4%	-49.2%	-51.1%	-45.7%	-49.8%

D-I Near-Term Technologies

D-I.1 Light-Duty Truck 2

Parameter	GV: FRFG2, MTBE	GV: CARFG2, ETBE	GV: CARFG2, EtOH	CIDI: CD	Bi-fuel CNGV	Dedi. CNGV	Dedi. LPGV: crude	Dedi. LPGV: NG	M85 FFV: NG	M85 FFV: FG	M85 FFV: LFG
Total energy	0.0%	0.8%	0.4%	-29.7%	6.7%	3.3%	-8.6%	-9.6%	20.2%	22.4%	7.8%
Fossil fuels	0.0%	-3.1%	-2.6%	-29.6%	5.7%	2.3%	-8.6%	-9.3%	20.7%	-36.0%	-50.5%
Petroleum	-11.0%	-10.1%	-2.5%	-26.7%	-99.4%	-99.4%	-3.4%	-98.2%	-71.3%	-71.3%	-71.8%
VOC: Total	-11.7%	-6.9%	3.9%	-35.8%	-50.7%	-71.0%	-42.9%	-45.9%	-25.3%	-78.5%	-33.5%
VOC: Urban	-13.2%	-13.1%	1.8%	-33.3%	-49.7%	-72.6%	-43.0%	-41.8%	-26.7%	-26.7%	-27.9%
CO: Total	-19.5%	-19.4%	-19.7%	-92.1%	-43.3%	-51.2%	-39.7%	-39.9%	-38.6%	-39.5%	-43.5%
CO: Urban	-20.0%	-20.0%	-20.0%	-92.8%	-43.8%	-51.8%	-40.0%	-40.0%	-40.0%	-40.0%	-41.5%
NOx: Total	-2.3%	4.8%	-1.2%	-5.0%	13.2%	12.1%	-17.8%	-20.1%	-7.5%	-26.7%	-12.5%
NOx: Urban	-4.7%	-4.2%	-4.7%	3.7%	9.5%	9.1%	-14.6%	-14.6%	-15.6%	-15.6%	-17.8%
PM10: Total	-2.0%	96.8%	47.8%	125.4%	-39.3%	-41.3%	-37.0%	-48.1%	-27.9%	-45.8%	-325.5%
PM10: Urban	-1.4%	-0.1%	-1.4%	249.9%	-34.0%	-36.2%	-35.2%	-35.3%	-26.2%	-26.2%	-291.1%
SOx: Total	-28.9%	-0.4%	-16.3%	-31.4%	-37.5%	-39.5%	-57.3%	-77.4%	-56.6%	-57.5%	52.5%
SOx: Urban	-82.7%	-82.8%	-83.0%	-3.9%	-96.1%	-96.2%	-98.0%	-98.1%	-72.4%	-72.4%	-98.6%
CH4	19.2%	19.9%	-2.2%	-36.3%	182.9%	176.7%	-7.2%	1.7%	8.0%	-7.0%	-467.7%
N2O	0.4%	67.8%	35.1%	-21.2%	-38.3%	-19.4%	-2.0%	-1.9%	2.0%	-2.3%	-0.1%
CO2	1.2%	-0.9%	-5.1%	-25.8%	-13.8%	-16.5%	-12.6%	-14.3%	0.0%	-67.9%	-136.3%
GHGs	1.6%	0.8%	-4.4%	-26.0%	-9.0%	-11.5%	-12.2%	-13.7%	0.3%	-65.2%	-142.7%

D-I.1 Light-Duty Truck 2 (Cont.)

Parameter	E10 GV: corn	E85 FFV: corn	E85 FFV: WB	E85 FFV: HB	EV: US mix	EV: NE US mix	EV: CA mix	GC SIDI HEV: CARFG2, ETBE, CA mix	GC SIDI HEV: CARFG2, EtOH, CA mix	GI SIDI HEV: FRFG2, MTBE	GI CIDI HEV: CD
Total energy	2.1%	23.8%	99.9%	88.1%	-14.7%	-14.0%	-16.9%	-35.9%	-36.0%	-47.4%	-52.5%
Fossil fuels	-3.4%	-38.9%	-80.9%	-71.3%	-34.7%	-46.0%	-68.6%	-52.9%	-52.7%	-47.4%	-52.5%
Petroleum	-6.3%	-72.5%	-69.8%	-71.9%	-98.4%	-96.9%	-99.5%	-64.9%	-62.0%	-53.2%	-50.6%
VOC: Total	6.4%	13.8%	-12.4%	-14.5%	-94.0%	-95.3%	-97.6%	-48.8%	-33.4%	-31.0%	-37.9%
VOC: Urban	3.7%	-24.8%	-24.8%	-24.8%	-99.8%	-99.8%	-99.8%	-50.0%	-31.4%	-28.9%	-33.7%
CO: Total	-35.5%	-38.5%	-34.7%	-35.5%	-99.0%	-99.0%	-99.3%	-57.7%	-57.8%	-40.0%	-92.4%
CO: Urban	-36.0%	-39.9%	-39.9%	-39.9%	-100.0%	-99.9%	-99.9%	-58.0%	-58.0%	-40.0%	-92.8%
NOx: Total	4.9%	45.3%	57.8%	65.2%	-18.2%	-44.6%	-75.8%	-34.1%	-36.5%	-20.9%	-9.0%
NOx: Urban	0.3%	-11.3%	-11.8%	-11.6%	-98.0%	-96.6%	-97.4%	-39.8%	-40.0%	-15.4%	3.4%
PM10: Total	70.7%	804.5%	187.9%	167.9%	65.6%	18.6%	-33.6%	17.3%	-1.7%	-17.0%	117.0%
PM10: Urban	0.8%	-14.6%	-15.3%	-15.0%	-40.1%	-37.2%	-39.1%	-6.6%	-7.1%	6.5%	249.0%
SOx: Total	15.7%	182.2%	-154.4%	-95.6%	462.8%	217.2%	-13.9%	-35.4%	-41.6%	-62.6%	-53.7%
SOx: Urban	-6.7%	-77.5%	-78.1%	-77.8%	-96.9%	-90.7%	-99.0%	-93.0%	-93.1%	-90.9%	-35.2%
CH4	-1.6%	-13.4%	-66.6%	-51.3%	-12.0%	-20.3%	-47.1%	-34.4%	-43.0%	-32.6%	-56.4%
N2O	49.3%	570.1%	213.3%	692.5%	-89.1%	-89.3%	-92.3%	-2.8%	-15.5%	-2.0%	-22.0%
CO2	-2.8%	-32.4%	-112.8%	-83.9%	-24.3%	-42.8%	-70.7%	-50.4%	-51.9%	-46.8%	-49.9%
GHGs	-1.9%	-22.1%	-106.3%	-70.3%	-25.1%	-43.0%	-70.4%	-49.2%	-51.1%	-45.7%	-49.7%

D-II Long-Term Technologies

D-II.1 Passenger Cars

Parameter	Dedi. CNGV	Dedi. LNGV	Dedi. LPGV: crude	Dedi. LPGV: NG	Dedi. MeOHV: M90, NG	Dedi. MeOHV: M90, FG	Dedi. MeOHV: M90, LFG	Dedi. EtOHV: E90, corn	Dedi. EtOHV: E90, WB	Dedi. EtOHV: E90, HB	SIDI: FRFG2, MTBE
Total energy	-8.6%	-5.7%	-16.8%	-17.7%	8.8%	13.8%	-1.8%	10.0%	57.7%	44.4%	-20.0%
Fossil fuels	-9.5%	-5.1%	-16.9%	-17.4%	9.4%	-45.4%	-61.0%	-50.1%	-82.2%	-78.2%	-20.0%
Petroleum	-99.4%	-96.0%	-1.3%	-98.2%	-78.1%	-78.1%	-78.7%	-81.5%	-79.3%	-81.1%	-20.0%
VOC: Total	-62.6%	-55.8%	-48.6%	-56.2%	-15.8%	-156.0%	-35.9%	74.4%	4.9%	-0.1%	-11.0%
VOC: Urban	-55.1%	-56.8%	-49.0%	-45.3%	-11.1%	-11.1%	-15.0%	-8.9%	-9.0%	-9.0%	-7.3%
CO: Total	-19.9%	-18.2%	-20.6%	-21.3%	1.5%	-0.9%	-14.9%	2.1%	11.7%	9.5%	-1.0%
CO: Urban	-19.4%	-20.1%	-19.9%	-20.0%	-0.2%	-0.2%	-5.6%	0.0%	0.0%	0.0%	-0.1%
NOx: Total	26.5%	67.7%	-32.1%	-39.9%	-4.8%	-74.3%	-24.7%	147.0%	223.2%	228.4%	-16.6%
NOx: Urban	102.8%	-11.5%	-2.8%	-3.7%	-17.2%	-17.2%	-48.5%	9.4%	4.9%	6.2%	-5.2%
PM10: Total	-34.2%	-30.4%	-31.1%	-39.0%	-25.4%	-36.7%	-265.9%	409.1%	59.4%	46.8%	1.5%
PM10: Urban	-24.6%	-26.0%	-25.1%	-25.2%	-14.5%	-14.5%	-197.8%	-12.2%	-12.4%	-12.3%	11.9%
SOx: Total	-34.1%	-76.7%	-48.4%	-71.8%	-60.0%	-60.4%	50.8%	120.0%	-90.2%	-70.0%	-20.0%
SOx: Urban	-80.6%	-98.3%	-91.3%	-91.5%	-77.9%	-77.9%	-234.2%	-82.9%	-83.7%	-83.3%	-20.0%
CH4	84.4%	84.2%	-28.9%	-22.3%	-22.2%	-27.0%	-409.0%	-19.3%	-60.9%	-54.3%	-18.0%
N2O	-48.5%	-47.7%	-2.2%	-2.2%	-0.4%	-2.7%	0.4%	307.9%	91.3%	337.6%	-0.9%
CO2	-26.9%	-27.0%	-21.3%	-22.9%	-11.6%	-77.3%	-146.8%	-49.4%	-107.1%	-88.7%	-20.0%
GHGs	-23.8%	-23.9%	-21.2%	-22.5%	-11.7%	-74.3%	-152.2%	-39.9%	-101.1%	-77.5%	-19.6%

D-II.1 Passenger Cars (Cont.)

Parameter	SIDI: FRFG2, ETBE	SIDI: FRFG2 EtOH	SIDI: CARFG2, ETBE	SIDI: CARFG2, EtOH	Dedi. MeOH SIDI: M90, NG	Dedi. MeOH SIDI: M90, FG	Dedi. MeOH SIDI: M90, LFG	Dedi. EtOH SIDI: E90, corn	Dedi. EtOH SIDI: E90, WB	Dedi. EtOH SIDI: E90, HB	GI SIDI HEV: FRFG2, MTBE
Total energy	-20.0%	-20.0%	-20.0%	-20.0%	-6.7%	-2.3%	-16.1%	-3.2%	38.7%	27.1%	-47.4%
Fossil fuels	-20.0%	-20.0%	-19.0%	-19.3%	-6.2%	-68.4%	-68.1%	-56.1%	-84.4%	-80.8%	-47.4%
Petroleum	-20.0%	-20.0%	-17.2%	-19.2%	-82.1%	-82.1%	-82.6%	-83.7%	-81.8%	-83.4%	-47.4%
VOC: Total	-12.0%	-8.7%	-12.0%	-8.7%	-24.6%	-148.0%	-42.3%	57.4%	-3.8%	-8.1%	-28.0%
VOC: Urban	-7.4%	-3.0%	-7.4%	-3.0%	-15.8%	-15.8%	-19.3%	-13.9%	-14.0%	-14.0%	-32.2%
CO: Total	-1.1%	-0.9%	-1.1%	-0.9%	0.4%	-1.8%	-14.0%	1.3%	9.8%	7.8%	-2.4%
CO: Urban	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	-5.0%	0.0%	0.0%	0.0%	-0.1%
NOx: Total	-17.2%	-16.7%	-17.2%	-16.7%	-22.5%	-83.6%	-39.9%	119.3%	186.4%	191.0%	-39.3%
NOx: Urban	-6.2%	-5.3%	-6.2%	-5.3%	-18.3%	-18.3%	-45.8%	5.3%	1.3%	2.5%	-12.4%
PM10: Total	-7.7%	-4.4%	-7.7%	-4.4%	-23.1%	-33.1%	-234.7%	359.2%	51.4%	40.3%	-12.2%
PM10: Urban	11.6%	11.9%	11.6%	11.9%	-2.1%	-2.1%	-163.4%	0.0%	-0.2%	-0.1%	4.8%
SOx: Total	-20.0%	-20.0%	-20.0%	-20.0%	-76.3%	-76.7%	21.2%	93.6%	-91.4%	-73.6%	-47.4%
SOx: Urban	-20.0%	-20.0%	-20.5%	-20.5%	-80.6%	-80.6%	-218.1%	-85.0%	-85.7%	-85.3%	-47.4%
CH4	-18.0%	-17.6%	-18.0%	-17.6%	-35.3%	-39.5%	-375.7%	-26.8%	-63.5%	-57.6%	-42.6%
N2O	-7.2%	-4.7%	-7.2%	-4.7%	-1.5%	-3.5%	-0.7%	268.1%	77.5%	294.2%	-2.1%
CO2	-20.0%	-19.7%	-20.0%	-19.8%	-24.7%	-82.5%	-143.7%	-55.3%	-106.2%	-90.0%	-47.4%
GHGs	-19.6%	-19.3%	-19.6%	-19.3%	-24.6%	-79.7%	-148.2%	-46.7%	-100.6%	-79.8%	-46.4%

D-II.1 Passenger Cars (Cont.)

Parameter	GI SIDI HEV: FRFG2, ETBE	GI SIDI HEV: FRFG2, EtOH	GI SI HEV: CNG	GI SI HEV: LNG	GI SI HEV: LPG, crude	GI SI HEV: LPG, NG	GI SIDI HEV: M90, NG	GI SIDI HEV: M90, FG	GI SIDI HEV: M90 LFG	GI SIDI HEV: E90, corn	GI SIDI HEV: E90, WB
Total energy	-47.4%	-47.4%	-43.5%	-41.7%	-46.2%	-46.7%	-37.0%	-34.1%	-43.2%	-36.3%	-8.7%
Fossil fuels	-47.4%	-47.4%	-44.1%	-41.4%	-46.2%	-46.6%	-36.7%	-68.4%	-77.4%	-71.1%	-89.7%
Petroleum	-47.4%	-47.4%	-99.6%	-97.5%	-36.1%	-98.8%	-87.3%	-87.3%	-87.7%	-89.3%	-88.0%
VOC: Total	-30.2%	-26.3%	-65.5%	-61.3%	-55.2%	-60.1%	-35.0%	-116.2%	-46.7%	16.3%	-24.0%
VOC: Urban	-32.3%	-23.6%	-56.2%	-57.2%	-50.7%	-48.3%	-25.7%	-25.7%	-28.0%	-24.3%	-24.3%
CO: Total	-2.5%	-2.1%	-21.5%	-20.4%	-21.8%	-22.2%	-1.2%	-2.7%	-10.7%	-0.7%	4.9%
CO: Urban	-0.2%	-0.1%	-19.7%	-20.1%	-20.0%	-20.0%	-0.2%	-0.2%	-3.4%	-0.1%	-0.1%
NOx: Total	-40.8%	-39.5%	-15.4%	10.1%	-50.0%	-55.1%	-37.8%	-78.0%	-49.2%	50.0%	94.1%
NOx: Urban	-14.7%	-12.5%	53.5%	-17.1%	-11.1%	-11.7%	-21.0%	-21.0%	-39.1%	-4.9%	-7.6%
PM10: Total	-27.2%	-21.8%	-34.5%	-32.1%	-32.0%	-37.1%	-27.5%	-34.1%	-166.8%	216.1%	13.6%
PM10: Urban	4.4%	4.8%	-16.5%	-17.4%	-16.8%	-16.8%	-7.1%	-7.1%	-113.2%	-5.6%	-5.7%
SOx: Total	-47.4%	-47.4%	-59.3%	-85.6%	-66.6%	-81.7%	-76.8%	-77.1%	-12.7%	27.4%	-94.3%
SOx: Urban	-47.4%	-47.4%	-88.0%	-98.9%	-94.4%	-94.5%	-87.2%	-87.2%	-177.7%	-90.1%	-90.6%
CH4	-42.7%	-41.7%	33.0%	32.8%	-50.1%	-45.8%	-52.8%	-55.6%	-276.8%	-45.7%	-69.8%
N2O	-16.9%	-11.2%	-50.0%	-49.4%	-3.0%	-3.0%	-2.1%	-3.4%	-1.6%	168.3%	42.9%
CO2	-47.4%	-47.2%	-55.0%	-55.0%	-49.1%	-50.1%	-48.8%	-86.9%	-127.1%	-70.3%	-103.8%
GHGs	-46.4%	-46.2%	-52.1%	-52.1%	-48.3%	-49.1%	-48.1%	-84.3%	-129.4%	-63.9%	-99.3%

D-II.1 Passenger Cars (Cont.)

Parameter	GI SIDI HEV: E90, HB	GC SIDI HEV: FRFG2, MTBE, US mix	GC SIDI HEV: FRFG2, ETBE, US mix	GC SIDI HEV: FRFG2, EtOH, US mix	GC SIDI HEV: FRFG2, MTBE, CA mix	GC SIDI HEV: FRFG2, ETBE, CA mix	GC SIDI HEV: FRFG2, EtOH, CA mix	GC SI HEV: CNG, US mix	GC SI HEV: CNG, CA mix	GC SI HEV: LNG, US mix	GC SI HEV: LNG, CA mix
Total energy	-16.4%	-43.7%	-43.8%	-43.7%	-43.9%	-44.0%	-43.9%	-40.8%	-41.0%	-39.5%	-39.7%
Fossil fuels	-87.4%	-48.2%	-47.1%	-47.3%	-55.5%	-54.8%	-54.9%	-45.7%	-53.0%	-43.8%	-51.1%
Petroleum	-89.1%	-60.7%	-60.4%	-61.4%	-61.0%	-60.7%	-61.7%	-99.4%	-99.6%	-97.8%	-98.1%
VOC: Total	-26.9%	-46.1%	-47.9%	-45.0%	-48.2%	-49.8%	-47.0%	-72.6%	-74.8%	-69.6%	-71.7%
VOC: Urban	-24.4%	-43.8%	-43.9%	-40.8%	-43.8%	-43.9%	-40.8%	-69.2%	-69.2%	-70.0%	-70.0%
CO: Total	3.6%	-30.9%	-31.0%	-30.7%	-31.2%	-31.3%	-31.0%	-44.3%	-44.5%	-43.5%	-43.8%
CO: Urban	-0.1%	-30.1%	-30.1%	-30.1%	-30.1%	-30.1%	-30.0%	-43.8%	-43.7%	-44.1%	-44.1%
NOx: Total	97.1%	4.4%	-7.7%	2.9%	-37.8%	-42.2%	-38.3%	21.7%	-20.4%	40.1%	-2.0%
NOx: Urban	-6.8%	-32.7%	-34.6%	-32.7%	-31.1%	-33.1%	-31.1%	14.9%	16.5%	-36.0%	-34.5%
PM10: Total	6.3%	-2.9%	-28.2%	-19.1%	-19.2%	-37.6%	-31.0%	-18.6%	-34.9%	-16.9%	-33.2%
PM10: Urban	-5.7%	-6.3%	-6.8%	-6.3%	-6.2%	-6.7%	-6.2%	-21.2%	-21.1%	-21.9%	-21.7%
SOx: Total	-82.6%	81.0%	53.4%	68.0%	-40.0%	-44.3%	-42.1%	72.6%	-48.5%	53.6%	-67.5%
SOx: Urban	-90.4%	-59.2%	-59.2%	-59.2%	-61.3%	-61.4%	-61.4%	-88.1%	-90.3%	-96.0%	-98.2%
CH4	-65.9%	-43.6%	-43.7%	-39.7%	-49.9%	-50.0%	-47.3%	10.2%	3.9%	10.1%	3.8%
N2O	185.5%	-28.2%	-39.4%	-35.0%	-29.9%	-40.5%	-36.4%	-61.7%	-63.4%	-61.3%	-63.0%
CO2	-93.1%	-46.1%	-46.5%	-45.8%	-56.0%	-56.2%	-55.8%	-51.4%	-61.3%	-51.4%	-61.4%
GHGs	-85.6%	-45.6%	-46.3%	-45.4%	-55.3%	-55.6%	-55.1%	-49.6%	-59.3%	-49.7%	-59.3%

D-II.1 Passenger Cars (Cont.)

Parameter	GC SI HEV: LPG, crude, US mix	GC SI HEV: LPG, NG, US mix	GC SI HEV: LPG, crude, CA mix	GC SI HEV: LPG, NG, CA mix	GC SIDI HEV: M90, NG, US mix	GC SIDI HEV: M90, FG, US mix	GC SIDI HEV: M90, LFG, US mix	GC SIDI HEV: M90, NG, CA mix	GC SIDI HEV: M90, FG, CA mix	GC SIDI HEV: M90, LFG, CA mix	GC SIDI HEV: E90, corn, US mix
Total energy	-42.7%	-43.1%	-42.9%	-43.3%	-36.2%	-34.1%	-40.6%	-36.4%	-34.3%	-40.8%	-35.8%
Fossil fuels	-47.2%	-47.5%	-54.6%	-54.8%	-40.5%	-63.3%	-69.8%	-47.8%	-70.7%	-77.1%	-64.7%
Petroleum	-53.6%	-98.8%	-53.8%	-99.0%	-90.5%	-90.5%	-90.7%	-90.8%	-90.8%	-91.0%	-91.9%
VOC: Total	-65.9%	-68.8%	-67.4%	-70.9%	-51.1%	-109.5%	-59.5%	-53.3%	-111.6%	-61.7%	-14.4%
VOC: Urban	-66.3%	-63.6%	-65.3%	-63.6%	-47.9%	-47.9%	-49.5%	-47.8%	-47.8%	-49.5%	-46.9%
CO: Total	-44.7%	-44.8%	-44.8%	-45.1%	-30.1%	-31.1%	-36.9%	-30.3%	-31.4%	-37.2%	-29.7%
CO: Urban	-44.0%	-44.0%	-44.0%	-44.0%	-30.1%	-30.1%	-32.4%	-30.1%	-30.1%	-32.4%	-30.0%
NOx: Total	-2.1%	-6.9%	-45.4%	-49.0%	5.5%	-23.4%	-2.7%	-36.6%	-65.5%	-44.9%	67.5%
NOx: Urban	-32.0%	-32.1%	-30.1%	-30.5%	-38.8%	-38.8%	-51.9%	-37.3%	-37.3%	-50.3%	-27.2%
PM10: Total	-16.0%	-20.5%	-33.1%	-36.8%	-13.8%	-18.5%	-113.9%	-30.1%	-34.8%	-130.2%	152.1%
PM10: Urban	-21.6%	-21.4%	-21.3%	-21.3%	-14.7%	-14.7%	-91.0%	-14.6%	-14.6%	-90.9%	-13.6%
SOx: Total	67.3%	56.4%	-53.8%	-64.7%	59.9%	59.7%	106.0%	-61.2%	-61.4%	-15.1%	121.8%
SOx: Urban	-92.7%	-92.8%	-94.9%	-95.0%	-87.6%	-87.6%	-152.6%	-89.8%	-89.8%	-154.8%	-89.6%
CH4	-49.5%	-45.8%	-55.2%	-52.1%	-50.8%	-52.8%	-211.8%	-57.1%	-59.1%	-218.1%	-42.8%
N2O	-28.5%	-28.9%	-30.5%	-30.5%	-28.3%	-29.2%	-27.9%	-29.9%	-30.9%	-29.5%	40.5%
CO2	-47.2%	-47.9%	-57.1%	-57.8%	-47.1%	-74.4%	-103.4%	-57.1%	-84.4%	-113.3%	-62.4%
GHGs	-47.0%	-47.5%	-56.6%	-57.1%	-46.9%	-72.9%	-105.3%	-56.5%	-82.6%	-115.0%	-59.4%

D-II.1 Passenger Cars (Cont.)

Parameter	GC SIDI HEV: E90, WB, US mix	GC SIDI HEV: E90, HB, US mix	GC SIDI HEV: E90, corn, CA mix	GC SIDI HEV: E90, WB, CA mix	GC SIDI HEV: E90, HB, CA mix	CIDI: RFD	CIDI: DME, NG	CIDI: DME, FG	CIDI: FT50, NG	CIDI: FT50, FG	CIDI: BD20
Total energy	-15.9%	-21.5%	-36.0%	-16.1%	-21.7%	-35.1%	-17.7%	-14.4%	-21.3%	-13.2%	-31.4%
Fossil fuels	-78.1%	-76.4%	-72.3%	-85.7%	-84.0%	-35.0%	-17.2%	-67.4%	-21.1%	-38.6%	-31.6%
Petroleum	-91.0%	-91.8%	-92.2%	-91.3%	-92.0%	-25.0%	-97.9%	-97.9%	-59.9%	-59.9%	-36.7%
VOC: Total	-43.3%	-45.4%	-16.4%	-45.3%	-47.4%	-61.9%	-74.3%	-192.5%	-67.4%	-135.9%	-38.0%
VOC: Urban	-46.9%	-46.9%	-46.8%	-46.9%	-46.9%	-63.4%	-76.0%	-76.0%	-65.0%	-65.0%	-61.3%
CO: Total	-25.6%	-26.6%	-29.9%	-25.9%	-26.8%	-2.4%	-0.5%	-3.1%	-2.1%	-3.1%	-0.2%
CO: Urban	-30.0%	-30.0%	-30.0%	-30.0%	-30.0%	-0.1%	-0.3%	-0.3%	-0.2%	-0.2%	0.5%
NOx: Total	99.2%	101.4%	26.1%	57.8%	60.0%	-24.4%	-23.2%	-90.0%	-32.7%	-64.7%	17.7%
NOx: Urban	-29.1%	-28.5%	-25.5%	-27.4%	-26.9%	43.1%	32.6%	32.6%	38.2%	38.2%	78.5%
PM10: Total	6.5%	1.2%	140.2%	-5.4%	-10.6%	-13.7%	-36.0%	-47.9%	-28.6%	-33.0%	-7.0%
PM10: Urban	-13.6%	-13.6%	-13.4%	-13.5%	-13.5%	-1.4%	-12.0%	-12.0%	-8.3%	-8.3%	-0.8%
SOx: Total	34.3%	42.7%	11.7%	-75.8%	-67.4%	-34.1%	-82.2%	-83.3%	-58.4%	-58.0%	-32.6%
SOx: Urban	-90.0%	-89.8%	-91.8%	-92.2%	-92.0%	6.8%	-95.7%	-95.7%	-42.2%	-42.2%	-9.6%
CH4	-60.1%	-57.3%	-50.4%	-67.7%	-64.9%	-51.9%	-50.0%	-49.9%	-52.1%	-51.6%	-53.9%
N2O	-49.6%	52.9%	39.2%	-51.0%	51.5%	-42.7%	-44.6%	-47.4%	-44.9%	-45.4%	-35.4%
CO2	-86.5%	-78.8%	-72.5%	-96.5%	-88.8%	-32.3%	-35.7%	-94.6%	-31.6%	-61.2%	-40.1%
GHGs	-84.9%	-75.1%	-69.2%	-94.6%	-84.8%	-33.1%	-36.3%	-92.3%	-32.5%	-60.6%	-40.5%

D-II.1 Passenger Cars (Cont.)

Parameter	GI CIDI HEV: RFD	GI CIDI HEV: DME, NG	GI CIDI HEV: DME, FG	GI CIDI HEV: FT50, NG	GI CIDI HEV: FT50, FG	GI CIDI HEV: BD20	GC CIDI HEV: RFD, US mix	GC CIDI HEV: RFD CA mix	GC CIDI HEV: DME, NG, US mix	GC CIDI HEV: DME, FG, US mix	GC CIDI HEV: DME, NG, CA mix
Total energy	-57.7%	-46.3%	-44.2%	-43.3%	-48.7%	-55.3%	-53.5%	-53.3%	-42.2%	-40.7%	-42.4%
Fossil fuels	-57.6%	-46.0%	-78.7%	-43.1%	-57.6%	-55.4%	-65.2%	-57.8%	-46.5%	-70.5%	-53.9%
Petroleum	-51.1%	-98.6%	-98.6%	-73.8%	-73.8%	-58.7%	-67.3%	-67.1%	-98.6%	-98.6%	-98.9%
VOC: Total	-67.0%	-77.5%	-154.6%	-115.3%	-70.6%	-51.4%	-76.2%	-74.1%	-80.9%	-137.4%	-83.1%
VOC: Urban	-41.2%	-48.6%	-48.6%	-65.6%	-65.6%	-63.2%	-75.2%	-75.2%	-83.3%	-83.3%	-83.3%
CO: Total	-3.3%	-2.1%	-3.8%	-3.8%	-3.1%	-1.9%	-31.9%	-31.7%	-30.6%	-31.9%	-30.9%
CO: Urban	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	0.2%	-30.2%	-30.2%	-30.2%	-30.2%	-30.1%
NOx: Total	-40.4%	-39.6%	-83.1%	-66.7%	-45.8%	-12.9%	-40.3%	1.8%	4.4%	-27.5%	-37.8%
NOx: Urban	6.5%	5.3%	5.3%	35.1%	35.1%	61.3%	-2.1%	-3.7%	-2.2%	-2.2%	-0.6%
PM10: Total	-21.0%	-37.7%	-45.5%	-35.0%	-32.2%	-17.3%	-26.2%	-9.9%	-21.0%	-26.7%	-37.3%
PM10: Urban	-1.9%	-11.4%	-11.4%	-8.6%	-8.6%	-2.7%	-11.7%	-11.8%	-18.2%	-18.2%	-18.1%
SOx: Total	-57.0%	-88.4%	-89.1%	-72.6%	-72.9%	-56.1%	-49.3%	71.8%	51.7%	51.2%	-69.4%
SOx: Urban	-4.7%	-14.9%	-14.9%	-62.3%	-62.3%	-41.1%	-54.9%	-52.7%	-94.7%	-94.7%	-96.9%
CH4	-68.1%	-66.3%	-66.3%	-67.9%	-68.2%	-69.4%	-69.6%	-63.3%	-60.1%	-60.1%	-66.4%
N2O	-43.5%	-44.8%	-46.6%	-45.3%	-45.0%	-38.8%	-59.0%	-57.3%	-58.1%	-59.5%	-59.8%
CO2	-55.8%	-58.1%	-96.5%	-74.7%	-55.4%	-60.9%	-64.5%	-54.5%	-53.2%	-81.3%	-63.2%
GHGs	-56.0%	-58.1%	-94.6%	-74.0%	-55.6%	-60.7%	-64.5%	-54.8%	-53.5%	-80.2%	-63.2%

D-II.1 Passenger Cars (Cont.)

Parameter	GC CIDI HEV: DME, FG, CA mix	GC CIDI HEV: FT50, NG, US mix	GC CIDI HEV: FT50, FG, US mix	GC CIDI HEV: FT50, NG, CA mix	GC CIDI HEV: FT50, FG, CA mix	GC CIDI HEV: BD20, US mix	GC CIDI HEV: BD20, CA mix	EV: US mix	EV: NE US mix	EV: CA mix	H2 FCV: NG, C. gaseous
Total energy	-40.9%	-43.9%	-40.1%	-44.1%	-40.3%	-48.8%	-49.0%	-38.4%	-39.7%	-39.0%	-59.7%
Fossil fuels	-77.8%	-48.3%	-56.7%	-55.7%	-64.0%	-53.4%	-60.7%	-53.4%	-57.2%	-77.9%	-60.3%
Petroleum	-98.9%	-80.5%	-80.5%	-80.7%	-80.7%	-69.4%	-69.7%	-98.7%	-98.2%	-99.6%	-99.7%
VOC: Total	-139.5%	-76.1%	-108.8%	-78.2%	-111.0%	-62.0%	-64.2%	-89.6%	-92.5%	-96.7%	-95.8%
VOC: Urban	-83.3%	-75.8%	-75.8%	-75.8%	-75.8%	-74.1%	-74.0%	-99.7%	-99.5%	-99.7%	-98.3%
CO: Total	-32.1%	-31.4%	-31.9%	-31.7%	-32.1%	-30.5%	-30.8%	-97.5%	-97.3%	-98.5%	-97.1%
CO: Urban	-30.1%	-30.1%	-30.1%	-30.1%	-30.1%	-29.8%	-29.8%	-99.9%	-99.8%	-99.9%	-99.5%
NOx: Total	-69.6%	-0.2%	-15.5%	-42.3%	-57.6%	23.9%	-18.3%	103.6%	44.7%	-36.8%	-41.5%
NOx: Urban	-0.6%	0.5%	0.5%	2.1%	2.1%	19.7%	21.3%	-80.8%	-60.2%	-75.5%	-23.4%
PM10: Total	-43.0%	-17.0%	-19.1%	-33.3%	-35.4%	-6.2%	-22.5%	17.7%	-8.2%	-36.7%	-47.4%
PM10: Urban	-18.1%	-15.7%	-15.7%	-15.6%	-15.6%	-11.5%	-11.3%	-32.4%	-30.5%	-32.0%	-32.2%
SOx: Total	-69.9%	63.1%	63.3%	-58.0%	-57.8%	75.4%	-45.7%	377.4%	147.0%	-26.2%	-66.0%
SOx: Urban	-96.9%	-69.2%	-69.2%	-71.4%	-71.4%	-53.6%	-55.8%	-89.3%	-78.7%	-96.5%	-99.0%
CH4	-66.3%	-61.4%	-61.2%	-67.7%	-67.5%	-62.3%	-68.6%	-48.8%	-45.9%	-69.7%	-62.6%
N2O	-61.1%	-58.3%	-58.5%	-59.9%	-60.2%	-53.7%	-55.4%	-89.3%	-90.2%	-94.9%	-98.2%
CO2	-91.3%	-51.2%	-65.4%	-61.2%	-75.4%	-55.3%	-65.2%	-46.3%	-56.7%	-79.4%	-68.6%
GHGs	-89.9%	-51.7%	-65.1%	-61.4%	-74.8%	-55.5%	-65.1%	-47.2%	-57.0%	-79.4%	-69.0%

D-II.1 Passenger Cars (Cont.)

Parameter	H2 FCV: NG, station gaseous	H2 FCV: solar, gas	H2 FCV: solar, liquid	H2 FCV: NG, liquid	FCV: MeOH, NG	FCV: MeOH, FG
Total energy	-53.2%	-65.5%	-71.8%	-58.8%	-52.3%	-49.7%
Fossil fuels	-52.9%	-93.1%	-98.3%	-58.5%	-52.0%	-80.3%
Petroleum	-99.7%	-99.9%	-98.1%	-97.8%	-98.6%	-98.6%
VOC: Total	-94.5%	-95.8%	-92.3%	-89.8%	-72.8%	-145.1%
VOC: Urban	-94.9%	-97.6%	-97.8%	-97.7%	-73.6%	-73.6%
CO: Total	-95.9%	-98.4%	-98.8%	-96.7%	-78.0%	-79.3%
CO: Urban	-97.1%	-99.3%	-99.8%	-99.8%	-80.0%	-80.0%
NOx: Total	-30.8%	-35.8%	-71.0%	-44.6%	-63.3%	-99.1%
NOx: Urban	93.3%	7.2%	-75.4%	-73.0%	-82.8%	-82.8%
PM10: Total	-46.4%	-46.4%	-43.6%	-38.8%	-49.5%	-55.4%
PM10: Urban	-25.6%	-31.4%	-30.8%	-30.6%	-34.0%	-34.0%
SOx: Total	-91.7%	-63.5%	-97.5%	-90.6%	-87.8%	-88.0%
SOx: Urban	-99.4%	-98.8%	-97.2%	-97.1%	-97.0%	-97.0%
CH4	-47.1%	-86.9%	-98.8%	-63.3%	-68.0%	-70.5%
N2O	-96.7%	-98.1%	-99.4%	-97.8%	-79.2%	-80.4%
CO2	-63.7%	-93.4%	-98.3%	-67.7%	-62.8%	-96.7%
GHGs	-63.8%	-93.3%	-98.3%	-68.1%	-63.3%	-95.6%

D-II.1 Passenger Cars (Cont.)

Parameter	FCV: MeOH, LFG	FCV: RFG	EtOH FCV: corn	EtOH FCV: WB	EtOH FCV: HB	NG FCV: CNG
Total energy	-57.8%	-50.0%	-37.7%	-7.1%	-15.6%	-52.0%
Fossil fuels	-88.3%	-50.0%	-77.4%	-97.3%	-94.8%	-52.5%
Petroleum	-98.9%	-50.0%	-96.5%	-94.9%	-96.2%	-99.7%
VOC: Total	-83.2%	-52.9%	-5.8%	-53.0%	-56.4%	-88.5%
VOC: Urban	-75.6%	-54.1%	-72.0%	-72.0%	-72.1%	-87.9%
CO: Total	-86.5%	-78.5%	-77.2%	-71.1%	-72.5%	-78.9%
CO: Urban	-82.8%	-79.9%	-79.8%	-79.9%	-79.8%	-79.6%
NOx: Total	-73.5%	-55.1%	46.7%	96.4%	99.8%	-39.1%
NOx: Urban	-98.9%	-72.1%	-55.1%	-59.5%	-58.2%	-17.5%
PM10: Total	-173.5%	-38.4%	349.9%	42.2%	31.1%	-46.7%
PM10: Urban	-128.6%	-32.8%	-31.6%	-31.8%	-31.7%	-32.5%
SOx: Total	-30.6%	-54.1%	45.9%	-102.1%	-87.9%	-66.2%
SOx: Urban	-177.6%	-94.9%	-95.8%	-96.6%	-96.1%	-99.1%
CH4	-267.5%	-53.0%	-70.7%	-92.8%	-89.3%	-9.4%
N2O	-78.7%	-78.7%	182.0%	8.6%	205.8%	-79.0%
CO2	-132.5%	-50.0%	-76.4%	-113.1%	-101.4%	-61.6%
GHGs	-135.8%	-50.6%	-71.2%	-110.1%	-95.1%	-60.3%

D-II Long-Term Technologies

D-II.2 Light-Duty Truck 1

Parameter	Dedi. CNGV	Dedi. LNGV	Dedi. LPGV: crude	Dedi. LPGV: NG	Dedi. MeOHV: M90, NG	Dedi. MeOHV: M90, FG	Dedi. MeOHV: M90, LFG	Dedi. EtOHV: E90, corn	Dedi. EtOHV: E90, WB	Dedi. EtOHV: E90, HB	SIDI: FRFG2, MTBE
Total energy	-8.6%	-5.7%	-16.8%	-17.7%	8.8%	13.8%	-1.8%	10.0%	57.8%	44.5%	-20.0%
Fossil fuels	-9.5%	-5.1%	-16.9%	-17.4%	9.4%	-45.4%	-61.0%	-52.1%	-83.1%	-79.2%	-20.0%
Petroleum	-99.4%	-96.0%	-1.3%	-98.2%	-78.1%	-78.1%	-78.7%	-80.1%	-77.7%	-79.6%	-20.0%
VOC: Total	-64.7%	-56.8%	-49.2%	-58.1%	-18.5%	-183.5%	-42.2%	98.5%	11.9%	5.7%	-12.1%
VOC: Urban	-56.3%	-58.5%	-49.9%	-45.3%	-14.0%	-14.0%	-19.0%	-12.0%	-12.1%	-12.2%	-8.0%
CO: Total	-19.9%	-17.6%	-20.8%	-21.7%	2.0%	-1.2%	-19.5%	1.8%	14.4%	11.5%	-1.3%
CO: Urban	-19.2%	-20.1%	-19.9%	-19.9%	-0.3%	-0.3%	-7.5%	-0.1%	-0.1%	-0.1%	-0.1%
NOx: Total	27.6%	70.7%	-33.5%	-41.7%	-5.1%	-77.6%	-25.7%	154.3%	235.4%	240.9%	-17.3%
NOx: Urban	126.1%	-14.1%	-3.5%	-4.5%	-21.1%	-21.1%	-59.5%	5.3%	-0.1%	1.5%	-6.4%
PM10: Total	-35.9%	-31.2%	-32.1%	-41.6%	-27.8%	-41.4%	-315.3%	713.4%	138.8%	118.1%	-0.7%
PM10: Urban	-24.2%	-26.0%	-24.9%	-25.0%	-15.1%	-15.1%	-257.0%	-12.4%	-12.6%	-12.5%	11.6%
SOx: Total	-34.1%	-76.7%	-48.4%	-71.8%	-60.0%	-60.4%	50.8%	140.7%	-90.6%	-68.3%	-20.0%
SOx: Urban	-80.6%	-98.3%	-91.3%	-91.5%	-77.9%	-77.9%	-234.2%	-83.0%	-83.8%	-83.3%	-20.0%
CH4	76.3%	76.1%	-29.9%	-23.1%	-21.5%	-26.4%	-418.2%	-33.6%	-69.0%	-63.3%	-18.5%
N2O	-48.1%	-47.0%	-2.9%	-2.9%	-0.6%	-3.6%	0.6%	534.4%	178.5%	583.1%	-1.2%
CO2	-26.9%	-26.9%	-21.3%	-22.9%	-11.6%	-77.3%	-146.8%	-50.1%	-107.4%	-89.1%	-20.0%
GHGs	-24.0%	-24.0%	-21.3%	-22.6%	-11.8%	-74.6%	-153.0%	-41.0%	-102.0%	-78.4%	-19.7%

D-II.2 Light-Duty Truck 1 (Cont.)

Parameter	SIDI: FRFG2, ETBE	SIDI: FRFG2, EtOH	SIDI: CARFG2, ETBE	SIDI: CARFG2, EtOH	Dedi. MeOH SIDI: NG	Dedi. MeOH SIDI: M90, FG	Dedi. MeOH SIDI: M90, LFG	Dedi. EtOH SIDI: E90, corn	Dedi. EtOH SIDI: E90, WB	Dedi. EtOH SIDI: E90, HB	GI SIDI HEV: FRFG2, MTBE
Total energy	-20.0%	-20.0%	-20.0%	-20.0%	-6.7%	-2.3%	-16.1%	-3.2%	38.9%	27.1%	-47.4%
Fossil fuels	-20.0%	-20.0%	-19.0%	-19.3%	-6.2%	-54.4%	-68.1%	-57.9%	-85.1%	-81.7%	-47.4%
Petroleum	-20.0%	-20.0%	-17.2%	-19.2%	-82.1%	-82.1%	-82.6%	-82.5%	-80.3%	-82.1%	-47.4%
VOC: Total	-13.1%	-10.1%	-13.1%	-12.6%	-28.0%	-173.2%	-48.9%	78.4%	2.2%	-3.3%	-30.3%
VOC: Urban	-8.0%	-3.8%	-8.0%	-7.9%	-18.7%	-18.7%	-23.1%	-17.0%	-17.0%	-17.1%	-32.9%
CO: Total	-1.4%	-1.2%	-1.4%	-1.2%	0.5%	-2.3%	-18.4%	0.8%	11.9%	9.4%	-3.1%
CO: Urban	-0.1%	-0.1%	-0.1%	-0.1%	-0.3%	-0.3%	-6.6%	-0.1%	-0.1%	-0.1%	-0.2%
NOx: Total	-17.8%	-17.4%	-17.8%	-17.4%	-23.5%	-87.3%	-41.7%	125.4%	196.8%	201.6%	-41.1%
NOx: Urban	-7.5%	-6.5%	-7.5%	-6.5%	-22.5%	-22.5%	-56.2%	0.8%	-4.0%	-2.6%	-15.2%
PM10: Total	-9.8%	-6.7%	-9.8%	-6.7%	-27.6%	-39.6%	-280.6%	629.4%	123.8%	105.6%	-15.8%
PM10: Urban	11.2%	11.6%	11.2%	11.6%	-2.8%	-2.8%	-215.8%	-0.4%	-0.7%	-0.6%	4.3%
SOx: Total	-20.0%	-20.0%	-20.0%	-20.0%	-76.3%	-76.7%	21.2%	111.8%	-91.7%	-72.1%	-47.4%
SOx: Urban	-20.0%	-20.0%	-20.5%	-20.5%	-80.6%	-80.6%	-218.1%	-85.0%	-85.7%	-85.3%	-47.4%
CH4	-18.5%	-18.1%	-18.5%	-18.1%	-34.9%	-39.3%	-384.0%	-40.1%	-71.3%	-66.3%	-43.7%
N2O	-8.5%	-5.8%	-8.5%	-5.8%	-1.9%	-4.5%	-0.9%	469.5%	156.4%	512.4%	-2.8%
CO2	-20.0%	-19.7%	-20.0%	-19.8%	-24.7%	-82.5%	-143.7%	-56.0%	-106.4%	-90.3%	-47.4%
GHGs	-19.7%	-19.4%	-19.7%	-19.4%	-24.7%	-80.0%	-149.0%	-47.8%	-101.5%	-80.7%	-46.6%

D-II.2 Light-Duty Truck 1 (Cont.)

Parameter	GI SIDI HEV: FRFG2, ETBE	GI SIDI HEV: FRFG2, EtOH	GI SI HEV: CNG	GI SI HEV: LNG	GI SI HEV: LPG, crude	GI SI HEV: LPG, NG	GI SIDI HEV: M90, NG	GI SIDI HEV: M90, FG	GI SIDI HEV: M90 LFG	GI SIDI HEV: E90, corn	GI SIDI HEV: E90, WB
Total energy	-47.4%	-47.4%	-43.5%	-41.7%	-46.2%	-46.7%	-37.0%	-34.1%	-43.2%	-36.3%	-8.6%
Fossil fuels	-47.4%	-47.4%	-44.1%	-41.4%	-46.2%	-46.6%	-36.7%	-68.4%	-77.4%	-72.3%	-90.2%
Petroleum	-47.4%	-47.4%	-99.6%	-97.5%	-36.1%	-98.8%	-87.3%	-87.3%	-87.7%	-88.5%	-87.1%
VOC: Total	-32.5%	-28.9%	-68.2%	-63.2%	-56.9%	-62.7%	-38.6%	-134.1%	-52.3%	29.2%	-20.9%
VOC: Urban	-33.0%	-24.7%	-57.8%	-59.1%	-52.1%	-49.1%	-28.5%	-28.5%	-31.4%	-27.4%	-27.4%
CO: Total	-3.3%	-2.8%	-22.0%	-20.6%	-22.4%	-22.9%	-1.6%	-3.5%	-14.1%	-1.7%	5.5%
CO: Urban	-0.2%	-0.2%	-19.6%	-20.2%	-20.1%	-20.1%	-0.3%	-0.3%	-4.5%	-0.2%	-0.2%
NOx: Total	-42.3%	-41.2%	-16.1%	10.5%	-52.3%	-57.6%	-39.4%	-81.4%	-51.4%	52.8%	99.8%
NOx: Urban	-17.8%	-15.3%	65.6%	-21.0%	-13.6%	-14.3%	-25.8%	-25.8%	-48.0%	-10.4%	-13.6%
PM10: Total	-30.7%	-25.6%	-38.1%	-35.2%	-35.0%	-41.2%	-32.0%	-39.8%	-198.4%	397.1%	64.5%
PM10: Urban	3.7%	4.3%	-16.6%	-17.8%	-17.0%	-17.0%	-7.9%	-7.9%	-147.9%	-6.3%	-6.4%
SOx: Total	-47.4%	-47.4%	-59.3%	-85.6%	-66.6%	-81.7%	-76.8%	-77.1%	-12.7%	39.4%	-94.5%
SOx: Urban	-47.4%	-47.4%	-88.0%	-98.9%	-94.4%	-94.5%	-87.2%	-87.2%	-177.7%	-90.1%	-90.6%
CH4	-43.8%	-43.0%	23.6%	23.4%	-51.6%	-47.2%	-52.9%	-55.8%	-282.6%	-56.7%	-77.2%
N2O	-20.2%	-13.8%	-49.9%	-49.2%	-3.9%	-4.0%	-2.8%	-4.5%	-2.1%	306.9%	100.9%
CO2	-47.4%	-47.2%	-54.9%	-54.9%	-49.1%	-50.1%	-48.8%	-86.9%	-127.1%	-70.8%	-104.0%
GHGs	-46.6%	-46.4%	-52.4%	-52.4%	-48.5%	-49.3%	-48.3%	-84.7%	-130.1%	-64.8%	-100.2%

D-II.2 Light-Duty Truck 1 (Cont.)

Parameter	GI SIDI HEV: E90, HB	GC SIDI HEV: FRFG2, MTBE, US mix	GC SIDI HEV: FRFG2, ETBE, US mix	GC SIDI HEV: FRFG2, EtOH, US mix	GC SIDI HEV: FRFG2, MTBE, CA mix	GC SIDI HEV: FRFG2, ETBE, CA mix	GC SIDI HEV: FRFG2, EtOH, CA mix	GC SI HEV: CNG, US mix	GC SI HEV: CNG, CA mix	GC SI HEV: LNG, US mix	GC SI HEV: LNG, CA mix
Total energy	-16.4%	-43.7%	-43.8%	-43.7%	-43.9%	-44.0%	-43.9%	-40.8%	-41.0%	-39.5%	-39.7%
Fossil fuels	-87.9%	-48.2%	-47.1%	-47.3%	-55.5%	-54.8%	-54.9%	-45.7%	-53.0%	-43.8%	-51.1%
Petroleum	-88.2%	-60.7%	-60.4%	-61.4%	-61.0%	-60.7%	-61.7%	-99.4%	-99.6%	-97.8%	-98.1%
VOC: Total	-24.5%	-47.1%	-49.0%	-46.3%	-49.6%	-51.2%	-48.7%	-73.9%	-76.4%	-70.4%	-72.9%
VOC: Urban	-27.5%	-44.7%	-44.8%	-41.8%	-44.7%	-44.8%	-41.7%	-70.3%	-70.3%	-71.2%	-71.2%
CO: Total	3.9%	-31.2%	-31.3%	-30.9%	-31.5%	-31.7%	-31.3%	-44.4%	-44.7%	-43.3%	-43.7%
CO: Urban	-0.2%	-30.1%	-30.1%	-30.1%	-30.1%	-30.1%	-30.1%	-43.7%	-43.7%	-44.1%	-44.1%
NOx: Total	103.0%	5.9%	-6.9%	4.3%	-38.1%	-42.6%	-38.7%	24.0%	-20.0%	43.2%	-0.8%
NOx: Urban	-12.7%	-33.3%	-35.6%	-33.3%	-31.3%	-33.8%	-31.4%	25.1%	27.0%	-37.4%	-35.5%
PM10: Total	52.5%	-2.4%	-30.6%	-21.0%	-21.9%	-40.9%	-34.5%	-18.2%	-37.7%	-16.1%	-35.6%
PM10: Urban	-6.4%	-6.7%	-7.3%	-6.7%	-6.5%	-7.1%	-6.5%	-21.3%	-21.1%	-22.1%	-22.0%
SOx: Total	-81.7%	81.0%	53.4%	68.0%	-40.0%	-44.3%	-42.1%	72.6%	-48.5%	53.6%	-67.5%
SOx: Urban	-90.3%	-59.2%	-59.2%	-59.2%	-61.3%	-61.4%	-61.4%	-88.1%	-90.3%	-96.0%	-98.2%
CH4	-73.9%	-43.9%	-44.1%	-40.1%	-50.4%	-50.5%	-47.9%	4.1%	-2.4%	4.0%	-2.5%
N2O	335.1%	-27.7%	-41.1%	-36.2%	-29.9%	-42.5%	-37.9%	-60.7%	-62.9%	-60.2%	-62.4%
CO2	-93.4%	-46.1%	-46.5%	-45.8%	-56.0%	-56.2%	-55.8%	-51.4%	-61.3%	-51.4%	-61.3%
GHGs	-86.5%	-45.7%	-46.3%	-45.5%	-55.5%	-55.7%	-55.3%	-49.8%	-59.5%	-49.8%	-59.5%

D-II.2 Light-Duty Truck 1 (Cont.)

Parameter	GC SI HEV: LPG, crude, US mix	GC SI HEV: LPG, NG, US mix	GC SI HEV: LPG, crude, CA mix	GC SI HEV: LPG, NG, CA mix	GC SIDI HEV: M90, NG, US mix	GC SIDI HEV: M90, FG, US mix	GC SIDI HEV: M90, LFG, US mix	GC SIDI HEV: M90, NG, CA mix	GC SIDI HEV: M90, FG, CA mix	GC SIDI HEV: M90, LFG, CA mix	GC SIDI HEV: E90, corn, US mix
Total energy	-42.7%	-43.1%	-42.9%	-43.3%	-36.2%	-34.1%	-40.6%	-36.4%	-34.3%	-40.8%	-35.7%
Fossil fuels	-47.2%	-47.5%	-54.6%	-54.8%	-40.5%	-63.3%	-69.8%	-47.8%	-70.7%	-77.1%	-66.1%
Petroleum	-53.6%	-98.8%	-53.8%	-99.0%	-90.5%	-90.5%	-90.7%	-90.8%	-90.8%	-91.0%	-91.3%
VOC: Total	-65.9%	-70.0%	-68.4%	-72.5%	-53.0%	-121.7%	-62.9%	-55.5%	-124.2%	-65.4%	-4.3%
VOC: Urban	-66.3%	-64.1%	-66.2%	-64.1%	-49.8%	-49.8%	-51.9%	-49.8%	-49.8%	-51.9%	-49.0%
CO: Total	-44.7%	-45.0%	-45.0%	-45.4%	-30.1%	-31.4%	-39.0%	-30.4%	-31.8%	-39.4%	-30.2%
CO: Urban	-44.0%	-44.0%	-44.0%	-44.0%	-30.2%	-30.2%	-33.2%	-30.2%	-30.2%	-33.2%	-30.1%
NOx: Total	-2.1%	-5.9%	-46.1%	-49.9%	7.1%	-23.1%	-1.5%	-36.9%	-67.1%	-45.5%	73.4%
NOx: Urban	-32.0%	-32.5%	-30.1%	-30.6%	-40.8%	-40.8%	-56.8%	-38.9%	-38.9%	-54.9%	-29.8%
PM10: Total	-16.0%	-20.4%	-35.5%	-39.9%	-13.9%	-19.6%	-133.6%	-33.4%	-39.1%	-153.1%	294.6%
PM10: Urban	-21.6%	-21.6%	-21.4%	-21.4%	-15.2%	-15.2%	-115.9%	-15.1%	-15.1%	-115.8%	-14.1%
SOx: Total	67.3%	56.4%	-53.8%	-64.7%	59.9%	59.7%	106.0%	-61.2%	-61.4%	-15.1%	143.4%
SOx: Urban	-92.7%	-92.8%	-94.9%	-95.0%	-87.6%	-87.6%	-152.6%	-89.8%	-89.8%	-154.8%	-89.7%
CH4	-49.5%	-46.4%	-56.0%	-52.8%	-50.5%	-52.5%	-215.6%	-56.9%	-59.0%	-222.0%	-53.3%
N2O	-28.5%	-28.5%	-30.7%	-30.7%	-27.7%	-28.9%	-27.2%	-29.9%	-31.1%	-29.4%	129.0%
CO2	-47.2%	-47.9%	-57.1%	-57.8%	-47.1%	-74.4%	-103.4%	-57.1%	-84.4%	-113.3%	-62.9%
GHGs	-47.0%	-47.6%	-56.7%	-57.3%	-46.9%	-73.1%	-105.7%	-56.7%	-82.8%	-115.4%	-59.8%

D-II.2 Light-Duty Truck 1 (Cont.)

Parameter	GC SIDI HEV: E90, WB, US mix	GC SIDI HEV: E90, HB, US mix	GC SIDI HEV: E90, corn, CA mix	GC SIDI HEV: E90, WB, CA mix	GC SIDI HEV: E90, HB, CA mix	CIDI: RFD	CIDI: DME, NG	CIDI: DME, FG	CIDI: FT50, NG	CIDI: FT50, FG	CIDI: BD20
Total energy	-15.8%	-21.4%	-35.9%	-16.0%	-21.6%	-35.1%	-17.7%	-14.4%	-21.3%	-13.2%	-31.4%
Fossil fuels	-79.0%	-77.4%	-73.4%	-86.3%	-84.7%	-35.0%	-17.2%	-67.4%	-21.1%	-38.6%	-31.6%
Petroleum	-90.3%	-91.1%	-91.6%	-90.6%	-91.4%	-25.0%	-97.9%	-97.9%	-59.9%	-59.9%	-36.7%
VOC: Total	-40.3%	-42.9%	-6.8%	-42.8%	-45.4%	-49.0%	-65.4%	-204.5%	-55.5%	-136.0%	-20.9%
VOC: Urban	-49.0%	-49.0%	-49.0%	-49.0%	-49.0%	-44.1%	-62.9%	-62.9%	-46.2%	-46.2%	-41.5%
CO: Total	-24.9%	-26.1%	-30.5%	-25.3%	-26.5%	90.2%	92.7%	89.3%	90.6%	89.3%	93.1%
CO: Urban	-30.1%	-30.1%	-30.1%	-30.1%	-30.1%	99.4%	99.3%	99.3%	99.4%	99.4%	100.3%
NOx: Total	107.2%	109.5%	29.4%	63.2%	65.5%	-2.2%	-1.0%	-70.7%	-10.9%	-44.3%	41.7%
NOx: Urban	-32.1%	-31.4%	-27.9%	-30.2%	-29.5%	171.6%	158.7%	158.7%	165.6%	165.6%	215.0%
PM10: Total	55.4%	46.8%	275.1%	35.9%	27.3%	2.5%	-27.9%	-42.1%	-17.8%	-23.0%	9.3%
PM10: Urban	-14.2%	-14.2%	-13.9%	-14.0%	-14.0%	29.1%	8.9%	8.9%	16.0%	16.0%	27.8%
SOx: Total	47.2%	56.4%	22.3%	-73.9%	-64.7%	-34.1%	-82.2%	-83.3%	-58.4%	-58.0%	-32.6%
SOx: Urban	-90.0%	-89.8%	-91.9%	-92.2%	-92.0%	6.8%	-95.7%	-95.7%	-42.2%	-42.2%	-9.6%
CH4	-68.1%	-65.7%	-59.8%	-74.5%	-72.1%	-50.7%	-48.9%	-48.8%	-50.9%	-50.5%	-52.8%
N2O	-19.1%	149.3%	126.9%	-21.2%	147.1%	-16.2%	-18.7%	-22.4%	-19.1%	-19.7%	-6.6%
CO2	-86.8%	-79.2%	-72.9%	-96.7%	-89.1%	-32.3%	-35.7%	-94.6%	-31.6%	-61.2%	-40.0%
GHGs	-85.2%	-75.4%	-69.5%	-94.9%	-85.1%	-32.6%	-35.9%	-92.2%	-32.0%	-60.3%	-39.9%

D-II.2 Light-Duty Truck 1 (Cont.)

Parameter	GI CIDI HEV: RFD	GI CIDI HEV: DME, NG	GI CIDI HEV: DME, FG	GI CIDI HEV: FT50, NG	GI CIDI HEV: FT50, FG	GI CIDI HEV: BD20	GC CIDI HEV: RFD, US mix	GC CIDI HEV: RFD CA mix	GC CIDI HEV: DME, NG, US mix	GC CIDI HEV: DME, FG, US mix	GC CIDI HEV: DME, NG, CA mix
Total energy	-57.7%	-46.3%	-44.2%	-48.7%	-43.3%	-55.3%	-53.3%	-53.5%	-42.2%	-40.7%	-42.4%
Fossil fuels	-57.6%	-46.0%	-78.7%	-48.5%	-59.9%	-55.4%	-57.8%	-65.2%	-46.5%	-70.5%	-53.9%
Petroleum	-51.1%	-98.6%	-98.6%	-73.8%	-73.8%	-58.7%	-67.1%	-67.3%	-98.6%	-98.6%	-98.9%
VOC: Total	-55.0%	-69.2%	-159.9%	-59.2%	-111.8%	-36.6%	-65.2%	-67.7%	-74.5%	-140.9%	-77.0%
VOC: Urban	-30.7%	-42.6%	-42.6%	-47.0%	-47.0%	-43.9%	-62.0%	-61.9%	-74.2%	-74.2%	-74.2%
CO: Total	89.0%	90.6%	88.4%	89.2%	88.4%	90.9%	33.2%	32.8%	34.5%	32.9%	34.2%
CO: Urban	33.3%	33.3%	33.3%	99.3%	99.3%	99.9%	39.5%	39.5%	39.5%	39.5%	39.5%
NOx: Total	-18.9%	-18.1%	-63.5%	-24.5%	-46.3%	9.8%	19.5%	-24.5%	22.2%	-11.1%	-21.8%
NOx: Urban	22.1%	21.0%	21.0%	161.7%	161.7%	193.9%	85.4%	87.3%	87.2%	87.2%	89.2%
PM10: Total	-6.2%	-30.0%	-39.2%	-22.0%	-25.5%	-3.1%	3.3%	-16.2%	-12.6%	-19.4%	-32.1%
PM10: Urban	24.6%	7.6%	7.6%	15.5%	15.5%	25.4%	9.2%	9.4%	-3.6%	-3.6%	-3.4%
SOx: Total	-57.0%	-88.4%	-89.1%	-72.9%	-72.6%	-56.1%	71.8%	-49.3%	51.7%	51.2%	-69.4%
SOx: Urban	-4.7%	-14.9%	-14.9%	-62.3%	-62.3%	-41.1%	-52.7%	-54.9%	-94.7%	-94.7%	-96.9%
CH4	-67.3%	-65.6%	-65.6%	-67.5%	-67.2%	-68.7%	-62.5%	-68.9%	-59.2%	-59.1%	-65.6%
N2O	-17.3%	-18.9%	-21.3%	-19.2%	-19.6%	-11.0%	-37.9%	-40.1%	-39.0%	-40.8%	-41.2%
CO2	-55.8%	-58.1%	-96.5%	-55.4%	-74.7%	-60.8%	-54.5%	-64.5%	-53.2%	-81.3%	-63.2%
GHGs	-55.6%	-57.8%	-94.5%	-55.2%	-73.7%	-60.3%	-54.5%	-64.2%	-53.2%	-80.1%	-62.9%

D-II.2 Light-Duty Truck 1 (Cont.)

Parameter	GC CIDI HEV: DME, FG, CA mix	GC CIDI HEV: FT50, NG, US mix	GC CIDI HEV: FT50, FG, US mix	GC CIDI HEV: FT50, NG, CA mix	GC CIDI HEV: FT50, FG, CA mix	GC CIDI HEV: BD20, US mix	GC CIDI HEV: BD20, CA mix	EV: US mix	EV: NE US mix	EV: CA mix	H2 FCV: NG, C. gaseous
Total energy	-40.9%	-43.9%	-40.1%	-44.1%	-40.3%	-48.8%	-49.0%	-38.4%	-39.8%	-39.0%	-59.7%
Fossil fuels	-77.8%	-48.3%	-56.7%	-64.0%	-51.8%	-53.4%	-60.7%	-53.4%	-55.5%	-77.9%	-60.3%
Petroleum	-98.9%	-80.5%	-80.5%	-80.7%	-80.7%	-69.4%	-69.7%	-98.7%	-98.3%	-99.6%	-99.7%
VOC: Total	-143.4%	-67.5%	-106.1%	-70.0%	-108.6%	-51.0%	-53.5%	-87.7%	-91.7%	-96.1%	-95.1%
VOC: Urban	-74.2%	-62.7%	-62.7%	-62.7%	-62.7%	-60.5%	-60.5%	-99.7%	-99.3%	-99.6%	-97.8%
CO: Total	32.5%	33.5%	32.9%	33.2%	32.6%	34.7%	34.4%	-96.8%	-96.5%	-98.0%	-96.2%
CO: Urban	39.5%	39.6%	39.6%	39.6%	39.6%	40.0%	40.0%	-99.9%	-99.7%	-99.8%	-99.3%
NOx: Total	-55.1%	17.4%	1.5%	-26.6%	-42.5%	42.5%	-1.5%	112.7%	47.5%	-34.0%	-38.9%
NOx: Urban	89.2%	90.5%	90.5%	92.5%	92.5%	114.1%	116.0%	-76.4%	-51.4%	-69.9%	-6.1%
PM10: Total	-38.9%	-6.9%	-9.4%	-26.5%	-29.0%	6.8%	-12.7%	27.5%	-33.5%	-37.6%	-50.3%
PM10: Urban	-3.4%	1.1%	1.1%	1.3%	1.3%	8.2%	8.4%	-32.5%	-29.9%	-31.9%	-32.2%
SOx: Total	-69.9%	63.1%	63.3%	-58.0%	-57.8%	75.4%	-45.7%	377.4%	124.5%	-26.2%	-66.0%
SOx: Urban	-96.9%	-69.2%	-69.2%	-71.4%	-71.4%	-53.6%	-55.8%	-89.3%	-78.5%	-96.5%	-99.0%
CH4	-65.6%	-60.5%	-60.3%	-66.9%	-66.7%	-61.4%	-67.8%	-47.5%	-32.7%	-69.0%	-61.7%
N2O	-43.0%	-39.2%	-39.5%	-41.4%	-41.7%	-33.3%	-35.4%	-86.0%	-90.3%	-93.3%	-97.7%
CO2	-91.3%	-51.3%	-65.4%	-61.2%	-75.4%	-55.2%	-65.2%	-46.3%	-56.4%	-79.4%	-68.6%
GHGs	-89.8%	-51.4%	-64.9%	-61.1%	-74.6%	-55.1%	-64.8%	-46.9%	-56.4%	-79.3%	-68.8%

D-II.2 Light-Duty Truck 1 (Cont.)

Parameter	H2 FCV: NG, station gaseous	H2 FCV: solar, gas	H2 FCV: solar, liquid	H2 FCV: NG, liquid	FCV: MeOH, NG	FCV: MeOH, FG
Total energy	-53.2%	-65.5%	-71.8%	-58.8%	-52.3%	-49.7%
Fossil fuels	-52.9%	-93.1%	-98.3%	-58.5%	-52.0%	-80.3%
Petroleum	-99.7%	-99.9%	-98.1%	-97.8%	-98.6%	-98.6%
VOC: Total	-93.5%	-95.1%	-90.9%	-88.0%	-73.3%	-158.4%
VOC: Urban	-93.5%	-97.0%	-97.3%	-97.0%	-74.6%	-74.6%
CO: Total	-94.7%	-97.9%	-98.4%	-95.7%	-77.4%	-79.1%
CO: Urban	-96.2%	-99.1%	-99.7%	-99.7%	-80.0%	-80.0%
NOx: Total	-27.7%	-33.0%	-69.8%	-42.1%	-62.5%	-99.9%
NOx: Urban	137.0%	31.5%	-69.9%	-66.8%	-83.5%	-83.5%
PM10: Total	-49.2%	-49.2%	-45.9%	-40.1%	-52.9%	-59.9%
PM10: Urban	-23.5%	-31.2%	-30.3%	-30.1%	-34.6%	-34.6%
SOx: Total	-91.7%	-63.5%	-97.5%	-90.6%	-87.8%	-88.0%
SOx: Urban	-99.4%	-98.8%	-97.2%	-97.1%	-97.0%	-97.0%
CH4	-45.7%	-86.6%	-98.7%	-62.3%	-67.7%	-70.3%
N2O	-95.7%	-97.5%	-99.2%	-97.2%	-78.9%	-80.5%
CO2	-63.7%	-93.4%	-98.3%	-67.7%	-62.8%	-96.7%
GHGs	-63.6%	-93.3%	-98.3%	-68.0%	-63.2%	-95.6%

D-II.2 Light-Duty Truck 1 (Cont.)

Parameter	FCV: MeOH, LFG	FCV: RFG	EtOH FCV: corn	EtOH FCV: WB	EtOH FCV: HB	NG FCV: CNG
Total energy	-57.8%	-50.0%	-37.8%	-7.2%	-15.7%	-52.0%
Fossil fuels	-88.3%	-50.0%	-77.5%	-97.4%	-94.9%	-52.5%
Petroleum	-98.9%	-50.0%	-96.5%	-94.9%	-96.2%	-99.7%
VOC: Total	-85.5%	-52.5%	5.3%	-50.2%	-54.2%	-88.7%
VOC: Urban	-77.2%	-53.9%	-72.6%	-72.6%	-72.7%	-88.1%
CO: Total	-88.5%	-78.0%	-76.5%	-68.4%	-70.2%	-78.5%
CO: Urban	-83.8%	-79.9%	-79.8%	-79.8%	-79.8%	-79.5%
NOx: Total	-73.2%	-54.0%	49.9%	101.8%	105.3%	-37.3%
NOx: Urban	-103.2%	-70.4%	-53.2%	-58.7%	-57.1%	-3.4%
PM10: Total	-201.1%	-39.6%	424.4%	56.5%	43.3%	-49.5%
PM10: Urban	-159.4%	-33.0%	-31.5%	-31.7%	-31.6%	-32.5%
SOx: Total	-30.6%	-54.1%	45.9%	-102.2%	-87.9%	-66.2%
SOx: Urban	-177.6%	-94.9%	-95.8%	-96.6%	-96.1%	-99.1%
CH4	-272.3%	-52.3%	-70.9%	-93.5%	-89.9%	-12.2%
N2O	-78.3%	-78.2%	264.2%	36.4%	295.4%	-78.6%
CO2	-132.5%	-50.0%	-76.5%	-113.2%	-101.5%	-61.6%
GHGs	-136.1%	-50.5%	-71.3%	-110.4%	-95.3%	-60.3%

D-II.3 Light-Duty Truck 2

Parameter	Dedi. CNGV	Dedi. LNGV	Dedi. LPGV: crude	Dedi. LPGV: NG	Dedi. MeOHV: M90, NG	Dedi. MeOHV: M90, FG	Dedi. MeOHV: M90, LFG	Dedi. EtOHV: E90, corn	Dedi. EtOHV: E90, WB	Dedi. EtOHV: E90, HB	SIDI: FRFG2, MTBE
Total energy	-4.0%	-1.0%	-12.9%	-13.8%	14.0%	19.3%	2.9%	15.1%	65.0%	51.1%	-20.0%
Fossil fuels	-5.0%	-0.4%	-12.9%	-13.5%	14.6%	-42.8%	-59.2%	-47.9%	-81.5%	-77.3%	-20.0%
Petroleum	-99.4%	-95.8%	3.4%	-98.1%	-77.1%	-77.1%	-77.7%	-80.6%	-78.3%	-80.2%	-20.0%
VOC: Total	-66.0%	-58.0%	-47.5%	-56.5%	-16.5%	-182.2%	-40.3%	89.4%	7.8%	1.9%	-11.7%
VOC: Urban	-59.3%	-61.4%	-48.6%	-44.0%	-12.9%	-12.9%	-17.8%	-10.4%	-10.4%	-10.5%	-7.7%
CO: Total	-19.8%	-18.3%	-20.4%	-20.9%	1.5%	-0.6%	-12.1%	1.8%	9.7%	7.9%	-0.8%
CO: Urban	-19.5%	-20.1%	-19.9%	-20.0%	-0.2%	-0.2%	-4.6%	0.0%	0.0%	0.0%	0.0%
NOx: Total	25.8%	60.7%	-23.9%	-30.5%	-0.9%	-59.6%	-17.7%	125.3%	190.1%	194.5%	-13.4%
NOx: Urban	53.6%	-5.3%	-0.8%	-1.3%	-8.3%	-8.3%	-24.3%	3.9%	1.5%	2.2%	-2.6%
PM10: Total	-42.4%	-37.8%	-38.7%	-47.9%	-29.9%	-43.1%	-309.5%	462.9%	68.0%	53.8%	4.3%
PM10: Urban	-36.9%	-38.6%	-37.6%	-37.7%	-21.2%	-21.2%	-246.2%	-18.4%	-18.6%	-18.5%	18.1%
SOx: Total	-30.8%	-75.5%	-45.9%	-70.4%	-58.0%	-58.5%	58.0%	130.5%	-89.8%	-68.6%	-20.0%
SOx: Urban	-79.6%	-98.2%	-90.9%	-91.1%	-76.9%	-76.9%	-240.6%	-82.1%	-82.9%	-82.5%	-20.0%
CH4	85.6%	85.3%	-26.7%	-19.6%	-18.1%	-23.3%	-430.7%	-18.5%	-63.1%	-55.9%	-18.3%
N2O	-48.2%	-47.2%	-2.3%	-2.3%	-0.3%	-2.8%	0.7%	345.7%	103.3%	378.8%	-1.0%
CO2	-23.2%	-23.3%	-17.6%	-19.2%	-7.4%	-76.2%	-149.0%	-46.9%	-107.4%	-88.1%	-20.0%
GHGs	-20.3%	-20.3%	-17.6%	-18.9%	-7.6%	-73.3%	-155.1%	-37.2%	-101.5%	-76.7%	-19.6%

D-II.3 Light-Duty Truck 2 (Cont.)

Parameter	SIDI: FRFG2, ETBE	SIDI: FRFG2, EtOH	SIDI: CARFG2, ETBE	SIDI: CARFG2, EtOH	Dedi. MeOH SIDI: NG	Dedi. MeOH SIDI: M90, FG	Dedi. MeOH SIDI: M90, LFG	Dedi EtOH SIDI: E90, corn	Dedi. EtOH SIDI: E90, WB	Dedi. EtOH SIDI: E90, HB	GI SIDI HEV: FRFG2, MTBE
Total energy	-20.0%	-20.0%	-20.0%	-20.0%	-6.7%	-2.3%	-16.1%	-3.3%	38.6%	26.9%	-47.4%
Fossil fuels	-20.0%	-20.0%	-19.0%	-19.3%	-6.2%	-54.4%	-68.1%	-56.2%	-84.5%	-80.9%	-47.4%
Petroleum	-20.0%	-20.0%	-17.2%	-19.2%	-82.1%	-82.1%	-82.6%	-83.7%	-81.8%	-83.4%	-47.4%
VOC: Total	-12.8%	-9.7%	-12.8%	-9.7%	-27.0%	-166.2%	-47.0%	64.7%	-3.8%	-8.7%	-29.5%
VOC: Urban	-7.8%	-3.6%	-7.8%	-3.6%	-17.8%	-17.8%	-21.9%	-15.6%	-15.6%	-15.7%	-33.9%
CO: Total	-0.8%	-0.7%	-0.8%	-0.7%	0.3%	-1.4%	-11.0%	0.9%	7.6%	6.1%	-1.9%
CO: Urban	-0.1%	0.0%	-0.1%	0.0%	-0.2%	-0.2%	-3.9%	0.0%	0.0%	0.0%	-0.1%
NOx: Total	-14.4%	-13.5%	-14.4%	-13.5%	-18.2%	-67.5%	-32.2%	94.5%	148.9%	152.6%	-31.7%
NOx: Urban	-3.2%	-2.6%	-3.2%	-2.6%	-9.0%	-9.0%	-22.5%	1.3%	-0.6%	0.0%	-6.1%
PM10: Total	-6.7%	-2.9%	-6.7%	-2.9%	-25.6%	-36.7%	-260.5%	386.9%	55.2%	43.3%	-12.2%
PM10: Urban	17.7%	18.1%	17.7%	18.1%	-2.5%	-2.5%	-191.6%	-0.1%	-0.3%	-0.2%	7.8%
SOx: Total	-20.0%	-20.0%	-20.0%	-20.0%	-76.3%	-76.7%	21.2%	93.6%	-91.4%	-73.6%	-47.4%
SOx: Urban	-20.0%	-20.0%	-20.5%	-20.5%	-80.6%	-80.6%	-218.1%	-85.0%	-85.7%	-85.3%	-47.4%
CH4	-18.3%	-18.0%	-18.3%	-18.0%	-35.0%	-39.3%	-381.6%	-29.1%	-66.6%	-60.6%	-43.4%
N2O	-7.6%	-5.0%	-7.6%	-5.0%	-1.6%	-3.8%	-0.7%	286.3%	82.7%	314.2%	-2.3%
CO2	-20.0%	-19.7%	-20.0%	-19.8%	-24.7%	-82.5%	-143.7%	-55.2%	-106.0%	-89.9%	-47.4%
GHGs	-19.6%	-19.3%	-19.6%	-19.4%	-24.7%	-79.8%	-148.5%	-46.8%	-100.7%	-79.9%	-46.5%

D-II.3 Light-Duty Truck 2 (Cont.)

Parameter	GI SIDI HEV: FRFG2, ETBE	GI SIDI HEV: FRFG2, EtOH	GI SI HEV: CNG	GI SI HEV: LNG	GI SI HEV: LPG, crude	GI SI HEV: LPG, NG	GI SIDI HEV: M90, NG	GI SIDI HEV: M90, FG	GI SIDI HEV: M90 LFG	GI SIDI HEV: E90, corn	GI SIDI HEV: E90, WB
Total energy	-47.4%	-47.4%	-43.5%	-41.7%	-46.2%	-46.7%	-37.0%	-34.1%	-43.2%	-36.4%	-8.8%
Fossil fuels	-47.4%	-47.4%	-44.1%	-41.4%	-46.2%	-46.6%	-36.7%	-68.4%	-77.4%	-71.2%	-89.8%
Petroleum	-47.4%	-47.4%	-99.6%	-97.5%	-36.1%	-98.8%	-87.3%	-87.3%	-87.7%	-89.3%	-88.0%
VOC: Total	-31.7%	-28.1%	-67.0%	-62.3%	-55.9%	-61.5%	-37.4%	-129.0%	-50.6%	20.0%	-25.0%
VOC: Urban	-34.0%	-25.8%	-56.6%	-57.9%	-50.9%	-48.1%	-27.4%	-27.4%	-30.2%	-25.8%	-25.9%
CO: Total	-2.0%	-1.7%	-21.2%	-20.3%	-21.5%	-21.8%	-1.0%	-2.1%	-8.5%	-0.6%	3.8%
CO: Urban	-0.1%	-0.1%	-19.8%	-20.1%	-20.0%	-20.0%	-0.2%	-0.2%	-2.6%	-0.1%	-0.1%
NOx: Total	-34.1%	-32.0%	-12.4%	8.1%	-40.4%	-44.5%	-30.5%	-62.9%	-39.7%	39.1%	74.9%
NOx: Urban	-7.5%	-6.1%	26.2%	-8.4%	-5.4%	-5.7%	-10.3%	-10.3%	-19.2%	-3.2%	-4.5%
PM10: Total	-28.1%	-22.6%	-41.6%	-38.9%	-38.8%	-44.5%	-31.5%	-38.9%	-186.1%	232.1%	13.8%
PM10: Urban	7.2%	7.7%	-24.5%	-25.5%	-24.9%	-24.9%	-9.9%	-9.9%	-134.3%	-8.2%	-8.3%
SOx: Total	-47.4%	-47.4%	-59.3%	-85.6%	-66.6%	-81.7%	-76.8%	-77.1%	-12.7%	27.4%	-94.4%
SOx: Urban	-47.4%	-47.4%	-88.0%	-98.9%	-94.4%	-94.5%	-87.2%	-87.2%	-177.7%	-90.1%	-90.6%
CH4	-43.4%	-42.6%	26.4%	26.2%	-51.2%	-46.8%	-52.9%	-55.7%	-280.9%	-48.2%	-72.8%
N2O	-17.9%	-11.9%	-49.9%	-49.4%	-3.3%	-3.3%	-2.3%	-3.7%	-1.8%	179.8%	45.8%
CO2	-47.4%	-47.2%	-54.9%	-54.9%	-49.1%	-50.1%	-48.8%	-86.9%	-127.1%	-70.2%	-103.6%
GHGs	-46.5%	-46.3%	-52.3%	-52.3%	-48.4%	-49.2%	-48.1%	-84.4%	-129.6%	-63.9%	-99.4%

D-II.3 Light-Duty Truck 2 (Cont.)

Parameter	GI SIDI HEVs: E90, HB	GC SIDI HEV: FRFG2, MTBE, US mix	GC SIDI HEV: FRFG2, ETBE, US mix	GC SIDI HEV: FRFG2, EtOH, US mix	GC SIDI HEV: FRFG2, MTBE, CA mix	GC SIDI HEV: FRFG2, ETBE, CA mix	GC SIDI HEV: FRFG2, EtOH, CA mix	GC SI HEV: CNG, US mix	GC SI HEV: CNG, CA mix	GC SI HEV: LNG, US mix	GC SI HEV: LNG, CA mix
Total energy	-16.5%	-43.7%	-43.8%	-43.7%	-43.9%	-44.0%	-43.9%	-40.8%	-41.0%	-39.5%	-39.7%
Fossil fuels	-87.5%	-48.2%	-47.1%	-47.3%	-55.5%	-54.8%	-54.9%	-45.7%	-53.0%	-43.8%	-51.1%
Petroleum	-89.1%	-60.7%	-60.4%	-61.4%	-61.0%	-60.7%	-61.7%	-99.4%	-99.6%	-97.8%	-98.1%
VOC: Total	-28.3%	-46.7%	-48.6%	-45.9%	-49.1%	-50.7%	-48.1%	-73.2%	-75.7%	-69.8%	-72.3%
VOC: Urban	-25.9%	-44.3%	-44.4%	-41.4%	-44.3%	-44.4%	-41.3%	-69.5%	-69.5%	-70.4%	-70.4%
CO: Total	2.8%	-30.7%	-30.8%	-30.5%	-30.9%	-31.0%	-30.8%	-44.2%	-44.4%	-43.6%	-43.8%
CO: Urban	-0.1%	-30.0%	-30.1%	-30.0%	-30.0%	-30.1%	-30.0%	-43.8%	-43.8%	-44.0%	-44.0%
NOx: Total	77.3%	-2.2%	-11.3%	-3.3%	-36.3%	-40.2%	-36.7%	11.8%	-22.3%	26.6%	-7.4%
NOx: Urban	-4.1%	-31.3%	-32.3%	-31.3%	-30.5%	-31.6%	-30.6%	-8.0%	-7.2%	-33.0%	-32.2%
PM10: Total	6.0%	-4.2%	-30.5%	-21.3%	-22.4%	-40.4%	-34.1%	-25.0%	-43.1%	-23.1%	-41.2%
PM10: Urban	-8.3%	-9.1%	-9.6%	-9.1%	-8.9%	-9.4%	-8.9%	-31.6%	-31.5%	-32.4%	-32.2%
SOx: Total	-82.7%	81.0%	53.4%	68.0%	-40.0%	-44.3%	-42.1%	72.6%	-48.5%	53.6%	-67.5%
SOx: Urban	-90.3%	-59.2%	-59.2%	-59.2%	-61.3%	-61.4%	-61.4%	-88.1%	-90.3%	-96.0%	-98.2%
CH4	-68.9%	-43.8%	-44.0%	-40.0%	-50.2%	-50.3%	-47.7%	5.9%	-0.5%	5.8%	-0.6%
N2O	198.1%	-28.1%	-39.9%	-35.4%	-29.9%	-41.1%	-36.8%	-61.4%	-63.2%	-61.0%	-62.8%
CO2	-92.9%	-46.1%	-46.5%	-45.8%	-56.0%	-56.2%	-55.8%	-51.4%	-61.3%	-51.4%	-61.3%
GHGs	-85.7%	-45.7%	-46.3%	-45.4%	-55.4%	-55.6%	-55.2%	-49.8%	-59.5%	-49.8%	-59.5%

D-II.3 Light-Duty Truck 2 (Cont.)

Parameter	GC SI HEV: LPG, crude, US mix	GC SI HEV: LPG, NG, US mix	GC SI HEV: LPG, crude, CA mix	GC SI HEV: LPG, NG, CA mix	GC SIDI HEV: M90, NG, US mix	GC SIDI HEV: M90, FG, US mix	GC SIDI HEV: M90, LFG, US mix	GC SIDI HEV: M90, NG, CA mix	GC SIDI HEV: M90, FG, CA mix	GC SIDI HEV: M90, LFG, CA mix	GC SIDI HEV: E90, corn, US mix
Total energy	-42.7%	-43.1%	-42.9%	-43.3%	-36.2%	-34.1%	-40.6%	-36.4%	-34.3%	-40.8%	-35.8%
Fossil fuels	-47.2%	-47.5%	-54.6%	-54.8%	-40.5%	-63.3%	-69.8%	-47.8%	-70.7%	-77.1%	-64.8%
Petroleum	-53.6%	-98.8%	-53.8%	-99.0%	-90.5%	-90.5%	-90.7%	-90.8%	-90.8%	-91.0%	-91.9%
VOC: Total	-65.3%	-69.3%	-67.8%	-71.7%	-52.4%	-118.2%	-61.8%	-54.8%	-120.6%	-64.2%	-11.2%
VOC: Urban	-65.5%	-63.4%	-65.4%	-63.4%	-49.1%	-49.1%	-51.0%	-49.0%	-49.0%	-51.0%	-47.9%
CO: Total	-44.4%	-44.6%	-44.6%	-44.8%	-30.0%	-30.9%	-35.4%	-30.3%	-31.1%	-35.6%	-29.8%
CO: Urban	-44.0%	-44.0%	-44.0%	-44.0%	-30.1%	-30.1%	-31.9%	-30.1%	-30.1%	-31.9%	-30.0%
NOx: Total	-8.4%	-11.3%	-42.4%	-45.4%	-1.3%	-24.7%	-8.0%	-35.4%	-58.7%	-42.0%	48.0%
NOx: Urban	-30.8%	-31.0%	-30.0%	-30.2%	-34.3%	-34.3%	-40.7%	-33.6%	-33.6%	-40.0%	-29.2%
PM10: Total	-22.9%	-27.0%	-41.1%	-45.2%	-18.0%	-23.2%	-129.1%	-36.1%	-41.3%	-147.2%	161.9%
PM10: Urban	-31.9%	-31.9%	-31.7%	-31.7%	-21.4%	-21.4%	-110.9%	-21.3%	-21.3%	-110.7%	-20.2%
SOx: Total	67.3%	56.4%	-53.8%	-64.7%	59.9%	59.7%	106.0%	-61.2%	-61.4%	-15.1%	121.8%
SOx: Urban	-92.7%	-92.8%	-94.9%	-95.0%	-87.6%	-87.6%	-152.6%	-89.8%	-89.8%	-154.8%	-89.6%
CH4	-49.3%	-46.2%	-55.7%	-52.6%	-50.6%	-52.6%	-214.5%	-57.0%	-59.0%	-220.9%	-44.1%
N2O	-28.8%	-28.8%	-30.6%	-30.6%	-28.1%	-29.1%	-27.7%	-29.9%	-30.9%	-29.5%	50.1%
CO2	-47.2%	-47.9%	-57.1%	-57.8%	-47.1%	-74.4%	-103.4%	-57.1%	-84.4%	-113.3%	-62.3%
GHGs	-46.9%	-47.5%	-56.6%	-57.2%	-46.9%	-73.0%	-105.5%	-56.6%	-82.6%	-115.2%	-59.3%

D-II.3 Light-Duty Truck 2 (Cont.)

Parameter	GC SIDI HEV: E90, WB, US mix	GC SIDI HEV: E90, HB, US mix	GC SIDI HEV: E90, corn, CA mix	GC SIDI HEV: E90, WB, CA mix	GC SIDI HEV: E90, HB, CA mix	CIDI: RFD	CIDI: DME, NG	CIDI: DME, FG	CIDI: FT50, NG	CIDI: FT50, FG	CIDI: BD20
Total energy	-16.0%	-21.5%	-36.0%	-16.2%	-21.7%	-35.1%	-17.7%	-14.4%	-21.3%	-13.2%	-31.4%
Fossil fuels	-78.2%	-76.5%	-72.4%	-85.8%	-84.1%	-35.0%	-17.2%	-67.4%	-21.1%	-38.6%	-31.6%
Petroleum	-91.0%	-91.8%	-92.2%	-91.3%	-92.0%	-25.0%	-97.9%	-97.9%	-59.9%	-59.9%	-36.7%
VOC: Total	-43.6%	-46.0%	-13.5%	-45.9%	-48.2%	-45.0%	-62.6%	-196.0%	-51.2%	-128.5%	-18.1%
VOC: Urban	-47.9%	-48.0%	-47.9%	-47.9%	-47.9%	-38.5%	-58.9%	-58.9%	-40.4%	-40.4%	-36.0%
CO: Total	-26.6%	-27.3%	-30.0%	-26.8%	-27.5%	-1.9%	-0.4%	-2.4%	-1.7%	-2.4%	-0.2%
CO: Urban	-30.0%	-30.0%	-30.0%	-30.0%	-30.0%	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	0.4%
NOx: Total	73.8%	75.5%	14.5%	40.2%	42.0%	-19.0%	-18.0%	-71.9%	-25.7%	-51.5%	15.0%
NOx: Urban	-30.1%	-29.8%	-28.4%	-29.3%	-29.1%	23.0%	17.9%	17.9%	20.6%	20.6%	40.4%
PM10: Total	5.0%	-0.6%	149.1%	-7.8%	-13.4%	-15.2%	-42.0%	-55.1%	-31.6%	-36.4%	-8.4%
PM10: Urban	-20.3%	-20.2%	-20.0%	-20.1%	-20.1%	-1.7%	-17.2%	-17.2%	-9.4%	-9.4%	-2.0%
SOx: Total	34.3%	42.7%	11.7%	-75.8%	-67.4%	-34.1%	-82.2%	-83.3%	-58.4%	-58.0%	-32.6%
SOx: Urban	-90.0%	-89.8%	-91.8%	-92.2%	-92.0%	6.8%	-95.7%	-95.7%	-42.2%	-42.2%	-9.6%
CH4	-61.8%	-59.0%	-51.8%	-69.5%	-66.7%	-51.0%	-49.2%	-49.1%	-51.2%	-50.8%	-53.1%
N2O	-46.2%	63.3%	48.6%	-47.7%	61.8%	-21.3%	-23.4%	-26.4%	-23.7%	-24.2%	-13.4%
CO2	-86.4%	-78.7%	-72.4%	-96.4%	-88.7%	-32.3%	-35.7%	-94.6%	-31.6%	-61.2%	-40.1%
GHGs	-84.8%	-75.0%	-69.1%	-94.6%	-84.7%	-32.7%	-35.9%	-92.0%	-32.1%	-60.2%	-40.0%

D-II.3 Light-Duty Truck 2 (Cont.)

Parameter	GI CIDI HEV: RFD	GI CIDI HEV: DME, NG	GI CIDI HEV: DME, FG	GI CIDI HEV: FT50, NG	GI CIDI HEV: FT50, FG	GI CIDI HEV: BD20	GC CIDI HEV: RFD, US mix	GC CIDI HEV: RFD CA mix	GC CIDI HEV: DME, NG, US mix	GC CIDI HEV: DME, FG, US mix	GC CIDI HEV: DME, NG, CA mix
Total energy	-57.7%	-46.3%	-44.2%	-48.7%	-43.3%	-55.3%	-49.4%	-49.6%	-39.6%	-38.0%	-39.8%
Fossil fuels	-57.6%	-46.0%	-78.7%	-48.5%	-59.9%	-55.4%	-54.5%	-62.9%	-44.5%	-68.5%	-52.9%
Petroleum	-51.1%	-98.6%	-98.6%	-73.8%	-73.8%	-58.7%	-65.5%	-65.8%	-98.6%	-98.5%	-98.9%
VOC: Total	-50.7%	-66.2%	-153.2%	-54.8%	-105.3%	-33.1%	-61.5%	-64.3%	-72.1%	-135.8%	-74.9%
VOC: Urban	-9.4%	-13.9%	-13.9%	-41.2%	-41.2%	-38.3%	-57.9%	-57.8%	-71.3%	-71.3%	-71.3%
CO: Total	-2.6%	-1.6%	-3.0%	-2.5%	-3.0%	-1.5%	-31.2%	-31.4%	-30.4%	-31.4%	-30.7%
CO: Urban	0.0%	-0.1%	-0.1%	-0.2%	-0.2%	0.2%	-30.1%	-30.1%	-30.1%	-30.1%	-30.1%
NOx: Total	-31.9%	-31.2%	-66.4%	-36.2%	-53.1%	-9.7%	4.0%	-34.9%	5.3%	-20.4%	-33.6%
NOx: Urban	2.7%	2.2%	2.2%	19.1%	19.1%	32.0%	-15.3%	-14.5%	-14.6%	-14.6%	-13.7%
PM10: Total	-23.3%	-43.9%	-52.5%	-35.5%	-38.7%	-19.9%	-9.0%	-29.7%	-23.2%	-29.5%	-43.9%
PM10: Urban	-2.6%	-19.7%	-19.7%	-9.8%	-9.8%	-4.2%	-16.9%	-16.7%	-26.6%	-26.6%	-26.4%
SOx: Total	-57.0%	-88.4%	-89.1%	-72.9%	-72.6%	-56.1%	93.7%	-44.7%	72.2%	71.7%	-66.2%
SOx: Urban	-4.7%	-15.0%	-15.0%	-62.3%	-62.3%	-41.1%	-50.1%	-52.6%	-94.3%	-94.3%	-96.8%
CH4	-67.5%	-65.8%	-65.7%	-67.6%	-67.4%	-68.9%	-59.5%	-66.8%	-57.2%	-57.1%	-64.5%
N2O	-22.2%	-23.5%	-25.5%	-23.8%	-24.1%	-17.0%	-41.6%	-43.6%	-42.5%	-44.0%	-44.6%
CO2	-55.8%	-58.1%	-96.5%	-55.4%	-74.7%	-60.8%	-50.8%	-62.2%	-50.9%	-79.0%	-62.3%
GHGs	-55.6%	-57.7%	-94.3%	-55.2%	-73.6%	-60.3%	-50.9%	-62.0%	-51.0%	-77.7%	-62.1%

D-II.3 Light-Duty Truck 2 (Cont.)

Parameter	GC CIDI HEV: DME, FG, CA mix	GC CIDI HEV: FT50, NG, US mix	GC CIDI HEV: FT50, FG, US mix	GC CIDI HEV: FT50, NG, CA mix	GC CIDI HEV: FT50, FG, CA mix	GC CIDI HEV: BD20, US mix	GC CIDI HEV: BD20, CA mix	EV: US mix	EV: NE US mix	EV: CA mix	H2 FCV: NG, C. gaseous
Total energy	-38.2%	-41.3%	-37.4%	-41.5%	-37.6%	-46.1%	-46.4%	-29.6%	-31.1%	-30.3%	-59.7%
Fossil fuels	-76.9%	-46.3%	-54.7%	-54.7%	-63.1%	-51.4%	-59.8%	-46.8%	-51.1%	-74.7%	-60.3%
Petroleum	-98.9%	-80.4%	-80.4%	-80.7%	-80.7%	-69.3%	-69.6%	-98.5%	-97.9%	-99.6%	-99.7%
VOC: Total	-138.5%	-64.1%	-101.1%	-66.9%	-103.8%	-48.3%	-51.0%	-86.6%	-90.3%	-95.8%	-95.3%
VOC: Urban	-71.3%	-58.7%	-58.7%	-58.7%	-58.7%	-56.6%	-56.6%	-99.6%	-99.3%	-99.6%	-97.9%
CO: Total	-31.6%	-31.0%	-31.4%	-31.3%	-31.6%	-30.3%	-30.5%	-97.8%	-97.6%	-98.6%	-97.7%
CO: Urban	-30.1%	-30.1%	-30.1%	-30.1%	-30.1%	-29.8%	-29.8%	-99.9%	-99.8%	-99.9%	-99.6%
NOx: Total	-59.3%	1.6%	-10.7%	-37.2%	-49.6%	21.0%	-17.9%	87.9%	33.5%	-41.7%	-52.8%
NOx: Urban	-13.7%	-13.3%	-13.3%	-12.4%	-12.4%	-3.9%	-3.0%	-89.2%	-77.7%	-86.2%	-62.4%
PM10: Total	-50.2%	-17.2%	-19.6%	-37.9%	-40.3%	-5.9%	-26.6%	24.6%	-8.3%	-44.4%	-59.2%
PM10: Urban	-26.4%	-21.3%	-21.3%	-21.1%	-21.1%	-17.2%	-17.0%	-48.1%	-45.4%	-47.5%	-48.2%
SOx: Total	-66.7%	83.5%	83.7%	-54.8%	-54.6%	95.8%	-42.5%	445.6%	182.3%	-15.6%	-66.0%
SOx: Urban	-96.7%	-68.7%	-68.7%	-71.2%	-71.2%	-53.2%	-55.7%	-87.7%	-75.6%	-96.0%	-99.0%
CH4	-64.4%	-58.5%	-58.3%	-65.8%	-65.6%	-59.4%	-66.7%	-40.4%	-37.1%	-64.8%	-62.0%
N2O	-46.0%	-42.7%	-42.9%	-44.7%	-45.0%	-37.7%	-39.8%	-86.8%	-87.9%	-93.6%	-98.1%
CO2	-90.4%	-48.9%	-63.1%	-60.3%	-74.5%	-52.9%	-64.3%	-38.6%	-50.5%	-76.5%	-68.6%
GHGs	-88.8%	-49.1%	-62.6%	-60.2%	-73.7%	-52.9%	-63.9%	-39.5%	-50.8%	-76.5%	-68.9%

D-II.3 Light-Duty Truck 2 (Cont.)

Parameter	H2 FCV: NG, station gaseous	H2 FCV: solar, gas	H2 FCV: solar, liquid	H2 FCV: NG, liquid	FCV: MeOH, NG	FCV: MeOH, FG
Total energy	-53.2%	-65.5%	-71.8%	-58.8%	-52.3%	-49.7%
Fossil fuels	-52.9%	-93.1%	-98.3%	-58.5%	-52.0%	-80.3%
Petroleum	-99.7%	-99.9%	-98.1%	-97.8%	-98.6%	-98.6%
VOC: Total	-93.8%	-95.3%	-91.3%	-88.5%	-73.3%	-154.9%
VOC: Urban	-93.9%	-97.1%	-97.4%	-97.2%	-74.5%	-74.5%
CO: Total	-96.8%	-98.7%	-99.0%	-97.4%	-78.4%	-79.5%
CO: Urban	-97.8%	-99.5%	-99.8%	-99.8%	-80.0%	-80.0%
NOx: Total	-44.1%	-48.2%	-76.6%	-55.3%	-66.5%	-95.4%
NOx: Urban	-5.1%	-47.4%	-87.9%	-86.7%	-81.4%	-81.4%
PM10: Total	-58.2%	-58.1%	-55.1%	-49.7%	-61.6%	-68.1%
PM10: Urban	-40.4%	-47.2%	-46.5%	-46.3%	-50.3%	-50.3%
SOx: Total	-91.7%	-63.5%	-97.5%	-90.6%	-87.8%	-88.0%
SOx: Urban	-99.4%	-98.8%	-97.2%	-97.1%	-97.0%	-97.0%
CH4	-46.1%	-86.7%	-98.8%	-62.6%	-67.8%	-70.3%
N2O	-96.4%	-97.9%	-99.3%	-97.7%	-79.1%	-80.4%
CO2	-63.7%	-93.4%	-98.3%	-67.7%	-62.8%	-96.7%
GHGs	-63.7%	-93.3%	-98.3%	-68.1%	-63.3%	-95.6%

D-II.3 Light-Duty Truck 2 (Cont.)

Parameter	FCV: MeOH, LFG	FCV: RFG	EtOH FCV: corn	EtOH FCV: WB	EtOH FCV: HB	NG FCV: CNG
Total energy	-57.8%	-50.0%	-37.8%	-7.2%	-15.7%	-52.0%
Fossil fuels	-88.3%	-50.0%	-77.5%	-97.4%	-94.9%	-52.5%
Petroleum	-98.9%	-50.0%	-96.5%	-94.9%	-96.2%	-99.7%
VOC: Total	-85.0%	-52.9%	2.0%	-51.1%	-54.9%	-88.6%
VOC: Urban	-76.9%	-54.3%	-72.6%	-72.6%	-72.7%	-87.9%
CO: Total	-85.1%	-78.8%	-77.9%	-73.0%	-74.1%	-79.1%
CO: Urban	-82.2%	-79.9%	-79.9%	-79.9%	-79.9%	-79.7%
NOx: Total	-74.7%	-59.9%	20.4%	60.5%	63.3%	-47.0%
NOx: Urban	-89.3%	-76.1%	-68.6%	-70.9%	-70.3%	-49.3%
PM10: Total	-199.2%	-49.2%	381.5%	40.0%	27.7%	-58.4%
PM10: Urban	-161.1%	-48.8%	-47.4%	-47.6%	-47.5%	-48.5%
SOx: Total	-30.6%	-54.1%	45.9%	-102.2%	-87.9%	-66.2%
SOx: Urban	-177.6%	-94.9%	-95.6%	-96.4%	-96.0%	-99.1%
CH4	-270.9%	-52.5%	-70.9%	-93.4%	-89.8%	-11.4%
N2O	-78.6%	-78.5%	204.7%	16.3%	230.5%	-78.9%
CO2	-132.5%	-50.0%	-76.4%	-113.1%	-101.4%	-61.6%
GHGs	-135.9%	-50.6%	-71.2%	-110.2%	-95.2%	-60.3%

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