

Supplemental Tables

Table 1: Freight Road Vehicle Types in SATIM

Freight Vehicle	Weight Class [kg]	Model ID
Light commercial vehicle	<3,000	LCV
Medium commercial vehicle	3,000 -7,500	HCV1
Heavy commercial vehicle	7,501 – 12,000	HCV2
Heavy commercial vehicle	12,001 – 16,000	HCV3
Heavy commercial vehicle	16,001 – 20,000	HCV4
Heavy commercial vehicle	20,001 – 24,000	HCV5
Heavy commercial vehicle	24,001 – 32,000	HCV6
Extra heavy commercial vehicle	32,001 – 40,000	HCV7
Extra Heavy commercial vehicle	40,001 – 50,000	HCV8
Extra heavy commercial vehicle	>50,000	HCV9

Table 2: Disaggregated Demand for Freight in SATIM

tkm Freight Class	Reference					EMS				
	2010	2020	2030	2040	2050	2010	2020	2030	2040	2050
LCV	20	24	28	35	49	20	24	28	35	49
HCV1	5	7	8	10	14	5	6	7	9	11
HCV2	2	2	3	4	5	2	2	3	3	4
HCV3	14	17	20	25	35	14	16	18	22	28
HCV4	5	7	8	10	14	5	6	7	8	11
HCV5	3	4	5	6	9	3	4	4	5	7
HCV6	78	94	112	142	194	78	90	101	122	158
HCV7	28	33	40	50	69	28	32	36	43	56
HCV8	0	0	0	1	1	0	0	0	0	1
HCV9	1	1	1	2	2	1	1	1	2	2
Corridor Rail	29	35	42	53	73	29	43	60	87	134
Other Rail	27	33	39	49	68	27	33	40	51	70
Export Rail (bulk mining)	67	70	85	100	127	67	70	85	100	127
Total	280	328	390	488	658	280	328	390	488	658

Table 3: Comparative Vehicle Costs and Efficiencies (AEA, 2012).

Vehicle Class	2010	2020	2030	2040	2050	2010	2020	2030	2040	2050
Passenger Car	Capital Cost					Net MJ/km (Real World Overall Vehicle)				
Petrol ICE	R 225 991	R 244 714	R 253 048	R 258 594	R 261 827	2.77	2.07	1.69	1.51	1.38
Diesel ICE	1.03	1.05	1.04	1.04	1.04	2.23	1.75	1.46	1.30	1.20
Petrol HEV	1.23	1.08	1.03	1.01	1.00	2.12	1.69	1.45	1.32	1.21
Diesel HEV	1.23	1.11	1.06	1.04	1.03	1.77	1.49	1.30	1.20	1.09
Petrol PHEV	1.64	1.23	1.12	1.09	1.06	1.68	1.27	1.13	1.06	1.00
Diesel PHEV	1.66	1.27	1.15	1.12	1.10	1.44	1.15	1.05	0.99	0.94
Petrol REEV	2.21	1.41	1.20	1.16	1.13	1.24	1.06	0.95	0.89	0.84
Diesel REEV	2.21	1.43	1.22	1.18	1.15	1.11	0.98	0.89	0.84	0.80
BEV	2.57	1.61	1.29	1.28	1.27	0.69	0.63	0.58	0.55	0.52
H2FC	7.76	2.83	1.44	1.26	1.21	1.08	0.94	0.84	0.77	0.71
H2FC PHEV	8.22	3.00	1.55	1.35	1.29	0.96	0.81	0.72	0.68	0.63
H2FC REEV	5.66	2.30	1.40	1.27	1.21	0.84	0.75	0.68	0.63	0.59
NG ICE	1.08	1.05	1.04	1.03	1.03	2.77	2.07	1.69	1.51	1.38
Van / LCV										
Petrol ICE	R 181 111	R 196 880	R 204 136	R 213 052	R 217 519	2.85	2.33	2.06	1.83	1.67
Diesel ICE	1.07	1.08	1.08	1.08	1.08	2.90	2.49	2.20	1.96	1.80
Petrol HEV	1.22	1.09	1.04	1.02	1.00	2.17	1.85	1.69	1.53	1.39
Diesel HEV	1.29	1.17	1.11	1.09	1.07	2.43	2.16	1.97	1.80	1.64
Petrol PHEV	1.53	1.22	1.11	1.07	1.05	1.73	1.36	1.28	1.20	1.13
Diesel PHEV	1.59	1.29	1.18	1.14	1.12	1.90	1.55	1.46	1.38	1.31
Petrol REEV	1.93	1.36	1.19	1.13	1.10	1.28	1.13	1.06	1.00	0.94
Diesel REEV	1.99	1.42	1.24	1.19	1.15	1.37	1.25	1.18	1.12	1.06
BEV	2.68	1.68	1.36	1.33	1.32	0.71	0.66	0.62	0.59	0.56
H2FC	7.91	2.91	1.50	1.30	1.24	1.40	1.25	1.14	1.05	0.97
H2FC PHEV	8.24	3.05	1.59	1.38	1.31	1.19	1.00	0.92	0.85	0.79
H2FC REEV	5.65	2.35	1.44	1.29	1.23	0.97	0.88	0.82	0.77	0.71
NG ICE	1.17	1.13	1.11	1.10	1.09	3.34	2.73	2.42	2.15	1.96
Small Rigid Truck										
Diesel ICE	R 469 697	R 565 181	R 600 945	R 632 973	R 654 002	9.38	8.86	8.17	7.66	7.37
Diesel FHV	1.22	1.13	1.08	1.06	1.04	8.04	8.07	7.43	6.97	6.70
Diesel HHV	1.24	1.08	1.06	1.05	1.04	8.51	8.55	7.81	7.26	6.98
Diesel HEV	1.27	1.11	1.05	1.01	0.99	7.56	7.61	7.01	6.64	6.33
BEV	3.35	1.83	1.40	1.35	1.32	2.87	2.78	2.62	2.48	2.34
H2FC	6.37	2.27	1.23	1.06	0.99	4.42	4.14	3.79	3.47	3.19
DNG ICE	1.58	1.29	1.22	1.18	1.16	9.38	8.86	8.17	7.66	7.37
NG ICE	1.51	1.24	1.17	1.14	1.12	10.79	10.19	9.39	8.81	8.47
Large Rigid Truck										
Diesel ICE	1.00	1.00	1.00	1.00	1.00	12.41	11.08	9.27	8.55	8.04
Diesel FHV	1.15	1.09	1.05	1.04	1.03	11.59	10.67	8.93	8.23	7.73
Diesel HHV	1.12	1.04	1.02	1.03	1.02	11.91	10.88	9.03	8.18	7.69
Diesel HEV	1.26	1.11	1.06	1.03	1.01	11.28	10.25	8.49	7.69	7.17
BEV	0.00	0.00	0.00	0.00	0.00					
H2FC	6.10	2.19	1.20	1.05	0.98	5.88	5.14	4.39	3.86	3.51
DNG ICE	1.43	1.21	1.15	1.12	1.11	12.41	11.08	9.27	8.55	8.04
NG ICE	1.36	1.15	1.10	1.07	1.06	14.27	12.74	10.66	9.83	9.24
Articulated Truck										
Diesel ICE	R 984 231	R 1 220 537	R 1 283 632	R 1 332 877	R 1 363 471	13.99	11.82	9.41	8.51	7.91
Diesel FHV	1.16	1.09	1.05	1.03	1.02	13.44	11.50	9.24	8.42	7.84
Diesel HHV	1.18	1.06	1.04	1.03	1.02	13.67	11.61	9.26	8.37	7.80
Diesel HEV	1.28	1.10	1.05	1.03	1.01	13.15	11.27	8.93	8.05	7.40
BEV	0.00	0.00	0.00	0.00	0.00					
H2FC	6.69	2.26	1.22	1.06	0.99	6.64	5.62	4.70	4.18	3.77
DNG ICE	1.47	1.22	1.16	1.13	1.11	13.99	11.82	9.41	8.51	7.91
NG ICE	1.39	1.16	1.10	1.07	1.06	16.08	13.60	10.82	9.79	9.10
Construction Truck										
Diesel ICE	R 802 558	R 976 334	R 1 030 148	R 1 073 832	R 1 114 070	13.16	12.08	11.08	10.40	9.89
Diesel FHV	1.18	1.12	1.08	1.06	1.04	12.46	11.69	10.73	10.08	9.59
Diesel HHV	1.18	1.08	1.05	1.07	1.10	12.73	11.90	10.88	9.99	9.23
Diesel HEV	1.24	1.09	1.04	1.04	1.07	12.16	11.39	10.37	9.51	8.73
BEV	0.00	0.00	0.00	0.00	0.00					
H2FC	5.59	2.05	1.17	1.06	1.04	6.24	5.46	4.97	4.43	3.97
DNG ICE	1.49	1.25	1.19	1.16	1.14	13.16	12.08	11.08	10.40	9.89
NG ICE	1.43	1.20	1.15	1.12	1.10	15.13	13.90	12.75	11.95	11.38
Bus										
Diesel ICE	R 1 675 440	R 1 811 471	R 1 879 117	R 1 922 609	R 1 972 259	13.99	13.19	11.73	11.22	10.79
Diesel FHV	1.08	1.06	1.04	1.03	1.02	11.31	11.05	9.87	9.43	9.07
Diesel HHV	1.08	1.04	1.03	1.02	1.01	12.02	11.74	10.49	10.02	9.64
Diesel HEV	1.11	1.06	1.03	1.01	1.00	9.90	9.74	8.85	8.49	8.10
BEV	2.01	1.42	1.22	1.21	1.20	4.30	4.15	3.94	3.76	3.57
H2FC	2.65	1.44	1.08	1.03	1.00	6.63	6.20	5.69	5.27	4.87
DNG ICE	1.14	1.08	1.06	1.05	1.05	13.99	13.19	11.73	11.22	10.79
NG ICE	1.11	1.06	1.04	1.04	1.03	16.09	15.17	13.50	12.90	12.41

Table 4: Vehicle Scrappage Rates (Merven et al., 2012).

Decay Rate	Vehicle Type	Vehicle Life (years)				
		0	5	10	30	50
0.05	HCV1Diesel	50000	39049	23818	5404	456
0.09	HCV1Petrol	50000	32073	13197	919	11
0.10	HCV2Diesel	50000	30668	11538	614	5
0.05	HCV3Diesel	85000	65382	38685	8013	581
0.05	HCV4Diesel	85000	65382	38685	8013	581
0.08	HCV5Diesel	110000	74238	33814	3195	63
0.08	HCV6Diesel	110000	74238	33814	3195	63
0.09	HCV7Diesel	150000	94579	37601	2363	23
0.09	HCV8Diesel	150000	94579	37601	2363	23
0.08	HCV9Diesel	150000	101275	46166	4373	86
0.08	LCVDiesel	35000	23631	10772	1020	20
0.04	LCVGasoline	28000	22924	15367	4628	626
0.04	CarGasoline	21000	17193	11525	3471	470
0.04	MotoGasoline	10000	8187	5488	1653	224
0.04	SUVGasoline	24000	19650	13171	3967	537
0.04	BRTDiesel	40000	32749	21952	6612	895
0.04	BusDiesel	40000	32749	21952	6612	895
0.04	MBTDiesel	40000	32749	21952	6612	895

Table 5: SATIM Results: Fuel Commodity Costs.

Scenario Name	Fuels (R/GJ)															
	Diesel 137		Petrol 127			Gas 140		Electricity Utility (R/kWh) 0.57				2045				
	CO2 (R/ton)	Diesel	Petrol	E85	Gas	H2	Electricity Utility	Electricity Utility (R/kWh)	CO2 (R/ton)	Diesel	Petrol	E85	Gas	H2	Electricity Utility	Electricity Utility (R/kWh)
Reference	100	243	201	201	205	265	203	0.73	300	308	240	274	201	334	242	0.87
RefTech2020	90	251	189	189	204	262	203	0.73	280	307	238	269	200	328	244	0.88
Ref-LoOil	80	185	187	311	204	248	206	0.74	260	202	163	284	198	324	242	0.87
RefHiTech	150	243	248	255	208	283	203	0.73	470	284	310	277	261	374	242	0.87
RefHiTech_LoOil	130	189	198	255	207	257	203	0.73	420	185	224	259	257	363	236	0.85
RefHiTech-UCE	0	234	237	237	199	264	200	0.72	0	251	280	276	221	263	236	0.85
RefTech2020-UCE	0	245	181	182	199	251	203	0.73	0	282	219	228	182	263	239	0.86
Ref-UCE	0	233	207	285	199	255	200	0.72	0	282	219	228	182	263	239	0.86
Ref10Gt	480	267	273	270	228	364	222	0.8	1530	287	312	238	277	522	306	1.1
eMode	40	248	186	195	201	256	206	0.74	130	300	215	256	191	294	239	0.86
eModeLoOil	30	187	145	196	201	234	203	0.73	100	194	142	251	188	286	236	0.85
eModeHiTech	90	251	191	255	204	262	203	0.73	270	292	256	258	244	327	236	0.85
eMode10Gt	440	264	262	268	226	359	219	0.79	1410	291	295	295	269	506	306	1.1