

Te ine tukunga: He tohutohu pakihi

Measuring emissions: A guide for organisations

2023 summary of emission factors



Ministry for the
Environment
Manatū Mō Te Taiao



Te Kāwanatanga o Aotearoa
New Zealand Government

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Introduction

Organisations wishing to voluntarily monitor and report their greenhouse gas (GHG) emissions for their New Zealand operations can use these GHG emission factors.

We present the emission factors in carbon dioxide equivalents (CO₂-e) using data and methods from the 2021 calendar year.

This emission factors summary is part of a suite of documents that comprise *Measuring emissions: A guide for organisations*, listed in Figure 1.

Figure 1: Documents in *Measuring emissions: A guide for organisations*

Measuring emissions: A guide for organisations	
Detailed guide	For users who need to know the data sources, methodologies, uncertainties and assumptions behind the emission factors for each emission source
Emission factors summary	Quick look up tables providing the main emission factors for each emission source
Emission factors workbook	As above but in Excel format across multiple tabs
Emission factors flat file	Simple format for integration with software
Interactive workbook	Use this spreadsheet to input your activity data, in order to work out your organisation's emissions and produce an inventory
Example GHG inventory	Shows what a finished inventory might look like
Example GHG report	Shows what a finished report might look like

THIS DOCUMENT

For further guidance on how to measure and report your organisation's GHG emissions, and for understanding how these emission factors were derived, see the [Detailed Guide](#).

Fuel emission factors

Table 1: Stationary combustion of fuels: Residential use

Residential fuel emission Source	Unit	kg CO ₂ -e/unit
Coal - Default	kg	2.12
Coal - Bituminous	kg	2.88
Coal - Sub-Bituminous	kg	2.17
Coal - Lignite	kg	1.55

Table 2: Stationary combustion of fuels: Commercial use

Commercial fuel emission source	Unit	kg CO ₂ -e/unit
Coal - Default	kg	2.01
Coal - Bituminous	kg	2.66
Coal - Sub-Bituminous	kg	2.00
Coal - Lignite	kg	1.43
Diesel	litre	2.69
LPG	kg	2.97
Heavy Fuel Oil	litre	3.00
Light Fuel Oil	litre	2.97
Natural Gas	kWh	0.194
	GJ	53.8

Table 3: Stationary combustion of fuels: Industrial use

Industrial fuel emission source	Unit	kg CO ₂ -e/unit
Coal - Default	kg	1.96
Coal - Bituminous	kg	2.66
Coal - Sub-Bituminous	kg	2.00
Coal - Lignite	kg	1.43
Diesel	litre	2.68
LPG	kg	2.97
Heavy Fuel Oil	litre	3.00
Light Fuel Oil	litre	2.96
Natural Gas	kWh	0.193
	GJ	53.7

Table 4: Transport fuels

Transport fuel type	Unit	kg CO ₂ -e/unit
Regular Petrol	litre	2.46
Premium Petrol	litre	2.46
Diesel	litre	2.71
LPG	litre	1.62
Heavy Fuel Oil	litre	3.02
Light Fuel Oil	litre	2.98
Aviation fuel (Kerosene)	GJ	68.8
	litre	2.56
Aviation gas	GJ	66.4
	litre	2.25

Table 5: Biofuels

Biofuel type	Unit	Fossil (kg CO ₂ -e/unit)
Bioethanol	GJ	3.89
	litre	0.0917
Biodiesel	GJ	0.963
	litre	0.0351
Wood - Residential	kg	0.0729
Wood - Industrial	kg	0.0146

Table 6: Transmission and distribution losses for natural gas and electricity

Transmission and distribution losses source	Unit	kg CO ₂ -e/unit
Natural gas used	kWh	0.00713
	GJ	1.98

Refrigerant use emission factors

Table 7: Global warming potentials of refrigerants (refrigerant use emission factors)

Industrial designation or common name	Chemical formula	Unit	AR5 GWP100
Industrial designation or common name			
Carbon dioxide (R-744)	CO ₂	kg	1
Methane	CH ₄	kg	28
Propane (R-290)	C ₃ H ₈	kg	0.02*
Nitrous oxide (R-744a)	N ₂ O	kg	265
Butane	C ₄ H ₁₀	kg	0.006*
Substances controlled by the Montreal Protocol			
CFC-11 (R-11)	CCl ₃ F	kg	4660
CFC-12 (R-12)	CCl ₂ F ₂	kg	10200
CFC-13 (R-13)	CClF ₃	kg	13900
CFC-113 (R-113)	CCl ₂ FCClF ₂	kg	5820
CFC-114 (R-114)	CClF ₂ CClF ₂	kg	8590
CFC-115 (R-115)	CClF ₂ CF ₃	kg	7670
Halon-1301 (R-1301)	CBrF ₃	kg	6290
Halon-1211 (R-1211)	CBrClF ₂	kg	1750
Halon-2402 (R-2402)	CBrF ₂ CBrF ₂	kg	1470
Carbon tetrachloride (R-10)	CCl ₄	kg	1730
Methyl bromide	CH ₃ Br	kg	2
Methyl chloroform	CH ₃ CCl ₃	kg	160
HCFC-21	CHCl ₂ F	kg	148
HCFC-22 (R-22)	CHClF ₂	kg	1760
HCFC-123 (R-123)	CHCl ₂ CF ₃	kg	79
HCFC-124 (R-124)	CHClF ₂ CF ₃	kg	527
HCFC-141b (R-141b)	CH ₃ CCl ₂ F	kg	782
HCFC-142b (R-142b)	CH ₃ CClF ₂	kg	1980
HCFC-225ca (R-225ca)	CHCl ₂ CF ₂ CF ₃	kg	127
HCFC-225cb (R-225cb)	CHClF ₂ CF ₂ CF ₃	kg	525
Hydrofluorocarbons			
HFC-23 (R-23)	CHF ₃	kg	12400
HFC-32 (R-32)	CH ₂ F ₂	kg	677
HFC-41	CH ₃ F	kg	116

Industrial designation or common name	Chemical formula	Unit	AR5 GWP100
HFC-125 (R-125)	CHF ₂ CF ₃	kg	3170
HFC-134	CHF ₂ CHF ₂	kg	1120
HFC-134a (R-134a)	CH ₂ FCF ₃	kg	1300
HFC-143	CH ₂ FCHF ₂	kg	328
HFC-143a (R-143a)	CH ₃ CF ₃	kg	4800
HFC-152	CH ₂ FCH ₂ F	kg	16
HFC-152a (R-152a)	CH ₃ CHF ₂	kg	138
HFC-161	CH ₃ CH ₂ F	kg	4
HFC-227ea (R-227ea)	CF ₃ CHFCF ₃	kg	3350
HFC-236cb	CH ₂ FCF ₂ CF ₃	kg	1210
HFC-236ea	CHF ₂ CHFCF ₃	kg	1330
HFC-236fa (R-236fa)	CF ₃ CH ₂ CF ₃	kg	8060
HFC-245ca	CH ₂ FCF ₂ CHF ₂	kg	716
HFC-245fa (R - 245fa)	CHF ₂ CH ₂ CF ₃	kg	858
HFC-365mfc (R- 365mfc)	CH ₃ CF ₂ CH ₂ CF ₃	kg	804
HFC-43-10mee	CF ₃ CHFCHFCF ₂ CF ₃	kg	1650
Perfluorinated compounds			
Sulphur hexafluoride	SF ₆	kg	23500
Nitrogen trifluoride	NF ₃	kg	16100
PFC-14	CF ₄	kg	6630
PFC-116	C ₂ F ₆	kg	11100
PFC-218	C ₃ F ₈	kg	8900
PFC-318	c-C ₄ F ₈	kg	9540
PFC-31-10	C ₄ F ₁₀	kg	9200
PFC-41-12	C ₅ F ₁₂	kg	8550
PFC-51-14	C ₆ F ₁₄	kg	7910
PFC-91-18	C ₁₀ F ₁₈	kg	7190
Trifluoromethyl sulphur pentafluoride	SF ₅ CF ₃	kg	17400
Perfluorocyclopropane	c-C ₃ F ₆	kg	9200
Fluorinated ethers			
HFE-125	CHF ₂ OCF ₃	kg	12400
HFE-134	CHF ₂ OCHF ₂	kg	5560
HFE-143a	CH ₃ OCF ₃	kg	523
HFE-227ea	CF ₃ CHFOCF ₃	kg	6450
HCFE-235da2 (Isoflurane)	CHF ₂ OCHClCF ₃	kg	491
HFE-236ea2	CHF ₂ OCHFCF ₃	kg	1790
HFE-236fa	CF ₃ CH ₂ OCF ₃	kg	979
HFE-245cb2	CH ₃ OCF ₂ CF ₃	kg	654
HFE-245fa1	CHF ₂ CH ₂ OCF ₃	kg	828
HFE-245fa2	CHF ₂ OCH ₂ CF ₃	kg	812
HFE-254cb2	CH ₃ OCF ₂ CHF ₂	kg	301
HFE-263fb2	CF ₃ CH ₂ OCH ₃	kg	1
HFE-329mcc2	CHF ₂ CF ₂ OCF ₂ CF ₃	kg	3070
HFE-338mcf2	CF ₃ CH ₂ OCF ₂ CF ₃	kg	929
HFE-347mcc3	CH ₃ OCF ₂ CF ₂ CF ₃	kg	530
HFE-347mcf2	CHF ₂ CH ₂ OCF ₂ CF ₃	kg	854
HFE-347pcf2	CHF ₂ CF ₂ OCH ₂ CF ₃	kg	889
HFE-356mec3	CH ₃ OCF ₂ CHFCF ₃	kg	387
HFE-356pcc3	CH ₃ OCF ₂ CF ₂ CHF ₂	kg	413
HFE-356pcf2	CHF ₂ CH ₂ OCF ₂ CHF ₂	kg	719
HFE-356pcf3	CHF ₂ OCH ₂ CF ₂ CHF ₂	kg	446
HFE-365mcf3	CF ₃ CF ₂ CH ₂ OCH ₃	kg	1
HFE-374pc2	CHF ₂ CF ₂ OCH ₂ CH ₃	kg	627
HFE-449sl (HFE-7100)	C ₄ F ₉ OCH ₃	kg	421
HFE-569sf2 (HFE-7200)	C ₄ F ₉ OC ₂ H ₅	kg	57
HFE-43-10pccc124 (H-Galden 1040x)	CHF ₂ OCF ₂ OC ₂ F ₄ OCHF ₂	kg	2820
HFE-236ca12 (HG-10)	CHF ₂ OCF ₂ OCHF ₂	kg	5350

Industrial designation or common name	Chemical formula	Unit	AR5 GWP100
HFE-338pcc13 (HG-01)	CHF ₂ OCF ₂ CF ₂ OCHF ₂	kg	2910
Perfluoropolyethers			
PFPME	CF ₃ OCF(CF ₃)CF ₂ OCF ₂ OCF ₃	kg	9710
Hydrocarbons and other compounds – Direct Effects			
Chloroform	CHCl ₃	kg	16
Dimethylether	CH ₃ OCH ₃	kg	1
Methylene chloride	CH ₂ Cl ₂	kg	9
Halon-1201	CHBrF ₂	kg	376
Methyl chloride	CH ₃ Cl	kg	12

Table 8: Global warming potentials of medical gases

Industrial designation or common name	Chemical formula	Unit	AR5 GWP100
Medical gases			
HFE-347mmz1 (Sevoflurane)*	(CF ₃) ₂ CHOCH ₂ F	kg	216
HCFE-235da2 (Isoflurane)	CHF ₂ OCHClCF ₃	kg	491
HFE-236ea2 (Desflurane)*	CHF ₂ OCHF ₂ CF ₃	kg	1790

* AR6 values

Purchased electricity, heat and steam emission factors

Table 9: Purchased electricity – annual average

Emission source	Unit	Purchased grid-average electricity kg CO ₂ -e/unit
2022	kWh	0.0742
2021	kWh	0.115
2020	kWh	0.120
2019	kWh	0.110
2018	kWh	0.0947
2017	kWh	0.0996
2016	kWh	0.0885
2015	kWh	0.112
2014	kWh	0.118
2013	kWh	0.141
2012	kWh	0.167
2011	kWh	0.135
2010	kWh	0.1457

Table 10: Purchased electricity – calendar quarters

Emission source – Quarter	Unit	Purchased grid-average electricity kg CO ₂ -e/unit
Dec-2022	kWh	0.0353
Sep-2022	kWh	0.0554
Jun-2022	kWh	0.108
Mar-2022	kWh	0.0991
Dec-2021	kWh	0.0496
Sep-2021	kWh	0.0931
Jun-2021	kWh	0.170
Mar-2021	kWh	0.147
Dec-2020	kWh	0.103
Sep-2020	kWh	0.147
Jun-2020	kWh	0.111
Mar-2020	kWh	0.117

Table 11: Transmission and distribution losses for electricity consumption

Emission source	Unit	kg CO ₂ -e/unit
2022	kWh	0.00860
2021	kWh	0.0108
2020	kWh	0.0109
2019	kWh	0.00993
2018	kWh	0.00797
2017	kWh	0.00879
2016	kWh	0.00593
2015	kWh	0.00671
2014	kWh	0.00693
2013	kWh	0.0102
2012	kWh	0.0137
2011	kWh	0.00976
2010	kWh	0.0103

Note: These numbers are rounded to three significant figures.

Indirect business-related emission factors

Table 12: Working from home emission factors

Emission source	Unit	kg CO ₂ -e/unit
Default	employee days	0.365
Without heating	employee days	0.054
With heating	employee days	0.799

Travel emission factors

Table 13: Passenger vehicle fleet

Passenger vehicle travel emission source	Unit	Pre-2010 fleet kg CO ₂ -e/unit	2010–2015 fleet kg CO ₂ -e/unit	Post-2015 fleet kg CO ₂ -e/unit	
Petrol vehicle	<1350 cc	km	0.195	0.172	0.159
	1350–<1600 cc	km	0.201	0.178	0.165
	1600–<2000 cc	km	0.227	0.201	0.186
	2000–3000 cc	km	0.252	0.223	0.206
	≥3000 cc	km	0.301	0.267	0.247
Diesel vehicle	<1350 cc	km	0.214	0.190	0.178
	1350–<1600 cc	km	0.206	0.183	0.171
	1600–<2000 cc	km	0.218	0.194	0.181
	2000–<3000 cc	km	0.268	0.238	0.223
	≥3000 cc	km	0.298	0.264	0.247
Petrol hybrid vehicle	<1350 cc	km	0.154	0.136	0.126
	1350–<1600 cc	km	0.159	0.141	0.130
	1600–<2000 cc	km	0.179	0.159	0.147
	2000–<3000 cc	km	0.199	0.176	0.163
	≥3000 cc	km	0.238	0.211	0.195
Diesel Hybrid vehicle	<1350 cc	km	0.192	0.170	0.157
	1350–<1600 cc	km	0.185	0.164	0.151
	1600–<2000 cc	km	0.196	0.173	0.160
	2000–<3000 cc	km	0.241	0.213	0.197
	≥3000 cc	km	0.267	0.237	0.219
Motorcycle	<60cc, petrol	km	0.0683	0.0605	0.0565
	≥ 60cc, petrol	km	0.137	0.121	0.113
PHEV (Petrol) - Petrol consumption	<1350 cc	km	n/a	0.0712	0.0658
	1350–<1600 cc	km	n/a	0.0737	0.0681
	1600–<2000 cc	km	n/a	0.0830	0.0767
	2000–<3000 cc	km	n/a	0.0922	0.0852
	≥3000 cc	km	n/a	0.110	0.102
PHEV (Petrol) - Electricity consumption	<1350 cc	km	n/a	0.00736	0.00695
	1350–<1600 cc	km	n/a	0.00762	0.00719
	1600–<2000 cc	km	n/a	0.00858	0.00810
	2000–<3000 cc	km	n/a	0.00953	0.00899
	≥3000 cc	km	n/a	0.0114	0.0108
PHEV (Diesel) - Diesel consumption	<1350 cc	km	n/a	0.0890	0.0823
	1350–<1600 cc	km	n/a	0.0856	0.0792
	1600–<2000 cc	km	n/a	0.0908	0.0839
	2000–<3000 cc	km	n/a	0.112	0.103
	≥3000 cc	km	n/a	0.124	0.114
PHEV (Diesel) - Electricity consumption	<1350 cc	km	n/a	0.00803	0.00758
	1350–<1600 cc	km	n/a	0.00771	0.00728
	1600–<2000 cc	km	n/a	0.00845	0.00798
	2000–<3000 cc	km	n/a	0.00957	0.00903
	≥3000 cc	km	n/a	0.0113	0.0107
Electric vehicle	<1350 cc	km	n/a	0.0154	0.0146
	1350–<1600 cc	km	n/a	0.0160	0.0151
	1600–<2000 cc	km	n/a	0.0180	0.0170
	2000–<3000 cc	km	n/a	0.0200	0.0189
	≥3000 cc	km	n/a	0.0239	0.0226
Motorcycle	<60cc, electricity	km	n/a	0.00380	0.00372
	≥ 60cc, electricity	km	n/a	0.00760	0.00743

Table 14: Default private car emission factors

Default private car travel emission source	Unit	kg CO ₂ -e/unit
Petrol	km	0.252
Diesel	km	0.268
Petrol hybrid	km	0.199
Diesel hybrid	km	0.241
PHEV (Petrol) - Petrol consumption	km	0.0922
PHEV (Petrol) - Electricity consumption	km	0.00953
PHEV (Diesel) - Diesel consumption	km	0.112
PHEV (Diesel) - Electricity consumption	km	0.00957
Electric	km	0.0200

Table 15: Default rental car emission factors

Default rental car travel emission source	Unit	kg CO ₂ -e/unit
Petrol	km	0.186
Diesel	km	0.181
Petrol hybrid	km	0.147
Diesel hybrid	km	0.160
PHEV (Petrol) - Petrol consumption	km	0.0767
PHEV (Petrol) - Electricity consumption	km	0.00810
PHEV (Diesel) - Diesel consumption	km	0.0839
PHEV (Diesel) - Electricity consumption	km	0.00798
Electric	km	0.0170

Table 16: Taxi travel

Taxi travel emission source	Unit	kg CO ₂ -e/unit
Regular	km	0.164
Regular - dollars spent	\$	0.0514
Petrol hybrid	km	0.176
Petrol hybrid - dollars spent	\$	0.0550
Electric	km	0.0200
Electric - dollars spent	\$	0.00625

Table 17: Public transport passenger

Emission source		Unit	kg CO ₂ -e/unit
Bus	National Average for Bus	pkm	0.155
	Electric Bus	pkm	0.0124
	Diesel Bus	pkm	0.0600
	Average Bus	pkm	0.0363
Rail	Metropolitan Electric	pkm	0.0130
	Metropolitan Diesel	pkm	0.0460
	Metropolitan Average	pkm	0.0190

Table 18: Public transport vehicles

Emission source		Unit	kg CO ₂ -e/unit
Diesel Bus	< 7500 kg	km	0.567
	7500 - 12000 kg	km	0.785
	≥ 12000 kg	km	1.09
Diesel hybrid bus	< 7500 kg	km	0.401
	7500 - 12000 kg	km	0.556
	≥ 12000 kg	km	0.770
Electric bus	< 7500 kg	km	0.0552
	7500 - 12000 kg	km	0.0765
	≥ 12000 kg	km	0.106

Table 19: Air travel (domestic)

Emission source	Unit	With radiative forcing kg CO ₂ -e/unit	Without radiative forcing kg CO ₂ -e/unit
National average	pkm	0.306	0.164
Large aircraft	pkm	0.180	0.097
Medium aircraft	pkm	0.239	0.128
Small aircraft	pkm	0.670	0.352

For calculating international air travel emissions, use the [International Civil Aviation Organisation calculator](#). If you prefer not to use this, emission factors for international travel can be found in the [Emission Factors Workbook](#).

Table 20: Air travel (international)

Emission source	Travel class	Unit	With radiative forcing kg CO ₂ -e/unit	Without radiative forcing kg CO ₂ -e/unit
Short-haul (<3700km)	Average passenger	pkm	0.154	0.0812
	Economy class	pkm	0.151	0.0798
	Business class	pkm	0.227	0.120
Long-haul (>3700km)	Average passenger	pkm	0.193	0.102
	Economy class	pkm	0.148	0.0782
	Premium economy class	pkm	0.237	0.125
	Business class	pkm	0.429	0.227
	First class	pkm	0.591	0.313

Table 21: Helicopter emission factors

Emission source	Unit	kg CO ₂ -e/unit
Eurocopter AS 350B Squirrel	hours	467
Eurocopter AS 350B3 Squirrel	hours	483
Robinson R44	hours	186
Robinson R22 Beta	hours	129
Bell 206B	hours	322

Table 22: Accommodation

Country stayed in	kg CO ₂ -e/unit
Argentina	50.0
Australia	38.9
Austria	11.9
Belgium	11.6
Brazil	14.9
Canada	17.1
Caribbean Region	61.1
Chile	30.8
China	60.7
Colombia	11.0
Costa Rica	7.00
Czech Republic	31.8
Egypt	54.0
Fiji	54.8
Finland	11.1
France	7.50
Germany	18.2
Greece	42.8
Hong Kong	66.2
Hungary	22.0
India	66.0
Indonesia	88.2
Ireland	23.9
Israel	51.8
Italy	23.9
Japan	54.7
Jordan	64.5
Kazakhstan	106
Macau	68.1
Malaysia	80.3
Maldives	176
Mexico	27.0
Morocco	104
Netherlands	21.2
New Zealand	9.40
Oman	117
Panama	23.7
Peru	29.9
Philippines	62.9
Poland	35.8
Portugal	27.2
Qatar	105
Romania	25.5
Russian Federation	30.9
Saudi Arabia	112
Singapore	28.5
South Africa	56.6
South Korea	56.5
Spain	16.3
Switzerland	7.40
Thailand	55.9
Turkey	38.0
United Arab Emirates	95.9
United Kingdom	13.4
United States	19.8
Vietnam	49.2

Freight transport emission factors

Table 23: Road freight: Light commercial vehicles

Light commercial vehicle travel emission source	Unit	Pre-2010 fleet kg CO ₂ -e/unit	2010–2015 kg CO ₂ -e/unit	Post-2015 fleet kg CO ₂ -e/unit	
Petrol	<1350 cc	km	0.207	0.195	0.184
	1350 - <1600 cc	km	0.222	0.209	0.197
	1600 - <2000 cc	km	0.300	0.283	0.266
	2000 - <3000 cc	km	0.317	0.299	0.281
	≥3000 cc	km	0.362	0.341	0.321
Diesel	<1350 cc	km	0.217	0.200	0.190
	1350 - <1600 cc	km	0.209	0.193	0.183
	1600 - <2000 cc	km	0.278	0.256	0.244
	2000 - <3000 cc	km	0.298	0.275	0.261
	≥3000 cc	km	0.302	0.278	0.264
Petrol hybrid	<1350 cc	km	0.163	0.154	0.144
	1350 - <1600 cc	km	0.175	0.165	0.155
	1600 - <2000 cc	km	0.237	0.223	0.209
	2000 - <3000 cc	km	0.250	0.236	0.221
	≥3000 cc	km	0.286	0.269	0.252
Diesel hybrid	<1350 cc	km	0.195	0.179	0.171
	1350 - <1600 cc	km	0.187	0.173	0.165
	1600 - <2000 cc	km	0.249	0.230	0.219
	2000 - <3000 cc	km	0.267	0.247	0.235
	≥3000 cc	km	0.271	0.250	0.238
PHEV (Petrol) - Petrol consumption	<1350 cc	km	n/a	0.0806	0.0754
	1350 - <1600 cc	km	n/a	0.0865	0.0810
	1600 - <2000 cc	km	n/a	0.117	0.109
	2000 - <3000 cc	km	n/a	0.123	0.116
	≥3000 cc	km	n/a	0.141	0.132
PHEV (Petrol) - Electricity consumption	<1350 cc	km	n/a	0.00835	0.00808
	1350 - <1600 cc	km	n/a	0.00897	0.00868
	1600 - <2000 cc	km	n/a	0.0101	0.00982
	2000 - <3000 cc	km	n/a	0.0125	0.0121
	≥3000 cc	km	n/a	0.0146	0.0141
PHEV (Diesel) - Diesel consumption	<1350 cc	km	n/a	0.0939	0.0895
	1350 - <1600 cc	km	n/a	0.0904	0.0861
	1600 - <2000 cc	km	n/a	0.120	0.115
	2000 - <3000 cc	km	n/a	0.129	0.123
	≥3000 cc	km	n/a	0.131	0.124
PHEV (Diesel) - Electricity consumption	<1350 cc	km	n/a	0.00848	0.00820
	1350 - <1600 cc	km	n/a	0.00814	0.00787
	1600 - <2000 cc	km	n/a	0.00892	0.00863
	2000 - <3000 cc	km	n/a	0.0101	0.00976
	≥3000 cc	km	n/a	0.0119	0.0115
Electric vehicle	<1350 cc	km	n/a	0.0175	0.0170
	1350 - <1600 cc	km	n/a	0.0188	0.0182
	1600 - <2000 cc	km	n/a	0.0213	0.0206
	2000 - <3000 cc	km	n/a	0.0262	0.0254
	≥3000 cc	km	n/a	0.0306	0.0297

Table 24: Road freight: Default light commercial vehicles

Emission source	Unit	kg CO ₂ -e/unit
Petrol	km	0.317
Diesel	km	0.298
Petrol Hybrid	km	0.250
Diesel Hybrid	km	0.267

Table 25: Road freight: Heavy goods vehicles

Emission source	Unit	Pre-2010 fleet kg CO ₂ -e	2010–2015 fleet kg CO ₂ -e	Post-2015 fleet kg CO ₂ -e	
HGV diesel	< 5,000 kg	km	0.450	0.427	0.425
	5,000 - 7,500 kg	km	0.515	0.489	0.481
	7,500 - 10,000 kg	km	0.630	0.598	0.589
	10,000 - 12,000 kg	km	0.747	0.706	0.698
	12,000 - 15,000 kg	km	0.849	0.805	0.793
	15,000 - 20,000 kg	km	0.991	0.966	0.964
	20,000 - 25,000 kg	km	1.32	1.29	1.28
	25,000 - 30,000 kg	km	1.56	1.44	1.43
HGV diesel hybrid	< 5,000 kg	km	0.362	0.343	0.335
	5,000 - 7,500 kg	km	0.415	0.394	0.384
	7,500 - 10,000 kg	km	0.508	0.481	0.469
	10,000 - 12,000 kg	km	0.602	0.570	0.557
	12,000 - 15,000 kg	km	0.684	0.648	0.633
	15,000 - 20,000 kg	km	0.901	0.878	0.876
	20,000 - 25,000 kg	km	1.20	1.17	1.17
	25,000 - 30,000 kg	km	1.39	1.35	1.35
HGV BEV	≥ 30,000 kg	km	1.56	1.51	1.51
	< 5,000 kg	km	n/a	0.0367	0.0359
	5,000 - 7,500 kg	km	n/a	0.0421	0.0412
	7,500 - 10,000 kg	km	n/a	0.0515	0.0503
	10,000 - 12,000 kg	km	n/a	0.0610	0.0678
	12,000 - 15,000 kg	km	n/a	0.0693	0.0761

Table 26: Road freight: Default emission factors for heavy goods vehicles

Emission source	Unit	kg CO ₂ -e
HGV Diesel	km	0.482
HGV Diesel Hybrid	km	0.389

Table 27: Road freight: Emission factors for freighting goods by road

Emission source	Unit	kg CO ₂ -e
Long-haul heavy truck	tkm	0.105
Urban delivery heavy truck	tkm	0.390
All trucks	tkm	0.135

Table 28: Freighting goods in New Zealand

Emission source	Unit	kg CO ₂ -e
Oil products	tkm	0.0160
Other bulk	tkm	0.0300
Container freight	tkm	0.0460
Rail Freight	tkm	0.0270

Table 29: Air freight

Emission source	Unit	With radiative forcing kg CO ₂ -e/unit	Without radiative forcing kg CO ₂ -e/unit
Domestic	tkm	4.49	2.38
Short haul	tkm	2.30	1.22
Long haul	tkm	1.02	0.539

Table 30: International shipping

Emission source	Unit	kg CO ₂ -e	
Bulk carrier	200,000+ dwt	tkm	0.00253
	100,000–199,999 dwt	tkm	0.00304
	60,000–99,999 dwt	tkm	0.00416
	35,000–59,999 dwt	tkm	0.00578
	10,000–34,999 dwt	tkm	0.00801
	0–9999 dwt	tkm	0.0296
	Average	tkm	0.00355
General cargo	10,000+ dwt	tkm	0.0121
	5000–9999 dwt	tkm	0.0160
	0–4999 dwt	tkm	0.0141
	10,000+ dwt 100+ TEU	tkm	0.0112
	5000–9999 dwt 100+ TEU	tkm	0.0177
	0–4999 dwt 100+ TEU	tkm	0.0201
	Average	tkm	0.0133
Container ship	8000+ TEU	tkm	0.0127
	5000–7999 TEU	tkm	0.0168
	3000–4999 TEU	tkm	0.0168
	2000–2999 TEU	tkm	0.0203
	1000–1999 TEU	tkm	0.0325
	0–999 TEU	tkm	0.0368
	Average	tkm	0.0161
Vehicle transport	4000+ CEU	tkm	0.0324
	0–3999 CEU	tkm	0.0584
	Average	tkm	0.0386
RoRo-Ferry	2000+ LM	tkm	0.0502
	0–1999 LM	tkm	0.0611
	Average	tkm	0.0517
	Large RoPax ferry	tkm	0.377
Refrigerated cargo	All dwt	tkm	0.0131

Water supply and wastewater treatment emission factors

Table 31: Water supply

Emission source	Unit	kg CO ₂ -e
Water supply emission factors	m3	0.0369
	per capita	4.302

Table 32: Wastewater treatment

Emission source		Unit	kg CO ₂ -e/unit
Domestic wastewater	Average for wastewater treatment plants	m3 of water supplied	0.508
		per capita	48.5
	Septic tanks	per capita	190
Industrial Wastewater	Meat (excl. poultry)	tonne of kills	52.6
	Poultry	tonne of kills	51.7
	Pulp & paper	tonne of product	11.8
	Wine	tonne of crushed grapes	5.79
	Dairy processing	m ³ of milk	0.102

Materials and waste emission factors

Table 33: Waste disposal with and without landfill gas recovery (LFGR)

Emission source		Unit	With LFGR kg CO ₂ -e/unit	Without LFGR kg CO ₂ -e/unit
Waste (known composition)	Waste - Food	kg	0.674	2.11
	Waste - Garden	kg	0.552	1.72
	Waste - Paper	kg	0.981	3.06
	Waste - Wood (combined)	kg	0.380	1.19
	Wood (treated)	kg	0.0613	0.192
	Wood (untreated)	kg	0.858	2.68
	Waste - Textile	kg	0.490	1.53
	Waste - Nappies	kg	0.245	0.766
	Waste - Sludge	kg	0.153	0.479
	Waste - Other (Inert)	kg	n/a	n/a
	Waste (unknown composition)	General waste	kg	0.232
Office waste		kg	0.666	2.08

Table 34: Composting

Emission source	Unit	kg CO ₂ -e/unit
Composting	kg	0.176
Anaerobic digestion	Kg	0.0224

Agriculture, forestry and other land-use emission factors

Table 35: Forest growth removal source

Emission source	Unit	kg CO ₂ -e/unit
Planted forests: Approach one - Stock change accounting		
All planted forests	ha	-35,503
<i>Pinus radiata</i>	ha	-36,655
Other softwoods	ha	-29,414
All hardwoods	ha	-16,102
Planted forests: Approach two - Averaging accounting		
All planted forests – First rotation (age 22 years and under)	ha	-35,503
<i>Pinus radiata</i> – First rotation (age 22 years and under)	ha	-36,655
Other softwoods – First rotation (age 28 years and under)	ha	-29,414
All hardwoods – First rotation (age 13 years and under)	ha	-16,102
All planted forest above the long-term average age	ha	0000
Natural forests		
Post-1989 Regenerating natural forest	ha	-7,973
Pre-1990 Regenerating natural forest	ha	-1,567
Pre-1990 Tall natural forest	ha	0000

Table 36: Land-use change

Emission source	Unit	kg CO ₂ -e/unit	
Planted forests: Approach one - Stock change accounting			
All planted forests	Harvest or deforestation ha	994,095	
<i>Pinus radiata</i>	Harvest or deforestation ha	1,026,353	
Other softwoods	Harvest or deforestation ha	1,176,533	
All hardwoods	Harvest or deforestation ha	241,536	
Planted forests: Approach two - Averaging accounting			
All planted forests	Harvest	ha	n/a
	Deforestation	ha	994,095
<i>Pinus radiata</i>	Harvest	ha	n/a
	Deforestation	ha	1,026,353
Other softwoods	Harvest	ha	n/a
	Deforestation	ha	1,176,533
All hardwoods	Harvest	ha	n/a
	Deforestation	ha	241,536
Natural forests			
Post-1989 Regenerating natural forest	Deforestation	ha	141,350
Pre-1990 Regenerating natural forest	Deforestation	ha	898,662
Pre-1990 Tall natural forest	Deforestation	ha	277,161

Table 37: Agriculture

Emission source		Unit	kg CO ₂ -e/unit
Enteric Fermentation	Dairy cattle	per head	2,423
	Non-dairy cattle	per head	1,679
	Sheep	per head	349
	Deer	per head	644
	Swine	per head	29.7
	Goats	per head	251
	Horses	per head	504
	Alpaca and llama	per head	224
	Mules and asses	per head	280
Manure management	Poultry	per head	0000
	Dairy cattle	per head	255
	Non-dairy cattle	per head	23.3
	Sheep	per head	3.81
	Deer	per head	8.33
	Swine	per head	218
	Goats	per head	5.60
	Horses	per head	65.5
	Alpaca and llama	per head	2.84
	Mules and asses	per head	30.8
Fertiliser Use	Poultry	per head	1.43
	Nitrogen content of non-urea nitrogen fertiliser	kg N	4.80
	Nitrogen content of urea nitrogen fertiliser not coated with urease inhibitor	kg N	4.69
	Nitrogen content of urea nitrogen fertiliser coated with urease inhibitor	kg N	4.50
	Limestone	kg	0.440
Agricultural soils (live stock)	Dolomite	kg	0.477
	Dairy cattle	per head	377.2
	Non-dairy cattle	per head	226.6
	Sheep	per head	31.5
	Deer	per head	72.5
	Swine	per head	42.0
	Goats	per head	61.5
	Horses	per head	290.9
	Alpaca and llama	per head	66.3
	Mules and asses	per head	129.6
Poultry	per head	1.54	