

Measuring emissions: A guide for organisations

2022 summary of emissions factors

Using data from the 2020 calendar year



Ministry for the
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Manatū Mō Te Taiao



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Introduction

Organisations wishing to 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 2020 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	
Quick guide	The go-to document explaining changes since the last update, how to produce an inventory, and what data you need to work out emissions from your activities
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 see the [Quick Guide](#). 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	2.10
Coal – bituminous	kg	2.86
Coal – sub-bituminous	kg	2.15
Coal – lignite	kg	1.54

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	2.01
Coal – lignite	kg	1.43
Diesel	litre	2.67
LPG	kg	3.03
Heavy fuel oil	litre	3.02
Light fuel oil	litre	2.96
Natural gas	kWh	0.195
	GJ	54.1

Table 3: Stationary combustion of fuels: Industrial use

Industrial fuel emission source	Unit	kg CO ₂ -e/unit
Coal – default	kg	1.93
Coal – bituminous	kg	2.66
Coal – sub-bituminous	kg	2.01
Coal – lignite	kg	1.43
Diesel	litre	2.66
LPG	kg	3.02
Heavy fuel oil	litre	3.02
Light fuel oil	litre	2.92
Natural gas	kWh	0.194
	GJ	54.0

Table 4: Transport fuels

Transport fuel type	Unit	kg CO ₂ -e/unit
Regular petrol	litre	2.46
Premium petrol	litre	2.48
Diesel	litre	2.69
LPG	litre	1.64
Heavy fuel oil	litre	3.04
Light fuel oil	litre	2.94
Aviation fuel (Kerosene) / Jet A1	GJ	70.6
	litre	2.63
Aviation gasoline	GJ	68.3
	litre	2.31

Table 5: Biofuels

Biofuel type	Unit	kg CO ₂ -e/unit
Bioethanol	GJ	3.42
	litre	0.0000807
Biodiesel	GJ	3.42
	litre	0.000125
Wood – residential	kg	0.06696
Wood – industrial	kg	0.01496

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	0.012
	GJ	3.212

Refrigerant use emission factors

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

Industrial designation or common name	Chemical formula	Unit	AR4 GWP ₁₀₀	AR5 GWP ₁₀₀
Substances controlled by the Montreal Protocol				
CFC-11	CCl ₃ F	kg	4,750	4,660
CFC-12	CCl ₂ F ₂	kg	10,900	10,200
CFC-13	CCIF ₃	kg	14,400	13,900
CFC-113	CCl ₂ FCCIF ₂	kg	6,130	5,820
CFC-114	CCIF ₂ CCIF ₂	kg	10,000	8,590
CFC-115	CCIF ₂ CF ₃	kg	7,370	7,670
Halon-1301	CBrF ₃	kg	7,140	6,290
Halon-1211	CBrClF ₂	kg	1,890	1,750
Halon-2402	CBrF ₂ CBrF ₂	kg	1,640	1,470
Carbon tetrachloride	CCl ₄	kg	1,400	1,750
Methyl bromide	CH ₃ Br	kg	5	2
Methyl chloroform	CH ₃ CCl ₃	kg	146	160
HCFC-21	CHCl ₂ F	kg	n/a	148
HCFC-22	CHClF ₂	kg	1,810	1,760
HCFC-123	CHCl ₂ CF ₃	kg	77	79
HCFC-124	CHClFCF ₃	kg	609	527
HCFC-141b	CH ₃ CCl ₂ F	kg	725	782
HCFC-142b	CH ₃ CCIF ₂	kg	2,310	1,980
HCFC-225ca	CHCl ₂ CF ₂ CF ₃	kg	122	127
HCFC-225cb	CHClFCF ₂ CCIF ₂	kg	595	525
Hydrofluorocarbons				
HFC-23	CHF ₃	kg	14,800	12,400
HFC-32	CH ₂ F ₂	kg	675	677
HFC-41	CH ₃ F ₂	kg	n/a	116
HFC-125	CHF ₂ CF ₃	kg	3,500	3,170
HFC-134	CHF ₂ CHF ₂	kg	n/a	1,120
HFC-134a	CH ₂ FCF ₃	kg	1,430	1,300
HFC-143	CH ₂ FCHF ₂	kg	n/a	328
HFC-143a	CH ₃ CF ₃	kg	4,470	4,800
HFC-152	CH ₂ FCH ₂ F	kg	n/a	16
HFC-152a	CH ₃ CHF ₂	kg	124	138
HFC-161	CH ₃ CH ₂ F	kg	n/a	4
HFC-227ea	CF ₃ CHFCF ₃	kg	3,220	3,350
HFC-236cb	CH ₂ FCF ₂ CF ₃	kg	n/a	1,210
HFC-236ea	CHF ₂ CHFCF ₃	kg	n/a	1,330

Industrial designation or common name	Chemical formula	Unit	AR4 GWP ₁₀₀	AR5 GWP ₁₀₀
HFC-236fa	CF ₃ CH ₂ CF ₃	kg	9,810	8,060
HFC-245ca	CH ₂ FCF ₂ CHF ₂	kg	n/a	716
HFC-245fa	CHF ₂ CH ₂ CF ₃	kg	1030	858
HFC-365mfc	CH ₃ CF ₂ CH ₂ CF ₃	kg	794	804
HFC-43-10mee	CF ₃ CHFCHFCF ₂ CF ₃	kg	1,640	1,650
Perfluorinated compounds				
Sulphur hexafluoride	SF ₆	kg	22,800	23,500
Nitrogen trifluoride	NF ₃	kg	17,200	16,100
PFC-14	CF ₄	kg	7,390	6,630
PFC-116	C ₂ F ₆	kg	12,200	11,100
PFC-218	C ₃ F ₈	kg	8,830	8,900
PFC-318	c-C ₄ F ₈	kg	10,300	9,540
PFC-3-1-10	C ₄ F ₁₀	kg	8,860	9,200
PFC-4-1-12	C ₅ F ₁₂	kg	9,160	8,550
PFC-5-1-14	C ₆ F ₁₄	kg	9,300	7,910
PFC-9-1-18	C ₁₀ F ₁₈	kg	7,500	7,190
Trifluoromethyl sulphur pentafluoride	SF ₅ CF ₃	kg	17,700	17,400
Perfluorocyclopropane	c-C ₃ F ₆	kg	n/a	9,200
Fluorinated ethers				
HFE-125	CHF ₂ OCF ₃	kg	14,900	12,400
HFE-134	CHF ₂ OCHF ₂	kg	6,320	5,560
HFE-143a	CH ₃ OCF ₃	kg	756	523
HFE-227ea	CF ₃ CHFOCF ₃	kg	n/a	6,450
HCFE-235da2	CHF ₂ OCHClCF ₃	kg	350	491
HFE-236ea2	CHF ₂ OCHF ₂ CF ₃	kg	n/a	1,790
HFE-236fa	CF ₃ CH ₂ OCF ₃	kg	n/a	979
HFE-245cb2	CH ₃ OCF ₂ CF ₃	kg	708	654
HFE-245fa1	CHF ₂ CH ₂ OCF ₃	kg	n/a	828
HFE-245fa2	CHF ₂ OCH ₂ CF ₃	kg	659	812
HFE-245fb2	CF ₃ CH ₂ OCH ₃	kg	n/a	1
HFE-254cb2	CH ₃ OCF ₂ CHF ₂	kg	359	359*
HFE-329mcc2	CHF ₂ CF ₂ OCF ₂ CF ₃	kg	n/a	3,070
HFE-338mcf2	CF ₃ CH ₂ OCF ₂ CF ₃	kg	n/a	929
HFE-347mcc3	CH ₃ OCF ₂ CF ₂ CF ₃	kg	575	530
HFE-347mcf2	CHF ₂ CH ₂ OCF ₂ CF ₃	kg	n/a	854
HFE-347pcf2	CHF ₂ CF ₂ OCH ₂ CF ₃	kg	580	889
HFE-356mec3	CH ₃ OCF ₂ CHF ₂ CF ₃	kg	n/a	387
HFE-356pcc3	CHF ₂ OCF ₂ CF ₂ OCHF ₂ CH ₃ OCF ₂ CF ₂ CHF ₂	kg	110	413
HFE-356pcf2	CHF ₂ CH ₂ OCF ₂ CHF ₂	kg	n/a	719

Industrial designation or common name	Chemical formula	Unit	AR4 GWP ₁₀₀	AR5 GWP ₁₀₀
HFE-356pcf3	CHF ₂ OCH ₂ CF ₂ CHF ₂	kg	n/a	446
HFE-365mcf3	CF ₃ CF ₂ CH ₂ OCH ₃	kg	n/a	<1
HFE-374pc2	CHF ₂ CF ₂ OCH ₂ CH ₃	kg	n/a	627
HFE-449sl (HFE-7100)	C ₄ F ₉ OCH ₃	kg	297	421
HFE-569sf2 (HFE-7200)	C ₄ F ₉ OC ₂ H ₅	kg	59	57
HFE-43-10pccc124 (H-Galden 1040x)	CHF ₂ OCF ₂ OC ₂ F ₄ OCHF ₂	kg	1,870	2,820
HFE-236ca12 (HG-10)	CHF ₂ OCF ₂ OCHF ₂	kg	2,800	5,350
HFE-338pcc13 (HG-01)	CHF ₂ OCF ₂ CF ₂ OCHF ₂	kg	1,500	2,910
Perfluoropolyethers				
PFPME	CF ₃ OCF(CF ₃) CF ₂ OCF ₂ OCF ₃	kg	10,300	9,710
Hydrocarbons and other compounds – Direct Effects				
Chloroform	CHCl ₃	kg	n/a	16
Dimethylether	CH ₃ OCH ₃	kg	1	1
Halon-1201	CHBrF ₂	kg	n/a	376
Methylene chloride	CH ₂ Cl ₂	kg	8.7	9
Methyl chloride	CH ₃ Cl	kg	13	12

Table 8: Global warming potentials of medical gases

Industrial designation or common name	Chemical formula	Unit	AR4 GWP ₁₀₀	AR5 GWP ₁₀₀
Medical gases				
HFE-347mmz1 (Sevoflurane)	(CF ₃) ₂ CHOCH ₂ F	kg	Not available	216
HCFE-235da2 (Isoflurane)	CHF ₂ OCHClCF ₃	kg	350	491
HFE-236ea2 (Desflurane)	CHF ₂ OCHF ₂ CF ₃	kg	Not available	1,790
Medical blends				
Entonox	N ₂ O/O ₂ (50.0/50.0)	kg	173	173

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
2020	kWh	0.120
2019	kWh	0.110
2018	kWh	0.094
2017	kWh	0.099
2016	kWh	0.088
2015	kWh	0.112
2014	kWh	0.118
2013	kWh	0.141
2012	kWh	0.167
2011	kWh	0.134
2010	kWh	0.145

Table 10: Purchased electricity – calendar quarter

Emission source – Quarter	Unit	Purchased grid-average electricity kg CO ₂ -e/unit
December 2020	kWh	0.103
September 2020	kWh	0.147
June 2020	kWh	0.111
March 2020	kWh	0.117
December 2019	kWh	0.095
September 2019	kWh	0.113
June 2019	kWh	0.101
March 2019	kWh	0.131

Table 11: Transmission and distribution losses for electricity consumption

Emission source	Unit	kg CO ₂ -e/unit
2020	kWh	0.0110
2019	kWh	0.0119
2018	kWh	0.0092
2017	kWh	0.0094
2016	kWh	0.0075
2015	kWh	0.0107
2014	kWh	0.0092
2013	kWh	0.0100
2012	kWh	0.0152
2011	kWh	0.0126
2010	kWh	0.0148

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 per day	0.446
Without heating	employee per day	0.0665
With heating	employee per day	0.9791

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	0.204	0.181	0.170
	1350– <1600 cc	km	0.212	0.187	0.176
	1600– <2000 cc	km	0.238	0.211	0.198
	2000– <3000 cc	km	0.265	0.234	0.220
	≥3000 cc	km	0.317	0.280	0.263
Diesel vehicle	<1350 cc	km	0.215	0.198	0.188
	1350– <1600 cc	km	0.207	0.190	0.181
	1600– <2000 cc	km	0.220	0.202	0.191
	2000– <3000 cc	km	0.270	0.248	0.235
	≥3000 cc	km	0.300	0.275	0.261
Petrol hybrid vehicle	<1350 cc	km	0.156	0.141	0.128
	1350– <1600 cc	km	0.161	0.146	0.133
	1600– <2000 cc	km	0.181	0.165	0.149
	2000– <3000 cc	km	0.201	0.183	0.166
	≥3000 cc	km	0.241	0.219	0.198
Diesel hybrid vehicle	<1350 cc	km	0.193	0.176	0.164
	1350– <1600 cc	km	0.186	0.170	0.158
	1600– <2000 cc	km	0.197	0.180	0.167
	2000– <3000 cc	km	0.242	0.221	0.206
	≥3000 cc	km	0.269	0.245	0.228
Petrol plug-in hybrid electric vehicle (PHEV) – petrol consumption	<1350 cc	km		0.074	0.067
	1350– <1600 cc	km		0.077	0.069
	1600– <2000 cc	km		0.086	0.078
	2000– <3000 cc	km		0.096	0.087
	≥3000 cc	km		0.114	0.104
Petrol plug-in hybrid electric vehicle (PHEV) – electricity consumption	<1350 cc	km		0.010	0.010
	1350– <1600 cc	km		0.010	0.010
	1600– <2000 cc	km		0.012	0.011
	2000– <3000 cc	km		0.013	0.012
	≥3000 cc	km		0.015	0.015
Diesel plug-in hybrid electric vehicle (PHEV) – diesel consumption	<1350 cc	km		0.092	0.086
	1350– <1600 cc	km		0.089	0.083
	1600– <2000 cc	km		0.094	0.088
	2000– <3000 cc	km		0.116	0.108
	≥3000 cc	km		0.128	0.119

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
Diesel plug-in hybrid electric vehicle (PHEV) – electricity consumption	<1350 cc	km		0.011	0.010
	1350– <1600 cc	km		0.010	0.010
	1600– <2000 cc	km		0.011	0.011
	2000– <3000 cc	km		0.013	0.012
	≥3000 cc	km		0.015	0.014
Electric vehicle	Very small	km		0.021	0.020
	Small	km		0.022	0.021
	Medium	km		0.024	0.023
	Large	km		0.026	0.026
	Very large	km		0.032	0.031
Motorcycle	<60 cc, petrol	km	0.066	0.060	0.057
	≥60 cc, petrol	km	0.131	0.121	0.115
	<60 cc, electricity	km		0.005	0.005
	≥60 cc, electricity	km		0.009	0.009

Table 14: Default private car emission factors

Default private car travel emission source		Unit	kg CO ₂ -e/unit
Private car default	Petrol	km	0.265
	Diesel	km	0.270
	Petrol hybrid	km	0.201
	Diesel hybrid	km	0.242
	Petrol plug-in hybrid (petrol consumption)	km	0.096
	Petrol plug-in hybrid (electricity consumption)	kWh	0.012
	Diesel plug-in hybrid (diesel consumption)	km	0.116
	Diesel plug-in hybrid (electricity consumption)	kWh	0.012
	Electric	km	0.026

Table 15: Default rental car emission factors

Default rental car travel emission source		Unit	kg CO ₂ -e/unit
Private car default	Petrol	km	0.211
	Diesel	km	0.202
	Petrol hybrid	km	0.165
	Diesel hybrid	km	0.180
	Petrol plug-in hybrid (petrol consumption)	km	0.086
	Petrol plug-in hybrid (electricity consumption)	kWh	0.021
	Diesel plug-in hybrid (diesel consumption)	km	0.094
	Diesel plug-in hybrid (electricity consumption)	kWh	0.021
	Electric	km	0.023

Table 16: Taxi travel

Taxi travel emission source		Unit	kg CO ₂ -e/unit
Taxi travel	Distance travelled	km	0.225
	Dollars spent	\$	0.070

Table 17: Public transport passenger

Emission source		Unit	kg CO ₂ -e/unit
Bus	National Average for Bus	pkm	0.155
	Wellington Electric Bus	pkm	0.012
	Wellington Diesel Bus	pkm	0.060
	Wellington Average Bus	pkm	0.036
Rail	Electric (based on Wellington)	pkm	0.013
	Diesel (based on Wellington)	pkm	0.046
	Average (based on Wellington)	pkm	0.019

Table 18: Public transport vehicles

Emission source		Unit	kg CO ₂ -e/unit
Diesel bus	<7,500 kg	km	0.567
	<12,000 kg	km	0.785
	≥12,000 kg	km	1.088
Diesel hybrid bus	<7,500 kg	km	0.401
	<12,000 kg	km	0.556
	≥12,000 kg	km	0.770
Electric bus	<7,500 kg	km	0.055
	<12,000 kg	km	0.076
	≥12,000 kg	km	0.106

Table 19: Air travel for 2019 (domestic)

Emission source	Unit	Without radiative forcing	With radiative forcing
		kg CO ₂ -e/unit	kg CO ₂ -e/unit
National average	pkm	0.163	0.306
Large aircraft	pkm	0.090	0.168
Medium aircraft	pkm	0.120	0.224
Small aircraft	pkm	0.352	0.670

Table 20: Air travel for 2020 (domestic)

Emission source	Unit	Without radiative forcing	With radiative forcing
		kg CO ₂ -e/unit	kg CO ₂ -e/unit
National average	pkm	0.164	0.306
Large aircraft	pkm	0.090	0.168
Medium aircraft	pkm	0.120	0.224
Small aircraft	pkm	0.352	0.670

For calculating international air travel emissions, use the International Civil Aviation Organisation calculator (see [Quick Guide](#), section 4.5.4). If you prefer not to use this, emission factors for international travel can be found in the [Emission Factors Workbook](#).

Table 21: Air travel (international)

Emission source	Travel class	Unit	Without radiative forcing kg CO ₂ -e/unit	With radiative forcing kg CO ₂ -e/unit
Short haul (<3700 km)	Average passenger	pkm	0.081	0.154
	Economy	pkm	0.080	0.151
	Business	pkm	0.120	0.227
Long haul (>3700 km)	Average passenger	pkm	0.102	0.193
	Economy	pkm	0.078	0.148
	Premium economy	pkm	0.125	0.237
	Business	pkm	0.227	0.429
	First	pkm	0.313	0.591

Table 22: Helicopter emission factors

Emission source	Unit	kg CO ₂ -e/unit
Eurocopter AS 350B Squirrel	hours	480.185
Eurocopter AS 350B3 Squirrel	hours	496.518
Robinson R44	hours	191.016
Robinson R22 Beta	hours	130.695
Bell 206B	hours	329.923

Table 23: Accommodation

Country stayed in	Unit	kg CO ₂ -e/unit
Argentina	Room per night	50.0
Australia	Room per night	38.9
Austria	Room per night	11.9
Belgium	Room per night	11.6
Brazil	Room per night	14.9
Canada	Room per night	17.1
Caribbean Region	Room per night	61.1
Chile	Room per night	30.8
China	Room per night	60.7
Colombia	Room per night	11.0
Costa Rica	Room per night	7.0
Czech Republic	Room per night	31.8
Egypt	Room per night	54.0
Fiji	Room per night	54.8

Country stayed in	Unit	kg CO ₂ -e/unit
Finland	Room per night	11.1
France	Room per night	7.5
French Polynesia	Room per night	73.0
Germany	Room per night	18.2
Greece	Room per night	42.8
Hong Kong	Room per night	66.2
Hungary	Room per night	22.0
India	Room per night	66.0
Indonesia	Room per night	88.2
Ireland	Room per night	23.9
Israel	Room per night	51.8
Italy	Room per night	23.9
Japan	Room per night	54.7
Jordan	Room per night	64.5
Kazakhstan	Room per night	105.7
Macau	Room per night	68.1
Malaysia	Room per night	80.3
Maldives	Room per night	176.5
Mexico	Room per night	27.0
Morocco	Room per night	104.0
Netherlands	Room per night	21.2
New Zealand	Room per night	9.4
Oman	Room per night	117.3
Panama	Room per night	23.7
Peru	Room per night	29.9
Philippines	Room per night	62.9
Poland	Room per night	35.8
Portugal	Room per night	27.2
Qatar	Room per night	104.9
Romania	Room per night	25.5
Russian Federation	Room per night	30.9
Saudi Arabia	Room per night	112.5
Singapore	Room per night	28.5
South Africa	Room per night	56.6
South Korea	Room per night	56.5
Spain	Room per night	16.3
Switzerland	Room per night	7.4
Taiwan	Room per night	86.8

Country stayed in	Unit	kg CO ₂ -e/unit
Thailand	Room per night	55.9
Turkey	Room per night	38.0
United Arab Emirates	Room per night	95.9
United Kingdom	Room per night	13.4
United States	Room per night	19.8
Vietnam	Room per night	49.2

Freight transport emission factors

Table 24: Road freight: Light commercial vehicles

Light commercial vehicle travel emission source		Unit	Pre-2010 kg CO ₂ -e	2010–2015 kg CO ₂ -e	Post-2015 kg CO ₂ -e
Petrol	<1350 cc	km	0.207	0.195	0.184
	1350– <1600 cc	km	0.222	0.209	0.198
	1600– <2000 cc	km	0.299	0.282	0.267
	2000– <3000 cc	km	0.317	0.299	0.282
	≥3000 cc	km	0.362	0.341	0.322
Diesel	<1350 cc	km	0.215	0.199	0.189
	1350– <1600 cc	km	0.207	0.191	0.182
	1600– <2000 cc	km	0.276	0.254	0.242
	2000– <3000 cc	km	0.296	0.273	0.259
	≥3000 cc	km	0.300	0.276	0.262
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	0.236	0.223	0.208
	2000– <3000 cc	km	0.250	0.236	0.221
	≥3000 cc	km	0.286	0.269	0.252
Diesel hybrid	<1350 cc	km	0.193	0.178	0.170
	1350– <1600 cc	km	0.186	0.171	0.163
	1600– <2000 cc	km	0.247	0.228	0.217
	2000– <3000 cc	km	0.265	0.245	0.233
	≥3000 cc	km	0.269	0.248	0.236
Petrol plug-in hybrid electric vehicle (PHEV) – petrol consumption	<1350 cc	km		0.080	0.075
	1350– <1600 cc	km		0.086	0.081
	1600– <2000 cc	km		0.117	0.109
	2000– <3000 cc	km		0.123	0.115
	≥3000 cc	km		0.141	0.132
Petrol plug-in hybrid electric vehicle (PHEV) – electricity consumption	<1350 cc	km		0.010	0.010
	1350– <1600 cc	km		0.011	0.011
	1600– <2000 cc	km		0.012	0.012
	2000– <3000 cc	km		0.015	0.015
	≥3000 cc	km		0.018	0.017
Diesel plug-in hybrid electric vehicle (PHEV) – diesel consumption	<1350 cc	km		0.093	0.089
	1350– <1600 cc	km		0.090	0.085
	1600– <2000 cc	km		0.119	0.114

Light commercial vehicle travel emission source	Unit	Pre-2010 kg CO ₂ -e	2010–2015 kg CO ₂ -e	Post-2015 kg CO ₂ -e	
	2000– <3000 cc	km		0.128	0.122
	≥3000 cc	km		0.130	0.123
Diesel plug-in hybrid electric vehicle (PHEV) – electricity consumption	<1350 cc	km		0.010	0.010
	1350– <1600 cc	km		0.010	0.010
	1600– <2000 cc	km		0.011	0.011
	2000– <3000 cc	km		0.012	0.012
	≥3000 cc	km		0.015	0.014
Electricity: BEV (battery electric vehicle)	Very small	km		0.021	0.021
	Small	km		0.023	0.022
	Medium	km		0.026	0.025
	Large	km		0.032	0.031
	Very large	km		0.038	0.036

Table 25: Road freight: Default light commercial vehicles

Emission source	Unit	kg CO ₂ -e/unit
Petrol	km	0.317
Diesel	km	0.296
Petrol hybrid	km	0.250
Diesel hybrid	km	0.265

Table 26: 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	
HGVD diesel	<5,000 kg	km	0.446	0.423	0.421
	5,000– <7,500 kg	km	0.510	0.484	0.477
	7,500– <10,000 kg	km	0.624	0.592	0.583
	10,000– <12,000 kg	km	0.740	0.702	0.692
	12,000– <15,000 kg	km	0.841	0.798	0.786
	15,000– <20,000 kg	km	0.982	0.957	0.955
	20,000– <25,000 kg	km	1.308	1.274	1.271
	25,000– <30,000 kg	km	1.460	1.423	1.420
	≥30,000 kg	km	1.538	1.499	1.496
HGVD diesel hybrid	<5,000 kg	km	0.359	0.340	0.332
	5,000– <7,500 kg	km	0.411	0.390	0.380
	7,500– <10,000 kg	km	0.503	0.477	0.465
	10,000– <12,000 kg	km	0.596	0.565	0.551
	12,000– <15,000 kg	km	0.678	0.642	0.627

Emission source	Unit	Pre-2010 fleet kg CO ₂ -e	2010–2015 fleet kg CO ₂ -e	Post-2015 fleet kg CO ₂ -e	
	15,000– <20,000 kg	km	0.893	0.870	0.868
	20,000– <25,000 kg	km	1.188	1.158	1.156
	25,000– <30,000 kg	km	1.372	1.338	1.334
	≥30,000 kg	km	1.446	1.409	1.406
HGV BEV (battery electric vehicle)	<5,000 kg	km		0.045	0.044
	5,000– <7,500 kg	km		0.052	0.050
	7,500– <10,000 kg	km		0.063	0.062
	10,000– <12,000 kg	km		0.075	0.083
	12,000– <15,000 kg	km		0.085	0.083

Table 27: Road freight: Default emission factors for heavy goods vehicles

Emission source	Unit	kg CO ₂ -e
HGV diesel	km	0.480
HGV diesel hybrid	km	0.387

Table 28: 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 29: Freighting goods in New Zealand

Emission source	Unit	kg CO ₂ -e	
Rail	Rail freight	tkm	0.027
Coastal shipping	Container freight	tkm	0.046
	Oil products	tkm	0.016
	Other bulk coastal shipping	tkm	0.030

Table 30: Air freight

Emission source	Unit	Without radiative forcing kg CO ₂ -e	With radiative forcing kg CO ₂ -e
Domestic air freight	tkm	2.377	4.494
Short haul air freight	tkm	1.217	2.302
Long haul air freight	tkm	0.539	1.019

Table 31: International shipping

Emission source		Unit	kg CO ₂ -e
Bulk carrier	200,000+ deadweight tonnes (dwt)	tkm	0.003
	100,000–199,999 dwt	tkm	0.003
	60,000–99,999 dwt	tkm	0.004
	35,000–59,999 dwt	tkm	0.006
	10,000–34,999 dwt	tkm	0.008
	0–9,999 dwt	tkm	0.030
	Average	tkm	0.004
General cargo	10,000+ dwt	tkm	0.012
	5,000–9,999 dwt	tkm	0.016
	0–4,999 dwt	tkm	0.014
	10,000+ dwt 100+ TEU	tkm	0.011
	5,000–9,999 dwt 100+ TEU	tkm	0.018
	0–4,999 dwt 100+ TEU	tkm	0.020
	Average	tkm	0.013
Container ship	8,000+ twenty-foot equivalent unit (TEU)	tkm	0.013
	5,000–7,999 TEU	tkm	0.017
	3,000–4,999 TEU	tkm	0.017
	2,000–2,999 TEU	tkm	0.020
	1,000–1,999 TEU	tkm	0.033
	0–999 TEU	tkm	0.037
	Average	tkm	0.016
Vehicle transport	4,000+ car equivalent unit (CEU)	tkm	0.032
	0–3,999 CEU	tkm	0.058
	Average	tkm	0.039
RoRo (Roll-on, Roll-off) ferry	2,000+ lanemetre (LM)	tkm	0.050
	0–1,999 LM	tkm	0.061
	Average	tkm	0.052
	Large RoPax ferry	tkm	0.377
Refrigerated cargo	All dwt	tkm	0.013

Water supply and wastewater treatment emission factors

Table 32: Water supply

Emission source	Unit	kg CO ₂ -e
Water supply	m ³	0.031
	Per capita	3.785

Table 33: Wastewater treatment

Emission source		Unit	kg CO ₂ -e/unit
Domestic wastewater	Average for wastewater treatment plants	m ³ water supplied	0.48
		Per capita	48.36
	Septic tanks	Per capita	175.2
Industrial wastewater	Meat (excluding poultry)	tonne of kills	47.528
	Poultry	tonne of kills	47.025
	Pulp and paper	tonne of product	10.530
	Wine	tonne of crushed grapes	5.173
	Dairy processing	m ³ of milk	0.115

Materials and waste emission factors

Table 34: 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)	Food	kg	0.602	1.881
	Garden	kg	0.492	1.539
	Paper	kg	0.876	2.736
	Wood	kg	0.339	1.060
	Textile	kg	0.438	1.368
	Nappies	kg	0.219	0.684
	Sludge	kg	0.137	0.428
	Other (Inert)	kg	n/a	n/a
Waste (unknown composition)	General waste	kg	0.207	0.647
	Office waste	kg	0.594	1.858

Table 35: Composting

Emission source	Unit	kg CO ₂ -e/unit
Composting	kg	0.172
Anaerobic digestion	kg	0.020

Agriculture, forestry and other land-use emission factors

Table 36: Forest growth removal source

Emission source	Unit	kg CO ₂ -e/unit
Planted forests: Approach one – Stock change accounting		
All planted forests	ha	-35,561
<i>Pinus radiata</i>	ha	-36,689
Other softwoods	ha	-29,453
All hardwoods	ha	-15,957
Planted forests: Approach two – Averaging accounting		
All planted forests – first rotation (age 23 years and under)	ha	-35,561
<i>Pinus radiata</i> – First rotation (age 22 years and under)	ha	-36,689
Other softwoods – First rotation (age 28 years and under)	ha	-29,453
All hardwoods – First rotation (age 13 years and under)	ha	-15,957
All planted forest above the long-term average age	ha	0
Natural forests		
Post-1989 Regenerating natural forest	ha	-7,973
Pre-1990 Regenerating natural forest	ha	-1,567
Pre-1990 Tall natural forest	ha	0

Table 37: 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	995,700
<i>Pinus radiata</i>	Harvest or deforestation	ha	1,027,286
Other softwoods	Harvest or deforestation	ha	1,178,113
All hardwoods	Harvest or deforestation	ha	239,354
Planted forests: Approach two – Averaging accounting			
All planted forests	Harvest	ha	n/a
All planted forests	Deforestation	ha	995,700
<i>Pinus radiata</i>	Harvest	ha	n/a
<i>Pinus radiata</i>	Deforestation	ha	1,027,286
Other softwoods	Harvest	ha	n/a
Other softwoods	Deforestation	ha	1,178,113
All hardwoods	Harvest	ha	n/a
All hardwoods	Deforestation	ha	239,354
Natural forests			
Post-1989 Regenerating natural forest	Deforestation	ha	141,350
Pre-1990 Regenerating natural forest	Deforestation	ha	898,704
Pre1990 Tall natural forest	Deforestation	ha	275,595

Table 38: Agriculture

Emission source		Unit	kg CO ₂ -e/unit
Enteric fermentation	Dairy cattle	per head	2,264
	Non-dairy cattle	per head	1,540
	Sheep	per head	318
	Deer	per head	597
	Swine	per head	27
	Goats	per head	224
	Horses	per head	450
	Alpaca	per head	200
	Mules & asses	per head	250
	Poultry	per head	0
Manure management	Dairy cattle	per head	238
	Non-dairy cattle	per head	21.4
	Sheep	per head	3.53
	Deer	per head	7.57
	Swine	per head	206
	Goats	per head	5.0
	Horses	per head	58.5
	Alpaca	per head	2.57
	Mules & asses	per head	27.5
	Poultry	per head	1.44
Fertiliser use	Nitrogen content of non-urea nitrogen fertiliser	kg	5.40
	Nitrogen content of urea nitrogen fertiliser not coated with urease inhibitor	kg	5.07
	Nitrogen content of urea nitrogen fertiliser coated with urease inhibitor	kg	4.86
	Limestone	kg	0.440
	Dolomite	kg	0.477
Agricultural soils	Dairy cattle	per head	468
	Non-dairy cattle	per head	267
	Sheep	per head	36.3
	Deer	per head	83.8
	Swine	per head	5.4
	Goats	per head	68.7
	Horses	per head	325
	Alpaca	per head	75.9
	Mules & asses	per head	145
	Poultry	per head	0.11