



Ministry for the  
**Environment**  
*Manatū Mō Te Taiao*

# Measuring Emissions: A Guide for Organisations

2020 SUMMARY OF EMISSION FACTORS

Using data from the 2018 calendar year

New Zealand Government

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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 (CO<sub>2</sub>-e) using data and methods from the 2018 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 please see the [Quick Guide](#). For understanding how these emission factors were derived, please see the [Detailed Guide](#).

# Fuel emission factors

**Table 1: Stationary combustion of fuels: Residential use**

Residential fuel emission Source	Unit	kg CO <sub>2</sub> -e/unit
Coal – default	kg	1.88
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 <sub>2</sub> -e/unit
Coal – default	kg	1.77
Coal – bituminous	kg	2.66
Coal – sub-bituminous	kg	2.01
Coal – lignite	kg	1.43
Diesel	litre	2.66
LPG	kg	3.03
Heavy fuel oil	litre	3.03
Light fuel oil	litre	2.93
Natural gas	kWh	0.195
	GJ	54.1

**Table 3: Stationary combustion of fuels: Industrial use**

Industrial fuel emission source	Unit	kg CO <sub>2</sub> -e/unit
Coal – default	kg	2.05
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 <sub>2</sub> -e/unit
Regular petrol	litre	2.45
Premium petrol	litre	2.45
Petrol – default	litre	2.45
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 <sub>2</sub> -e/unit
Bioethanol	GJ	3.42
	litre	0.0000807
Biodiesel	GJ	3.42
	litre	0.000125
Wood – fireplaces	kg	0.0670
Wood – industrial	kg	0.0150

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

Transmission and distribution losses source	Unit	kg CO <sub>2</sub> -e/unit
Natural gas used	kWh	0.012
	GJ	3.212
Electricity used		0.00869

# Refrigerant use emission factors

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

Industrial designation or common name	Chemical formula	Unit	GWP <sub>100</sub>
<b>Substances controlled by the Montreal Protocol</b>			
CFC-11	CCl <sub>3</sub> F	kg	4,750
CFC-12	CCl <sub>2</sub> F <sub>2</sub>	kg	10,900
CFC-13	CCIF <sub>3</sub>	kg	14,400
CFC-113	CCl <sub>2</sub> FCCIF <sub>2</sub>	kg	6,130
CFC-114	CCIF <sub>2</sub> CCIF <sub>2</sub>	kg	10,000
CFC-115	CCIF <sub>2</sub> CF <sub>3</sub>	kg	7,370
Halon-1301	CBrF <sub>3</sub>	kg	7,140
Halon-1211	CBrClF <sub>2</sub>	kg	1,890
Halon-2402	CBrF <sub>2</sub> CBrF <sub>2</sub>	kg	1,640
Carbon tetrachloride	CCl <sub>4</sub>	kg	1,400
Methyl bromide	CH <sub>3</sub> Br	kg	5
Methyl chloroform	CH <sub>3</sub> CCl <sub>3</sub>	kg	146
HCFC-22	CHClF <sub>2</sub>	kg	1,810
HCFC-123	CHCl <sub>2</sub> CF <sub>3</sub>	kg	77
HCFC-124	CHClFCF <sub>3</sub>	kg	609
HCFC-141b	CH <sub>3</sub> CCl <sub>2</sub> F	kg	725
HCFC-142b	CH <sub>3</sub> CCIF <sub>2</sub>	kg	2,310
HCFC-225ca	CHCl <sub>2</sub> CF <sub>2</sub> CF <sub>3</sub>	kg	122
HCFC-225cb	CHClFCF <sub>2</sub> CCIF <sub>2</sub>	kg	595
<b>Hydrofluorocarbons</b>			
HFC-23	CHF <sub>3</sub>	kg	14,800
HFC-32	CH <sub>2</sub> F <sub>2</sub>	kg	675
HFC-125	CHF <sub>2</sub> CF <sub>3</sub>	kg	3,500
HFC-134a	CH <sub>2</sub> FCF <sub>3</sub>	kg	1,430
HFC-143a	CH <sub>3</sub> CF <sub>3</sub>	kg	4,470
HFC-152a	CH <sub>3</sub> CHF <sub>2</sub>	kg	124
HFC-227ea	CF <sub>3</sub> CHFCF <sub>3</sub>	kg	3,220
HFC-236fa	CF <sub>3</sub> CH <sub>2</sub> CF <sub>3</sub>	kg	9,810
HFC-245fa	CHF <sub>2</sub> CH <sub>2</sub> CF <sub>3</sub>	kg	1030
HFC-365mfc	CH <sub>3</sub> CF <sub>2</sub> CH <sub>2</sub> CF <sub>3</sub>	kg	794
HFC-43-10mee	CF <sub>3</sub> CHFCHFCF <sub>2</sub> CF <sub>3</sub>	kg	1,640
<b>Perfluorinated compounds</b>			
Sulphur hexafluoride	SF <sub>6</sub>	kg	22,800



Industrial designation or common name	Chemical formula	Unit	GWP <sub>100</sub>
Nitrogen trifluoride	NF <sub>3</sub>	kg	17,200
PFC-14	CF <sub>4</sub>	kg	7,390
PFC-116	C <sub>2</sub> F <sub>6</sub>	kg	12,200
PFC-218	C <sub>3</sub> F <sub>8</sub>	kg	8,830
PFC-318	c-C <sub>4</sub> F <sub>8</sub>	kg	10,300
PFC-3-1-10	C <sub>4</sub> F <sub>10</sub>	kg	8,860
PFC-4-1-12	C <sub>5</sub> F <sub>12</sub>	kg	9,160
PFC-5-1-14	C <sub>6</sub> F <sub>14</sub>	kg	9,300
PFC-9-1-18	C <sub>10</sub> F <sub>18</sub>	kg	7,500
Trifluoromethyl sulphur pentafluoride	SF <sub>5</sub> CF <sub>3</sub>	kg	17,700
<b>Fluorinated ethers</b>			
HFE-125	CHF <sub>2</sub> OCF <sub>3</sub>	kg	14,900
HFE-134	CHF <sub>2</sub> OCHF <sub>2</sub>	kg	6,320
HFE-143a	CH <sub>3</sub> OCF <sub>3</sub>	kg	756
HCFE-235da2	CHF <sub>2</sub> OCHClCF <sub>3</sub>	kg	350
HFE-245cb2	CH <sub>3</sub> OCF <sub>2</sub> CF <sub>3</sub>	kg	708
HFE-245fa2	CHF <sub>2</sub> OCH <sub>2</sub> CF <sub>3</sub>	kg	659
HFE-254cb2	CH <sub>3</sub> OCF <sub>2</sub> CHF <sub>2</sub>	kg	359
HFE-347mcc3	CH <sub>3</sub> OCF <sub>2</sub> CF <sub>2</sub> CF <sub>3</sub>	kg	575
HFE-347pcf2	CHF <sub>2</sub> CF <sub>2</sub> OCH <sub>2</sub> CF <sub>3</sub>	kg	580
HFE-356pcc3	CHF <sub>2</sub> OCF <sub>2</sub> CF <sub>2</sub> OCHF <sub>2</sub> CH <sub>3</sub> OCF <sub>2</sub> CF <sub>2</sub> CHF <sub>2</sub>	kg	110
HFE-449sl (HFE-7100)	C <sub>4</sub> F <sub>9</sub> OCH <sub>3</sub>	kg	297
HFE-569sf2 (HFE-7200)	C <sub>4</sub> F <sub>9</sub> OC <sub>2</sub> H <sub>5</sub>	kg	59
HFE-43-10pccc124 (H-Galden 1040x)	CHF <sub>2</sub> OCF <sub>2</sub> OC <sub>2</sub> F <sub>4</sub> OCHF <sub>2</sub>	kg	1,870
HFE-236ca12 (HG-10)	CHF <sub>2</sub> OCF <sub>2</sub> OCHF <sub>2</sub>	kg	2,800
HFE-338pcc13 (HG-01)	CHF <sub>2</sub> OCF <sub>2</sub> CF <sub>2</sub> OCHF <sub>2</sub>	kg	1,500
<b>Perfluoropolyethers</b>			
PFPME	CF <sub>3</sub> OCF(CF <sub>3</sub> ) CF <sub>2</sub> OCF <sub>2</sub> OCF <sub>3</sub>	kg	10,300
<b>Hydrocarbons and other compounds – Direct Effects</b>			
Dimethylether	CH <sub>3</sub> OCH <sub>3</sub>	kg	1
Methylene chloride	CH <sub>2</sub> Cl <sub>2</sub>	kg	8.7
Methyl chloride	CH <sub>3</sub> Cl	kg	13

**Table 8: Global warming potentials of medical gases**

Industrial designation or common name	Chemical formula	Unit	AR4 GWP <sub>100</sub>	AR5 GWP <sub>100</sub>
<i>Medical gases</i>				
HFE-347mmz1 (Sevoflurane)	(CF <sub>3</sub> ) <sub>2</sub> CHOCH <sub>2</sub> F	kg	Not available	216
HCFE-235da2 (Isoflurane)	CHF <sub>2</sub> OCHClCF <sub>3</sub>	kg	350	491
HFE-236ea2 (Desflurane)	CHF <sub>2</sub> OCHF <sub>2</sub> CF <sub>3</sub>	kg	Not available	1790

# Purchased electricity, heat and steam emission factors

**Table 9: Purchased electricity and transmission and distribution losses**

Emission source	Unit	Purchased grid-average electricity kg CO <sub>2</sub> -e/unit	Transmission and distribution losses for electricity consumption kg CO <sub>2</sub> -e/unit
2018	kWh	0.1014	0.0087
2017	kWh	0.1125	0.0082
2016	kWh	0.0979	0.0064
2015	kWh	0.1211	0.0070
2014	kWh	0.1266	0.0070
2013	kWh	0.1508	0.0085
2012	kWh	0.1802	0.0123
2011	kWh	0.1433	0.0090
2010	kWh	0.1547	0.0098

# Indirect business-related emission factors

**Table 10: Working from home emission factors**

Emission source	Unit	kg CO <sub>2</sub> -e/unit
Default	employee per day	0.908

# Travel emission factors

**Table 11: Passenger vehicle fleet**

Passenger vehicle travel emission source	Unit	Pre-2010 fleet	2010–2015 fleet	Post-2015 fleet	
		kg CO <sub>2</sub> -e/unit	kg CO <sub>2</sub> -e/unit	kg CO <sub>2</sub> -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		0.009	0.009
	1350– <1600 cc	km		0.010	0.009
	1600– <2000 cc	km		0.011	0.011
	2000– <3000 cc	km		0.012	0.012
	≥3000 cc	km		0.015	0.014
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

Passenger vehicle travel emission source		Unit	Pre-2010 fleet	2010–2015 fleet	Post-2015 fleet
			kg CO <sub>2</sub> -e/unit	kg CO <sub>2</sub> -e/unit	kg CO <sub>2</sub> -e/unit
	2000– <3000 cc	km		0.116	0.108
	≥3000 cc	km		0.128	0.119
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	0.010
	2000– <3000 cc	km		0.012	0.012
	≥3000 cc	km		0.015	0.014
Electric vehicle	Very small	km		0.020	0.019
	Small	km		0.021	0.020
	Medium	km		0.023	0.022
	Large	km		0.026	0.025
	Very large	km		0.031	0.030
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 12: Default private car emission factors**

Default private car travel emission source		Unit	kg CO <sub>2</sub> -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 13: Default rental car emission factors**

Default rental car travel emission source		Unit	kg CO <sub>2</sub> -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 14: Taxi travel**

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

**Table 15: Public transport passenger**

Emission source		Unit	kg CO <sub>2</sub> -e/unit
Bus	National Average for Bus	pkm	0.136
	Wellington Electric Bus	pkm	0.013
	Wellington Diesel Bus	pkm	0.111
	Wellington Average Bus	pkm	0.108
Rail	Electric (based on Wellington)	pkm	0.009
	Diesel (based on Wellington)	pkm	0.038
	Average (based on Wellington)	pkm	0.014

**Table 16: Public transport vehicles**

Emission source		Unit	kg CO <sub>2</sub> -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 17: Air travel (domestic)**

Emission source	Unit	Without radiative forcing kg CO <sub>2</sub> -e/unit	With radiative forcing kg CO <sub>2</sub> -e/unit
National average	pkm	0.130	0.242
Jet aircraft	pkm	0.072	0.134
Medium aircraft	pkm	0.114	0.213
Small aircraft	pkm	0.353	0.659

**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 18: Air travel (international)**

Emission source	Travel class	Unit	Without radiative forcing kg CO <sub>2</sub> -e/unit	With radiative forcing kg CO <sub>2</sub> -e/unit
Short haul (<3700 km)	Average passenger	pkm	0.082	0.156
	Economy	pkm	0.081	0.153
	Business	pkm	0.121	0.229
Long haul (>3700 km)	Average passenger	pkm	0.101	0.191
	Economy	pkm	0.077	0.146
	Premium economy	pkm	0.124	0.234
	Business	pkm	0.224	0.424
	First	pkm	0.309	0.585



**Table 19: Accommodation**

Country stayed in	Unit	kg CO <sub>2</sub> -e/unit
Argentina	Room per night	50.0
Australia	Room per night	43.0
Austria	Room per night	13.4
Belgium	Room per night	15.2
Brazil	Room per night	13.0
Canada	Room per night	17.4
Caribbean Region	Room per night	61.1
Chile	Room per night	37.6
China	Room per night	62.3
China (Hong Kong)	Room per night	70.6
Colombia	Room per night	16.7
Costa Rica	Room per night	11.5
Czech Republic	Room per night	35.2
Egypt	Room per night	60.6
Finland	Room per night	11.8
France	Room per night	7.3
French Polynesia	Room per night	73.0
Germany	Room per night	18.6
India	Room per night	75.6
Indonesia	Room per night	72.5
Ireland	Room per night	27.1
Italy	Room per night	22.9
Japan	Room per night	56.0
Jordan	Room per night	74.9
Malaysia	Room per night	69.3
Maldives	Room per night	161.6
Mexico	Room per night	25.3
Netherlands	Room per night	22.7
New Zealand	Room per night	12.8
Oman	Room per night	92.6
Panama	Room per night	27.2
Philippines	Room per night	65.7
Poland	Room per night	40.9
Portugal	Room per night	30.1
Qatar	Room per night	117.9
Romania	Room per night	30.5
Russian Federation	Room per night	34.6

Country stayed in	Unit	kg CO <sub>2</sub> -e/unit
Saudi Arabia	Room per night	125.9
Singapore	Room per night	38.2
South Africa	Room per night	64.5
South Korea	Room per night	64.0
Spain	Room per night	20.6
Switzerland	Room per night	6.6
Taiwan	Room per night	86.8
Thailand	Room per night	55.6
Turkey	Room per night	37.3
United Arab Emirates	Room per night	98.7
United Kingdom	Room per night	15.7
United States	Room per night	21.7
Vietnam	Room per night	58.7

# Freight transport emission factors

**Table 20: Road freight: Light commercial vehicles**

Light commercial vehicle travel emission source		Unit	Pre-2010 kg CO <sub>2</sub> -e	2010–2015 kg CO <sub>2</sub> -e	Post-2015 kg CO <sub>2</sub> -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 <sub>2</sub> -e	2010–2015 kg CO <sub>2</sub> -e	Post-2015 kg CO <sub>2</sub> -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 21: Road freight: Default light commercial vehicles**

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

**Table 22: Road freight: Heavy goods vehicles**

Emission source		Unit	Pre-2010 fleet	2010–2015 fleet	Post-2015 fleet
			kg CO <sub>2</sub> -e	kg CO <sub>2</sub> -e	kg CO <sub>2</sub> -e
HGV diesel	<5,000 kg	km	0.421	0.400	0.394
	5,000– <7,500 kg	km	0.480	0.456	0.449
	7,500– <10,000 kg	km	0.661	0.627	0.618
	10,000– <12,000 kg	km	0.753	0.714	0.704
	12,000– <15,000 kg	km	0.895	0.849	0.837
	15,000– <20,000 kg	km	1.014	0.988	0.986
	20,000– <25,000 kg	km	1.292	1.259	1.257
	25,000– <30,000 kg	km	1.413	1.377	1.375
	≥30,000 kg	km	1.534	1.495	1.492
HGV diesel hybrid	<5,000 kg	km	0.340	0.322	0.315
	5,000– <7,500 kg	km	0.387	0.367	0.359
	7,500– <10,000 kg	km	0.532	0.505	0.493
	10,000– <12,000 kg	km	0.607	0.575	0.562
	12,000– <15,000 kg	km	0.721	0.683	0.668
	15,000– <20,000 kg	km	0.922	0.898	0.896
	20,000– <25,000 kg	km	1.174	1.144	1.142
	25,000– <30,000 kg	km	1.328	1.295	1.292
	≥30,000 kg	km	1.442	1.405	1.403
HGV BEV (battery electric vehicle)	<5,000 kg	km		0.043	0.042
	5,000– <7,500 kg	km		0.048	0.047
	7,500– <10,000 kg	km		0.067	0.065
	10,000– <12,000 kg	km		0.076	0.074
	12,000– <15,000 kg	km		0.090	0.088

**Table 23: Road freight: Default emission factors for heavy goods vehicles**

Emission source	Unit	kg CO <sub>2</sub> -e
HGV diesel	km	0.480
HGV diesel hybrid	km	0.387

**Table 24: Road freight: Emission factors for freighting goods by road**

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

**Table 25: Freighting goods in New Zealand**

Emission source		Unit	kg CO <sub>2</sub> -e
Road	Road freight by truck	tkm	0.136
Rail	Rail freight	tkm	0.028
Coastal shipping	Container freight	tkm	0.046
	Oil products	tkm	0.016
	Other bulk coastal shipping	tkm	0.030

**Table 26: Air freight**

Emission source	Unit	Without radiative forcing	With radiative forcing
		kg CO <sub>2</sub> -e	kg CO <sub>2</sub> -e
Domestic air freight	tkm	2.521	4.767
Short haul air freight	tkm	1.168	2.209
Long haul air freight	tkm	0.599	1.134

**Table 27: International shipping**

Emission source		Unit	kg CO <sub>2</sub> -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	0.006
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	0.012
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	0.020
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
Refrigerated cargo	All dwt	tkm	0.013

# Water supply and wastewater treatment emission factors

**Table 28: Water supply**

Emission source	Unit	kg CO <sub>2</sub> -e
Water supply	m <sup>3</sup>	0.031
	Per capita	3.951

**Table 29: Wastewater treatment**

Emission source		Unit	kg CO <sub>2</sub> -e/unit
Domestic wastewater	Average for wastewater treatment plants	m <sup>3</sup> water supplied	0.457
		Per capita	48.056
	Septic tanks	Per capita	162.500
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 <sup>3</sup> of milk	0.115



# Materials and waste emission factors

**Table 30: Construction material**

Emission source		Unit	kg CO <sub>2</sub> -e/unit
Concrete	Default	kg	0.12
	17.5 megapascals (MPa)	kg	0.094
	20 MPa	kg	0.099
	25 MPa	kg	0.110
	30 MPa	kg	0.115
	35 MPa	kg	0.124
	40 MPa	kg	0.136
	45 MPa	kg	0.149
	50 MPa	kg	0.161
Steel	Structural, columns and beams	kg	2.85
Aluminium	Default	kg	11.80

**Table 31: Waste disposal with and without landfill gas recovery (LFGR)**

Emission source		Unit	With LFGR kg CO <sub>2</sub> -e/unit	Without LFGR kg CO <sub>2</sub> -e/unit
Waste (known composition)	Food	kg	0.299	1.125
	Garden	kg	0.398	1.500
	Paper	kg	0.797	3.000
	Wood	kg	0.856	3.225
	Textile	kg	0.478	1.800
	Nappies	kg	0.478	1.800
	Other (Inert)	kg	n/a	n/a
Waste (unknown composition)	General waste	kg	0.311	1.170
	Office waste	kg	0.489	1.842

**Table 32: Composting**

Emission source	Unit	kg CO <sub>2</sub> -e/unit
Composting	kg	0.172

# Agriculture, forestry and other land-use emission factors

**Table 33: Forestry**

Emission source		Unit	kg CO <sub>2</sub> -e/unit
Planted forests	All	ha	-33,807
Natural forests	Regenerating natural forest	ha	-2,273
	Tall natural forest	ha	0

**Table 34: Land-use change – harvest and deforestation**

Emission source		Unit	kg CO <sub>2</sub> -e/unit
Planted forests	Harvest and deforestation	ha	946,605
Natural forests	Harvest and deforestation	ha	-828,667

**Table 35: Agriculture**

Emission source	Unit	kg CO <sub>2</sub> -e/unit	
Enteric fermentation	Dairy cattle	per head	2132
	Non-dairy cattle	per head	1452
	Sheep	per head	307
	Deer	per head	573
	Swine	per head	26.5
	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	212.6
	Non-dairy cattle	per head	19.5
	Sheep	per head	3.21
	Deer	per head	6.95
	Swine	per head	149
	Goats	per head	5.0
	Horses	per head	58.5
	Alpaca	per head	2.37
	Mules & asses	per head	27.5
	Poultry	per head	0.77
Fertiliser use	Non-urea nitrogen fertiliser	kg	5.40
	Urea nitrogen fertiliser not coated with urease inhibitor	kg	5.07
	Urea nitrogen fertiliser coated with urease inhibitor	kg	4.86
	Limestone	kg	0.440
	Dolomite	kg	0.477
Agricultural soils	Dairy cattle	per head	489
	Non-dairy cattle	per head	237
	Sheep	per head	32.2
	Deer	per head	78.1
	Swine	per head	47.0
	Goats	per head	68.7
	Horses	per head	325
	Alpaca	per head	70.0
	Mules & asses	per head	145
	Poultry	per head	1.72