

A8.1 Worksheets for the energy sector

Module 2004 Energy (New Zealand)
 Submodule CO2 emissions from energy sources (reference approach)
 Worksheet 1.1 (1-3 of 5)
 Sheet Emissions from domestic fuel combustion

Fuel type	Production	Imports	Exports	Inter-national bunkers	Stock change	Apparent consumption	Conversion factor (TJ/unit)	Apparent consumption (TJ)	Carbon emis fact (t C/TJ)	Carbon content (t C)	Carbon content (Gg)	Carbon stored (Gg)	Net C emissions (Gg)	Fraction of carbon oxidised	Actual C emissions (Gg)	Actual CO2 emissions (Gg)
Liquid fossil fuels - primary																
Crude oil	42.53	200.89	33.45		-3.58	213.56	1,000	213,558.53	17.80	3,801,341.83	3,801.34		3,801.34	0.99	3,763.33	13,798.87
Orimulsion	0.00	0.00	0.00		0.00	0.00										
Natural gas liquids	9.52	0.39	0.75		0.23	8.94	1,000	8,937.82	16.47	147,230.27	147.23		147.23	0.99	145.76	534.45
Liquid fossil fuels - secondary																
Gasoline - Regular Unleaded		29.72	0.00	0	0.93	28.79	1,000	28,789.44	18.05	519,780.31	519.78		519.78	0.99	514.58	1,886.80
Gasoline - Premium Unleaded		11.31	0.00	0	4.08	7.24	1,000	7,235.36	18.27	132,209.70	132.21		132.21	0.99	130.89	479.92
Jet kerosene		13.10	0.00	38.04	1.87	-26.81	1,000	-26,812.20	18.57	-497,975.60	-497.98		-497.98	0.99	-493.00	-1,807.65
Av Gas		0.70	0.00	0.00	0.06	0.63	1,000	634.95	17.73	11,255.93	11.26		11.26	0.99	11.14	40.86
Other kerosene		0.00	0.00	0.00	0.00	0.00										
Shale oil		0.00	0.00	0.00	0.00	0.00										
Gas/diesel oil		36.22	0.24	1.53	0.98	33.47	1,000	33,472.03	18.95	634,447.10	634.45		634.45	0.99	628.10	2,303.04
Residual fuel oil		0.00	2.62	8.80	0.20	-11.62	1,000	-11,620.21	19.91	-231,347.80	-231.35		-231.35	0.99	-229.03	-839.79
LPG		0.00	0.00		0.00	0.00										
Ethane		0.00	0.00		0.00	0.00										
Naphtha		0.00	0.00		0.00	0.00										
Bitumen		7.30	0.00	0.00	-0.34	7.64	1,000	7,639.74	20.76	158,601.08	158.60	261.93	-103.33	0.99	-102.30	-375.10
Lubricants		0.00	0.00	0.00	0.00	0.00										
Petroleum coke		0.00	0.00		0.00	0.00										
Refinery feedstocks		16.12	0.00		2.17	13.95	1,000	13,953.45	17.80	248,371.32	248.37		248.37	0.99	245.89	901.59
Other oil		0.00	0.00		0.00	0.00										
Total liquid fossil fuels	52.05	315.76	37.06	48.37	6.59	275.79		275,788.91		4,923,914.15	4,923.91	261.93	4,661.98		4,615.36	16,922.99
Solid fossil fuels - primary																
Anthracite	0.00	0.00	0.00		0.00	0.00										
Coking coal	2,467,897.00	0.00	1,908,418.22		559,478.78	0.00	0.03	0.00	24.22	-	0.00	0.00	-	0.98	0.00	0.00
Other bituminous coal	58,716.00	53,976.92	0.00	0.00	0.00	112,692.92	0.03	3,617.44	24.22	87,607.88	87.61		87.61	0.98	85.86	314.80
Sub-bituminous coal	2,389,353.00	822,156.04	0.00	0.00	0.00	3,211,509.04	0.02	72,580.10	24.87	1,805,265.14	1,805.27	450.70	1,354.57	0.98	1,327.48	4,867.42
Lignite	239,428.00	3.45	0.00		0.00	239,431.45	0.02	3,591.47	25.96	93,247.67	93.25		93.25	0.98	91.38	335.07
Peat	-	0.00	0.00		0.00	0.00										
Solid fossil fuels - secondary																
BKB & patent fuel		0.00	0.00		0.00	0.00										
Coke		13,653.02	0.00		0.00	13,653.02	0.03	380.92	27.90	10,627.65	10.63		10.63	0.98	10.42	38.19
Total solid fossil fuels	5,155,394.00	889,789.43	1,908,418.22	0.00	559,478.78	3,577,286.43		80,169.94		1,996,748.34	1,996.75	450.70	1,546.05		1,515.13	5,555.48
Total gaseous fossil fuels	160.64	0.00	0.00		0.10	160.54	1,000	160,540.44	16.13	2,588,816.06	2,588.82	511.09	2,077.72	1.00	2,067.33	7,580.22
Total fossil fuels								516,499.29		9,509,478.55	9,509.48	1,223.72	8,285.75		8,197.82	30,058.69
Total biomass fuels						36.47		36,466.00		1,034,548.64	1,034.55		1,034.55		984.64	3,610.34
Solid biomass	35.00					35.00	1,000	35,000.00	28.41	994,175.00	994.18		994.18	0.95	944.47	3,463.04
Liquid biomass								ne								ne
Gas biomass	1.47					1.47	1,000	1,466.00	27.54	40,373.64	40.37		40.37	1.00	40.17	147.30

Liquid and gaseous fossil fuel data are shown initially in petajoules. Solid fossil fuel data are shown initially in tonnes.

Module 2004 Energy (New Zealand)
Submodule CO2 emissions from energy sources (reference approach)
Worksheet 1.1 (4-5 of 5)
Sheet Emissions from international bunkers

Fuel type	Quantities delivered	Conversion factor (TJ/unit)	Quantities delivered (TJ)	Carbon emis fact (t C/TJ)	Carbon content (t C)	Carbon content (Gg)	Fraction of carbon stored	Carbon stored (Gg)	Net C emissions (Gg)	Fraction of carbon oxidised	Actual C emissions (Gg)
Solid fossil fuels											
Other bituminous coal	0.00										
Sub-bituminous coal	0.00										
Liquid fossil fuels											
Gasoline	0.00										
Jet kerosene	38.04	1,000	38040.91	18.57	706,523.48	706.52	0.00	0.00	706.52	0.99	699.46
Gas/diesel oil	1.53	1,000	1529.29	18.95	28,987.08	28.99	0.00	0.00	28.99	0.99	28.70
Residual fuel oil	8.80	1,000	8799.80	19.91	175,196.08	175.20	0.00	0.00	175.20	0.99	173.44
Lubricants	0.00										
Bitumen	0.00	1,000	0.00	20.76	0.00	0.00	0.00	0.00	0.00	0.99	0
Total fossil fuels			48,370.01								901.60

Liquid fossil fuel data are shown initially in petajoules.

Module 2004 Energy (New Zealand)
Submodule CO2 emissions from energy sources (reference approach)
Worksheet 1.1 (supplemental)
Sheet Estimating the carbon stored in products

Fuel type	Estimated fuel quantities	Conversion factor (TJ/unit)	Estimated quantities (TJ)	Carbon emis fact (t C/TJ)	Carbon content (t C)	Carbon content (Gg)	Fraction of carbon stored	Carbon stored (Gg)
Naphtha	0.00							no
Lubricants	0.00							no
Bitumen	12.62	1,000	12,617.24	20.76	261,933.94	261.93	1.00	261.93
Coal oils and tars	0.00	0.03	0.00	24.24	0.00	0.00	0.75	0.00
Coal1	17.6366650	1,000	17,636.67	25.55	450,696.96	450.70	1.00	450.70
Natural gas2	conf	1,000	conf	conf	conf	conf	conf	511.09
Gas/diesel oil	0.00							no
LPG	0.00							no
Ethane	0.00							no
Other fuels	0.00							no
Total								1,223.72

All data are shown initially in petajoules, except coal oils and tars, which is shown in tonnes.

- 1 Refers to coal used in the production of iron and steel. This carbon is emitted but is reported in the industrial processes sector.
- 2 Refers to gas used in the production of methanol, synthetic petrol and urea. Some natural gas data are confidential.

Module
Sub-module
Worksheets

2004 Energy (New Zealand)
CO2 emissions from fuel combustion by source categories (tier 1)
1.2 (part I)

Source and sink categories	Energy consumption (TJ)	Carbon emis fact (t C/TJ)	Carbon content (t C)	Carbon content (Gg)	Fraction of carbon stored1	Carbon stored1 (t C)	Net C emissions (Gg)	Fraction of carbon oxidised	Actual C emissions (Gg)	Actual CO2 emissions (Gg)
Total energy (parts I and II of worksheet)²	432,922.89		8,190,074.52	8,190.07			8,190.07		8,101.66	29,706.08
Total Liquid Fuels	251,044.90		4,643,535.66	4,643.54			4,643.54	0.99	4,597.10	16,856.03
Total Coal	63,691.73		1,616,593.00	1,616.59			1,616.59	0.98	1,584.26	5,808.96
Total Gaseous Fuels	118,186.27		1,929,945.85	1,929.95			1,929.95	1.00	1,920.30	7,041.09
1 Energy industries⁴	104,434.76		1,978,142.40	1,978.14			1,978.14		1,952.37	7,158.68
a Public electricity and heat	85,169.41		1,671,602.04	1,671.60			1,671.60	8.91	1,647.61	6,041.22
Total Liquid Fuels	23.11		436.88	0.44			0.44	6.93	0.43	1.59
Petrol Regular	1.22	18.05	22.03	0.02			0.02	0.99	0.02	0.08
Petrol Premium	0.00	18.27	0.00	0.00			0.00	0.99	0.00	0.00
Diesel	21.89	18.95	414.85	0.41			0.41	0.99	0.41	1.51
Heavy Fuel oil	0.00	20.05	0.00	0.00			0.00	0.99	0.00	0.00
Light Fuel oil	0.00	19.64	0.00	0.00			0.00	0.99	0.00	0.00
Jet Kerosene	0.00	18.57	0.00	0.00			0.00	0.99	0.00	0.00
Av Gas	0.00	17.73	0.00	0.00			0.00	0.99	0.00	0.00
Coal	41,126.00	25.35	1,042,454.09	1,042.45			1,042.45	0.98	1,021.61	3,745.89
Natural gas	44,020.31	14.28	628,711.07	628.71			628.71	1.00	625.57	2,293.75
Biogas (memo item) ³	1,059.00	28.41	30,080.90	30.08			30.08	1.00	29.93	109.75
b Petroleum refining	13,522.42		225,943.36	225.94			225.94	3.97	224.57	823.42
Total Liquid Fuels	2,495.79		48,911.18	48.91			48.91	1.98	48.42	177.55
Fuel oil	653.07	18.96	12,383.18	12.38			12.38	0.99	12.26	44.95
Asphalt	1,842.72	19.82	36,528.00	36.53			36.53	0.99	36.16	132.60
Total Natural Gas	11,026.63		177,032.18	177.03			177.03	1.99	176.15	645.87
Refinery gas	10,948.41	16.06	175,867.36	175.87			175.87	1.00	174.99	641.62
Natural gas	78.22	14.89	1,164.82	1.16			1.16	1.00	1.16	4.25
c Solid fuels and other energy	5,742.92		80,596.99	80.60			80.60	1.99	80.19	294.04
Total Natural Gas	5,742.92		80,596.99	80.60			80.60	1.99	80.19	294.04
Natural gas in synthetic petrol production	0.00	0.00	0.00	0.00			0.00	1.00	0.00	0.00
Natural gas in oil and gas extraction	5,742.92	14.03	80,596.99	80.60			80.60	1.00	80.19	294.04

Module 2004 Energy (New Zealand)
Sub-module CO2 emissions from fuel combustion by source categories (tier 1)
Worksheets 1.2 (part II)

Source and sink categories	Energy consumption (TJ)	Carbon emis fact (t C/TJ)	Carbon content (t C)	Carbon content (Gg)	Fraction of carbon stored1	Carbon stored1 (t C)	Net C emissions (Gg)	Fraction of carbon oxidised	Actual C emissions (Gg)	Actual CO2 emissions (Gg)
2 Manufacturing and construction²	66,032.19		1,384,534.62	1,384.53			1,384.53	1.00	1,370.77	5,026.17
a Iron and Steel	1,832.61		26,373.99	26.37			26.37		26.24	96.22
Natural gas	1,832.61	14.39	26,373.99	26.37			26.37	1.00	26.24	96.22
c Chemicals (methanol production)	conf	conf	221,370.84	221.37			221.37	1.00	220.26	807.63
Natural gas in methanol production ⁴	conf	conf	221,370.84	221.37			221.37	1.00	220.26	807.63
f Other	64,199.57		1,136,789.79	1,136.79			1,136.79		1,124.27	4,122.31
Total Liquid Fuels	13,728.10		252,639.98	252.64			252.64		250.11	917.08
Petrol Regular	256.05	18.05	4,622.87	4.62			4.62	0.99	4.58	16.78
Petrol Premium	123.66	18.27	2,259.68	2.26			2.26	0.99	2.24	8.20
Diesel	9,252.46	18.95	175,376.24	175.38			175.38	0.99	173.62	636.62
Heavy Fuel oil	107.64	20.05	2,157.66	2.16			2.16	0.99	2.14	7.83
Light Fuel oil	696.51	19.64	13,676.93	13.68			13.68	0.99	13.54	49.65
Jet Kerosene	146.70	18.57	2,724.70	2.72			2.72	0.99	2.70	9.89
Av Gas	11.21	17.73	198.72	0.20			0.20	0.99	0.20	0.72
LPG	3,133.86	16.47	51,623.17	51.62			51.62	0.99	51.11	187.39
Other liquid	0.00	19.88	0.00	0.00			0.00	0.99	0.00	0.00
Coal	14,602.28	25.46	371,723.07	371.72			371.72	0.98	364.29	1,335.72
Total Natural Gas	35,869.20		512,426.74	512.43			512.43	1.99	509.86	1,869.50
Autoproduction	14,951.09	14.14	211,384.44	211.38			211.38	1.00	210.33	771.20
Other natural gas	20,918.11	14.39	301,042.30	301.04			301.04	1.00	299.54	1,098.30
Total Biomass	32,763.16		930,376.31	930.38			930.38	2.00	930.33	3,411.23
Wood (memo item) ³	32,461.16	28.41	922,059.23	922.06			922.06	1.00	922.06	3,380.88
Biogas - Autoproduction (memo item) ³	302.00	27.54	8,317.08	8.32			8.32	1.00	8.28	30.34

Module
Sub-module
Worksheets

2004 Energy (New Zealand)
CO2 emissions from fuel combustion by source categories (tier 1)
1.2 (part III)

Source and sink categories	Energy Consumption (TJ)	Carbon emis fact (t C/TJ)	Carbon content (t C)	Carbon content (Gg)	Fraction of carbon stored1	Carbon stored1 (t C)	Net C emissions (Gg)	Fraction of carbon oxidised	Actual C emissions (Gg)	Actual CO2 emissions (Gg)
3 Transport	210,412.73		3,887,129.06	3,887.13			3,887.13	10.90	3,848.27	14,110.33
a Civil aviation	17,711.43		328,437.25	328.44			328.44	1.98	325.15	1,192.23
Jet Kerosene	17,105.42	18.57	317,694.39	317.69			317.69	0.99	314.52	1,153.23
Av Gas	606.01	17.73	10,742.86	10.74			10.74	0.99	10.64	39.00
b Road transport	185,636.56		3,420,629.24	3,420.63			3,420.63	4.96	3,386.44	12,416.93
Total Liquid Fuels	185,450.56		3,417,952.42	3,417.95			3,417.95		3,383.77	12,407.17
Petrol Regular	85,078.13	18.05	1,536,046.96	1,536.05			1,536.05	0.99	1,520.69	5,575.85
Petrol Premium	25,879.62	18.27	472,891.21	472.89			472.89	0.99	468.16	1,716.60
Diesel	73,298.87	18.95	1,389,346.69	1,389.35			1,389.35	0.99	1,375.45	5,043.33
LPG	1,193.95	16.47	19,667.56	19.67			19.67	0.99	19.47	71.39
CNG	186.00	14.39	2,676.81	2.68			2.68	1.00	2.66	9.77
c Rail transport (diesel)	2,457.00	18.95	46,571.32	46.57			46.57	0.99	46.11	169.05
d National navigation (fuel oil and diesel)	4,607.74		91,491.25	91.49			91.49	2.97	90.58	332.11
Diesel	0.00	18.95	0.00	0.00			0.00	0.99	0.00	0.00
Heavy Fuel oil	2,473.79	20.05	49,588.30	49.59			49.59	0.99	49.09	180.01
Light Fuel oil	2,133.95	19.64	41,902.95	41.90			41.90	0.99	41.48	152.11
Marine bunkers (memo item) ³	10,244.31		203,559.38	203.56			203.56		201.52	738.92
Diesel	1,536.33	18.95	29,120.42	29.12			29.12	0.99	28.83	105.71
Heavy Fuel oil	8,423.21	20.05	168,847.11	168.85			168.85	0.99	167.16	612.92
Light Fuel oil	284.77	19.64	5,591.85	5.59			5.59	0.99	5.54	20.30
Aviation bunkers (memo item) ³	38,040.98	0.00	706,524.68	706.52			706.52	0.99	699.46	2,564.68
Av Fuels	38,040.98	18.57	706,524.68	706.52			706.52	0.99	699.46	2,564.68

Module 2004 Energy (New Zealand)
 Sub-module CO2 emissions from fuel combustion by source categories (tier 1)
 Worksheets 1.2 (part IV)

Source and sink categories	Energy Consumption (TJ)	Carbon emis fact (t C/TJ)	Carbon content (t C)	Carbon content (Gg)	Fraction of carbon stored1	Carbon stored1 (t C)	Net C emissions (Gg)	Fraction of carbon oxidised	Actual C emissions (Gg)	Actual CO2 emissions (Gg)
4 Other sectors	52,043.22		940,268.45	940.27			940.27		930.25	3,410.90
a Commercial/institutional	25,606.31		466,864.02	466.86			466.86	9.90	461.43	1,691.92
Total Liquid Fuels	6,449.40		119,031.44	119.03			119.03	7.92	117.84	432.08
Petrol Regular	102.40	18.05	1,848.81	1.85			1.85	0.99	1.83	6.71
Petrol Premium	371.89	18.27	6,795.42	6.80			6.80	0.99	6.73	24.67
Diesel	3,409.51	18.95	64,625.69	64.63			64.63	0.99	63.98	234.59
Heavy Fuel oil	349.13	20.05	6,998.50	7.00			7.00	0.99	6.93	25.40
Light Fuel oil	276.94	19.64	5,438.12	5.44			5.44	0.99	5.38	19.74
Jet Kerosene	644.92	18.57	11,977.88	11.98			11.98	0.99	11.86	43.48
Av Gas	16.89	17.73	299.34	0.30			0.30	0.99	0.30	1.09
LPG	1,277.73	16.47	21,047.68	21.05			21.05	0.99	20.84	76.40
Coal	6,571.77	25.37	166,713.96	166.71			166.71	0.98	163.38	599.06
Natural gas	12,585.14	14.39	181,118.62	181.12			181.12	1.00	180.21	660.78
Biogas (memo item) ³	105.21	27.54	2,897.53	2.90			2.90	1.00	2.88	10.57
b Residential	9,996.03		158,337.12	158.34			158.34	9.90	157.03	575.78
Total Liquid Fuels	2,213.64		36,468.67	36.47			36.47	7.92	36.10	132.38
Petrol Regular	1.45	18.05	26.27	0.03			0.03	0.99	0.03	0.10
Petrol Premium	0.00	18.27	0.00	0.00			0.00	0.99	0.00	0.00
Diesel	0.37	18.95	6.97	0.01			0.01	0.99	0.01	0.03
Heavy Fuel oil	0.00	20.05	0.00	0.00			0.00	0.99	0.00	0.00
Light Fuel oil	0.00	19.64	0.00	0.00			0.00	0.99	0.00	0.00
Jet Kerosene	0.14	18.57	2.59	0.00			0.00	0.99	0.00	0.01
Av Gas	0.43	17.73	7.55	0.01			0.01	0.99	0.01	0.03
LPG	2,211.25	16.47	36,425.30	36.43			36.43	0.99	36.06	132.22
Coal	858.95	25.88	22,229.84	22.23			22.23	0.98	21.79	79.88
Natural gas	6,923.45	14.39	99,638.61	99.64			99.64	1.00	99.14	363.51
Wood (memo item) ⁴	2,538.71	28.41	72,112.05	72.11			72.11	1.00	72.11	264.41
c Agriculture/forestry/fishing	16,440.87		315,067.31	315.07			315.07	7.91	311.78	1,143.20
Total Liquid Fuels	15,908.14		301,595.27	301.60			301.60	6.93	298.58	1,094.79
Petrol Regular	1,088.78	18.05	19,657.36	19.66			19.66	0.99	19.46	71.36
Petrol Premium	97.66	18.27	1,784.46	1.78			1.78	0.99	1.77	6.48
Diesel	12,691.68	18.95	240,564.94	240.56			240.56	0.99	238.16	873.25
Heavy Fuel oil	0.00	20.05	0.00	0.00			0.00	0.99	0.00	0.00
Light Fuel oil	1,816.19	19.64	35,663.39	35.66			35.66	0.99	35.31	129.46
Jet Kerosene	158.97	18.57	2,952.47	2.95			2.95	0.99	2.92	10.72
Av Gas	54.87	17.73	972.66	0.97			0.97	0.99	0.96	3.53
Coal	532.74	25.29	13,472.04	13.47			13.47	0.98	13.20	48.41

Sheets 1-16 of worksheet 1-2 have been combined. Only New Zealand relevant source and sink categories have been included.

1 Energy containing carbon which is later stored is not included in the energy consumption reported here.

2 Does not include energy use for methanol production.

3 Data are included only as memo items and do not contribute to the data totals

4 Natural gas consumption data for methanol production is confidential.

Module **2004 Energy (New Zealand)**
 Submodule **CO2 from fuel combustion by source category (tier 1)**
 Worksheet **1.2 overview (totals)**

	Total liquid fossil TJ	Total solid fossil	Total gaseous fossil ¹	Total biomass fuels ²	Total all fuels
Total energy consumption	251,044.90	63,691.73	118,186.27	36,466.08	432,922.89
Energy industries	2,518.89	41,126.00	60,789.86	1,059.00	104,434.76
Manufacturing industries and construction	13,728.10	14,602.28	37,701.81	32,763.16	66,032.19
Transport					
Civil aviation	17,711.43				17,711.43
Road	185,450.56		186.00	no	185,636.56
Railways	2,457.00	ne			2,457.00
Navigation	4,607.74	ne			4,607.74
Other sectors					
Commercial/institutional	6,449.40	6,571.77	12,585.14	105.21	25,606.31
Residential	2,213.64	858.95	6,923.45	2,538.71	9,996.03
Ag/forest/fish	15,908.14	532.74	ne	ne	16,440.87
International marine bunkers (memo item)	10,244.31	ne			10,244.31
International aviation bunkers (memo item)	38,040.98				38,040.98
Total CO2 emissions	16,856.03	5,808.96	7,041.09	3,795.95	29,706.08
Energy industries	179.13	3,745.89	3,233.66	109.75	7,158.68
Manufacturing industries and construction	917.08	1,335.72	2,773.36	3,411.23	5,026.17
Transport					
Civil aviation	1,192.23				1,192.23
Road	12,407.17		9.77	no	12,416.93
Railways	169.05	ne			169.05
Navigation	332.11	ne			332.11
Other sectors					
Commercial/institutional	432.08	599.06	660.78	10.57	1,691.92
Residential	132.38	79.88	363.51	264.41	575.78
Ag/forest/fish	1,094.79	48.41	ne	ne	1,143.20
International marine bunkers (memo item)	738.92	ne			738.92
International aviation bunkers (memo item)	2,564.68				2,564.68

1 The figures for "Manufacturing industries and construction" and total gaseous fuels do not include gas used for methanol production, which is confidential.

2 Emissions from biomass (wood and biogas) are included as memo items only and are not included in totals.

Module **2004 Energy (New Zealand)**
 Submodule **Non-CO2 emissions from fuel combustion by source categories (tier 1)**
 Worksheets **1.3 (part I)**

Source and sink categories	Energy consumption (TJ)	CH4	N2O	NOX	CO	NMVOC	CH4	N2O	NOX	CO	NMVOC
		Emission Factor (t CH4/TJ)	Emission Factor (t N2O/TJ)	Emission Factor (t NOX/TJ)	Emission Factor (t CO/TJ)	Emission Factor (t NMVOC/TJ)	Emissions t CH4	Emissions t N2O	Emissions t NOX	Emissions t CO	Emissions t NMVOC
Total energy (parts I and II of worksheet)¹	451,972.35						4,525.65	855.02	155,558.63	601,846.88	115,624.63
1 Energy industries	105,493.76						177.59	70.89	27,786.45	1,935.95	485.63
a Public electricity and heat	86,228.41						149.35	68.67	23,610.23	1,628.72	398.32
Total Liquid Fuels	23.11						0.02	0.01	4.83	0.35	0.11
Distillate	23.11	0.00086	0.00038	0.20900	0.01520	0.00475	0.02	0.01	4.83	0.35	0.11
Residual	0.00	0.00086	0.00029	0.19000	0.01425	0.00475	0.00	0.00	0.00	0.00	0.00
Coal	41,126.00	0.00067	0.00152	0.36100	0.00855	0.00475	27.35	62.51	14,846.49	351.63	195.35
Natural Gas	44,020.31	0.00275	0.00009	0.19800	0.02880	0.00450	120.84	3.96	8,716.02	1,267.78	198.09
Bio Gas	1,059.00	0.00108	0.00207	0.04050	0.00846	0.00450	1.14	2.19	42.89	8.96	4.77
b Petroleum refining	13,522.42						21.01	1.70	2,884.06	214.20	61.47
Oil	2,495.79	0.00285	0.00029	0.16150	0.01425	0.00475	7.11	0.71	403.07	35.56	11.85
Gas	11,026.63						13.89	0.99	2,480.99	178.63	49.62
Natural Gas	78.22	0.00126	0.00009	0.22500	0.01620	0.00450	0.10	0.01	17.60	1.27	0.35
Refinery Gas	10,948.41	0.00126	0.00009	0.22500	0.01620	0.00450	13.79	0.99	2,463.39	177.36	49.27
c Solid fuels and other energy	5,742.92						7.24	0.52	1,292.16	93.04	25.84
Natural Gas in synthetic petrol prodn	0.00	0.00126	0.00009	0.22500	0.01620	0.00450	0.00	0.00	0.00	0.00	0.00
Natural Gas in oil and Gas extraction	5,742.92	0.00126	0.00009	0.22500	0.01620	0.00450	7.24	0.52	1,292.16	93.04	25.84
2 Manufacturing and construction¹	81,378.72						656.36	171.46	27,162.61	22,361.70	2,417.39
a Iron and Steel	1,832.61						2.31	0.16	412.34	29.69	8.25
Natural Gas	1,832.61	0.00126	0.00009	0.22500	0.01620	0.00450	2.31	0.16	412.34	29.69	8.25
c Chemicals (methanol production)²	conf						54.74	3.91	9,774.99	703.80	195.50
Natural Gas	conf	conf	conf	conf	conf	conf	54.74	3.91	9,774.99	703.80	195.50
f Other	79,546.11						599.31	167.38	16,975.28	21,628.22	2,213.65
Total Liquid Fuels	13,728.10						7.85	5.72	1,037.46	209.24	65.21
Distillate	9,632.18	0.00019	0.00038	0.06175	0.01520	0.00475	1.83	3.66	594.79	146.41	45.75
Residual	962.06	0.00285	0.00029	0.16150	0.01425	0.00475	2.74	0.27	155.37	13.71	4.57
LPG	3,133.86	0.00105	0.00057	0.09168	0.01568	0.00475	3.27	1.79	287.30	49.12	14.89
Total Coal	14,602.28						11.27	21.15	6,038.01	489.89	277.44
Lime and Cement	5,489.36	0.00095	0.00133	0.50065	0.07505	0.01900	5.21	7.30	2,748.25	411.98	104.30
Other	9,112.92	0.00067	0.00152	0.36100	0.00855	0.01900	6.06	13.85	3,289.76	77.92	173.15
Total Natural Gas							67.40	3.23	7,666.89	769.46	161.41
Autoproduction	14,951.09	0.00275	0.00009	0.19800	0.02880	0.00450	41.04	1.35	2,960.32	430.59	67.28
Other	20,918.11	0.00126	0.00009	0.22500	0.01620	0.00450	26.36	1.88	4,706.57	338.87	94.13
Total Biomass	36,264.65						512.79	137.28	2,232.92	20,159.62	1,709.58
Wood	35,962.65	0.01425	0.00380	0.06175	0.56050	0.04750	512.47	136.66	2,220.69	20,157.06	1,708.23
Biogas	302.00	0.00108	0.00207	0.04050	0.00846	0.00450	0.33	0.63	12.23	2.55	1.36

Module
Submodule
Worksheets

2004 Energy (New Zealand)
Non-CO2 emissions from fuel combustion by source categories (tier 1)
1.3 (part II)

Source and sink categories	Energy consumption (TJ)	CH4	N2O	NOX	CO	NMVOC	CH4	N2O	NOX	CO	NMVOC
		Emission Factor (t CH4/TJ)	Emission Factor (t N2O/TJ)	Emission Factor (t NOX/TJ)	Emission Factor (t CO/TJ)	Emission Factor (t NMVOC/TJ)	Emissions t CH4	Emissions t N2O	Emissions t NOX	Emissions t CO	Emissions t NMVOC
3 Transport	210,412.73						2,547.15	481.89	85,376.74	536,975.89	107,161.34
a Civil aviation	17,711.43						33.65	33.65	4,879.50	2,019.10	302.87
Jet Kerosene	17,105.42	0.00190	0.00190	0.27550	0.11400	0.01710	32.50	32.50	4,712.54	1,950.02	292.50
Av Gas	606.01	0.00190	0.00190	0.27550	0.11400	0.01710	1.15	1.15	166.96	69.08	10.36
b Road transport	185,636.56						2,473.52	430.38	71,037.78	533,424.27	106,381.10
Total Liquid Fuels	185,450.56						2,368.06	430.37	70,974.17	533,303.74	106,366.03
Petrol	110,957.75	0.01853	0.00143	0.21090	4.59135	0.88493	2,055.49	158.11	23,400.99	509,445.86	98,189.29
Diesel	73,298.87	0.00380	0.00371	0.64315	0.30305	0.10165	278.54	271.57	47,142.17	22,213.22	7,450.83
LPG	1,193.95	0.02850	0.00057	0.36100	1.37750	0.60800	34.03	0.68	431.01	1,644.66	725.92
CNG	186.00	0.56700	0.00009	0.34200	0.64800	0.08100	105.46	0.02	63.61	120.53	15.07
c Rail transport (diesel)	2,457.00	0.00380	0.00371	0.64315	0.30305	0.10165	9.34	9.10	1,580.22	744.59	249.75
d National navigation (fuel oil and diesel)	4,607.74						30.64	8.75	7,879.23	787.92	227.62
Diesel	0.00	0.00665	0.00190	1.71000	0.17100	0.04940	0.00	0.00	0.00	0.00	0.00
Fuel oil	4,607.74	0.00665	0.00190	1.71000	0.17100	0.04940	30.64	8.75	7,879.23	787.92	227.62
Aviation bunkers	38,040.96	0.00190	0.00190	0.27550	0.11400	0.01710	72.28	72.28	10,480.28	4,336.67	650.50
Marine bunkers	10,329.10						68.69	19.63	17,662.76	1,766.28	510.26
Diesel	1,529.29	0.00665	0.00190	1.71000	0.17100	0.04940	10.17	2.91	2,615.09	261.51	75.55
Fuel Oil	8,799.80	0.00665	0.00190	1.71000	0.17100	0.04940	58.52	16.72	15,047.66	1,504.77	434.71
4 Other sectors	54,687.14						1,144.55	130.77	15,232.84	40,573.33	5,560.26
a Commercial/institutional	25,711.52						81.77	37.58	2,545.72	1,445.76	1,336.38
Total Liquid Fuels	6,449.40						5.63	2.57	533.39	89.77	30.63
Distillate Fuel oil	3,883.80	0.00067	0.00038	0.06175	0.01520	0.00475	2.58	1.48	239.82	59.03	18.45
Residual Fuel oil	1,287.88	0.00133	0.00029	0.16150	0.01425	0.00475	1.71	0.37	207.99	18.35	6.12
LPG	1,277.73	0.00105	0.00057	0.06698	0.00969	0.00475	1.34	0.73	85.58	12.38	6.07
Coal	6,571.77	0.00950	0.00133	0.22800	0.19000	0.19000	62.43	8.74	1,498.36	1,248.64	1,248.64
Natural Gas	12,585.14	0.00108	0.00207	0.04050	0.00846	0.00450	13.59	26.05	509.70	106.47	56.63
Biogas	105.21	0.00108	0.00207	0.04050	0.00846	0.00450	0.11	0.22	4.26	0.89	0.47
b Residential	12,534.74						976.88	12.67	803.97	29,550.47	1,651.93
Total Liquid Fuels	2,213.64						2.31	1.26	98.94	21.04	10.51
Distillate Fuel oil	1.82	0.00067	0.00019	0.06175	0.01520	0.00475	0.00	0.00	0.11	0.03	0.01
Residual Fuel oil	0.56	0.00133	0.00019	0.16150	0.01425	0.00475	0.00	0.00	0.09	0.01	0.00
LPG	2,211.25	0.00105	0.00057	0.04465	0.00950	0.00475	2.31	1.26	98.73	21.01	10.50
Coal	858.95	0.28500	0.00133	0.17100	3.42000	0.19000	244.80	1.14	146.88	2,937.60	163.20
Natural Gas	6,923.45	0.00090	0.00009	0.04230	0.00900	0.00450	6.23	0.62	292.86	62.31	31.16
Wood	2,538.71	0.28500	0.00380	0.10450	10.45000	0.57000	723.53	9.65	265.30	26,529.52	1,447.06
c Agriculture/forestry/fishing	16,440.87						85.90	80.51	11,883.16	9,577.10	2,571.95
Total Liquid Fuels	15,908.14						80.84	79.80	11,761.69	9,475.88	2,470.73
Distillate Fuel oil - Stationary	693.91	0.00380	0.02850	1.14000	0.35150	0.16150	2.64	19.78	791.05	243.91	112.07
Residual Fuel oil - Stationary	371.95	0.00380	0.02850	1.14000	0.35150	0.16150	1.41	10.60	424.02	130.74	60.07
Petrol - Mobile	1,127.11	0.01853	0.00143	0.21090	4.59135	0.88493	20.88	1.61	237.71	5,174.96	997.41
Diesel - Mobile	12,057.09	0.00380	0.00371	0.64315	0.30305	0.10165	45.82	44.67	7,754.52	3,653.90	1,225.60
Fuel Oil - Mobile	1,462.24	0.00665	0.00190	1.71000	0.17100	0.04940	9.72	2.78	2,500.44	250.04	72.23
Aviation fuels - Mobile	195.83	0.00190	0.00190	0.27550	0.11400	0.01710	0.37	0.37	53.95	22.32	3.35
Coal	532.74	0.00950	0.00133	0.22800	0.19000	0.19000	5.06	0.71	121.46	101.22	101.22

Only New Zealand relevant source and sink categories have been included.

1 Does not include energy use for methanol production.

2 Natural gas consumption data for methanol production is confidential.

Module 2004 Energy (New Zealand)
Submodule Fugitive emissions from geothermal activities (tier 1)
Worksheet NZ 1.6 (additional)

Category	Fuel quantity (TJ)	CO2 emis fact (kg/GJ)	CH4 emis fact (kg/GJ)	CO2 emissions (Gg)	CH4 emissions (Gg)
Elec. generation and heat	70,312.00	3.98	0.03	279.67	2.42

Module 2004 Energy (New Zealand)
Submodule Fugitive emissions from coal mining and handling (tier 1)
Worksheet 1.4 (adapted)

Category	Coal production (Mt)	CH4 emis fact (Gg/Mt)	CH4 emissions (Gg)
Total		5.16	14.85
Underground mines	Mining	0.73	9.98
	Bituminous	0.26	16.75
	Sub-bituminous	0.47	12.10
	Post-mining		1.60
Surface mines	Mining	4.43	0.77
	Post-mining		0.30

Module 2004 Energy (New Zealand)
Submodule Fugitive emissions from oil
Worksheet 1.5 (adapted)

Category	Fuel quantity (TJ)
Total	
Oil	Exploration
	Production of crude oil
	Transport of crude oil
	Refining/storage
	Distribution of oil products
Gas	Production/processing
	Transmission / Distribution
	Other leakage
Venting and flaring from oil and gas prod.	



Module 2004 Energy (New Zealand)
Submodule Ozone precursors and SO2 from oil refining
Worksheet 1.8-1 (additional)
Sheet NMVOC emissions from oil refining (tier 1)

Crude oil Throughput (m3)	Emission factor (kg/m3)	Emissions (t)	Emissions (Gg)
5,487,717.95	0.53	2,908.49	2.91

Module 2004 Energy (New Zealand)
Submodule Ozone precursors and SO2 from oil refining
Worksheet 1.8-2
Sheet SO2 from sulphur recovery plants (tier 2)

Quantity of sulphur recovered (t)	Emission factor (kg/t)	Emissions (kg)	Emissions (Gg)
21,423.00	139.00	2,977,797.00	2.98

Module 2004 Energy (New Zealand)
Submodule Ozone precursors and SO2 from oil refining
Worksheet 1.8-3
Sheet NMVOC emissions from storage and handling (tier 2)

Storage type	Crude oil throughput (kt)	Emission factor (kg/t)	Emissions (t)	Emissions (Gg)
Floating roof (primary seals)	4,704.05	0.70	3,292.84	3.29