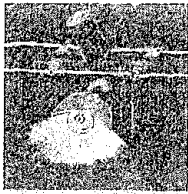


Energy						
CO <sub>2</sub> from Fuel Combustion by Source Categories (Bottom-Up Approach)						
1-1B Step by Step Calculations						
6 of 10 (Transport)						
FUEL TYPE AND SUBSECTOR	STEP 1			STEP 2		STEP 3
	G	H	I	J	K	L
	Fraction of Carbon Stored	Carbon Stored (Gg C)	Net Carbon Emissions (Gg C)	Fraction of Carbon Oxidised	Actual Carbon Emissions	Actual CO <sub>2</sub> Emissions
		H=(F×G)	I=(F-H)		K=(I×J)	L=(K×[44/12])
<b>Road Transport</b>						
Gasoline	0.00	0.00	1,398.53	0.99	1,384.55	5,076.67
Kerosene	0.00	0.00	1.41	0.99	1.40	5.12
Diesel	0.00	0.00	2,441.58	0.99	2,417.16	8,862.93
Fuel Oil	0.00	0.00	5.02	0.99	4.97	18.23
					<b>Subtotal</b>	<b>13,962.95</b>
<b>Domestic Marine</b>						
Gasoline	0.00	0.00	0.42	0.99	0.42	1.54
Kerosene	0.00	0.00	1.00	0.99	0.99	3.62
Diesel	0.00	0.00	93.10	0.99	92.17	337.94
Fuel Oil	0.00	0.00	245.70	0.99	243.25	891.91
					<b>Subtotal</b>	<b>1,235.01</b>
<b>Domestic Aviation</b>						
Avturbo	0.00	0.00	160.98	0.99	159.37	584.35
Avgas	0.00	0.00	5.05	0.99	5.00	18.33
					<b>Subtotal</b>	<b>602.68</b>
					<b>TOTAL CO<sub>2</sub> EMISSIONS</b>	<b>15,800.63</b>

Energy						
CO <sub>2</sub> from Fuel Combustion by Source Categories (Bottom-Up Approach)						
1-1B Step by Step Calculations						
7 of 10 (Commercial)						
FUEL TYPE AND SUBSECTOR	STEP 1		STEP 2		STEP 3	
	A	B	C	D	E	F
	Consumption (ktoe)	Conversion Factor (TJ/ktoe)	Consumption (TJ)	Carbon Emission Factor (t C/TJ)	Carbon Content (t C)	Carbon Content (Gg C)
		C=(A×B)		E=(C×D)	F=(E×10 <sup>3</sup> )	
<b>Commercial</b>						
Gasoline	18.46	41.87	773.03	18.90	14,610.28	14.61
Kerosene	39.52	41.87	1,654.82	19.60	32,434.39	32.43
Diesel	437.44	41.87	18,314.56	20.20	369,954.12	369.95
Fuel Oil	390.02	41.87	16,329.45	21.10	344,551.48	344.55
LPG	230.76	41.87	9,681.65	17.20	166,180.37	166.18
Avturbo	0.00	41.87	0.00	21.10	0.00	0.00
			<b>TOTAL CONSUMPTION</b>	<b>46,733.51</b>		

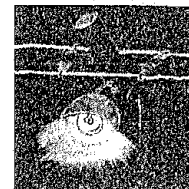
Energy						
CO <sub>2</sub> from Fuel Combustion by Source Categories (Bottom-Up Approach)						
1-1B Step by Step Calculations						
8 of 10 (Commercial)						
FUEL TYPE AND SUBSECTOR	STEP 4			STEP 5		STEP 6
	G	H	I	J	K	L
	Fraction of Carbon Stored	Carbon Stored (Gg C)	Net Carbon Emissions (Gg C)	Fraction of Carbon Oxidised	Actual Carbon Emissions	Actual CO <sub>2</sub> Emissions
		H=(F×G)	I=(F-H)		K=(I×J)	L=(K×[44/12])
<b>Commercial</b>						
Gasoline	0.00	0.00	14.61	0.99	14.46	53.04
Kerosene	0.00	0.00	32.43	0.99	32.11	117.74
Diesel	0.00	0.00	369.95	0.99	366.25	1,342.93
Fuel Oil	0.00	0.00	344.55	0.99	341.11	1,250.72
LPG	0.00	0.00	166.18	0.99	164.52	603.23
Avturbo	0.00	0.00	0.00	0.99	0.00	0.00
					<b>TOTAL CO<sub>2</sub> EMISSIONS</b>	<b>3,367.66</b>



Energy

Energy						
CO <sub>2</sub> from Fuel Combustion by Source Categories (Bottom-Up Approach)						
1-15 Step by Step Calculations						
9 of 10 (Residential, Agriculture)						
FUEL TYPE AND SUBSECTOR	A	B	C	D	E	F
	Consumption (ktoe)	Conversion Factor (TJ/ktoe)	Consumption (TJ)	Carbon Emission Factor (t C/TJ)	Carbon Content (t C)	Carbon Content (Gg C)
			$C=(A \times B)$		$E=(C \times D)$	$F=(E \times 10^{-3})$
<b>Residential</b>						
Gasoline	6.08	41.87	254.54	18.90	4,810.90	4.81
Kerosene	469.90	41.87	19,673.68	18.90	385,604.05	385.60
Diesel	15.38	41.87	643.80	20.20	13,004.81	13.00
LPG	419.79	41.87	17,575.59	17.70	302,300.23	302.30
	TOTAL CONSUMPTION		37,893.07			
<b>Agriculture</b>						
Gasoline	77.01	41.87	3,224.36	18.90	60,940.40	60.94
Kerosene	2.59	41.87	108.64	18.90	2,129.39	2.13
Diesel	307.58	41.87	12,877.62	20.20	260,127.89	260.13
Fuel Oil	3.56	41.87	149.16	21.10	3,147.30	3.15
	TOTAL CONSUMPTION		16,369.78			

Energy						
CO <sub>2</sub> from Fuel Combustion by Source Categories (Bottom-Up Approach)						
1-13 Step by Step Calculations						
10 of 10 (Residential, Agriculture)						
FUEL TYPE AND SUBSECTOR	G	H	I	J	K	L
	Fraction of Carbon Stored	Carbon Stored (Gg C)	Net Carbon Emissions (Gg C)	Fraction of Carbon Oxidised	Actual Carbon Emissions	Actual CO <sub>2</sub> Emissions
		$H=(F \times G)$	$I=(F-H)$		$K=(I \times J)$	$L=(K \times [44/12])$
<b>Residential</b>						
Gasoline	0.00	0.00	4.81	0.99	4.76	17.46
Kerosene	0.00	0.00	385.60	0.99	381.75	1,399.74
Diesel	0.00	0.00	13.00	0.99	12.87	47.21
LPG	0.00	0.00	302.30	0.99	299.28	1,097.35
	TOTAL CO <sub>2</sub> EMISSIONS					2,544.30
<b>Agriculture</b>						
Gasoline	0.00	0.00	60.94	0.99	60.33	221.21
Kerosene	0.00	0.00	2.13	0.99	2.11	7.73
Diesel	0.00	0.00	260.13	0.99	257.53	944.26
Fuel Oil	0.00	0.00	3.15	0.99	3.12	11.42
	TOTAL CO <sub>2</sub> EMISSIONS					1,184.63

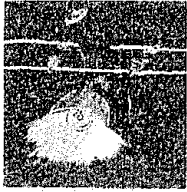


NON-CO<sub>2</sub> EMISSIONS FROM FUEL COMBUSTION ACTIVITIES

Module		Energy						
Submodule		Non-CO <sub>2</sub> from Fuel Combustion by Source Categories						
Worksheet		1-2						
Sheet		1 of 3 for CH <sub>4</sub>						
Activity		A						
		Fuel Consumption (TJ)						
		A1	A2	A3	A4	A5		
		Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass		
Energy Industries		20,531.55	161,554.51					
Manufacturing Industries		42,014.89	117,827.14	5,648.91			241,981.75	
Transport	Domestic Aviation		4,772.63					
	Domestic Marine		16,701.13					
	Road		Gasoline	Diesel				
			72,573.69	121,672.71				
Other Sectors	Commercial/Institutional		6,302.80					
	Residential		37,249.28		177,059.26	40,305.46	37,606.10	
	Agriculture/Forestry/Fishing	Stationary	10,814.51					
		Mobile						
All Others								
TOTAL		62,546.44	549,468.38	182,708.17	40,305.46	279,587.85		

Module		Energy						
Submodule		Non-CO <sub>2</sub> from Fuel Combustion by Source Categories						
Worksheet		1-2						
Sheet		2 of 3 for CH <sub>4</sub>						
Activity		B						
		Emission Factors (kg/TJ)						
		B1	B2	B3	B4	B5		
		Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass		
Energy Industries		1.00	3.00		30.00	200.00	30.00	
Manufacturing Industries		10.00	2.00		30.00	200.00	30.00	
Transport	Domestic Aviation		0.50					
	Domestic Marine		5.00					
	Road		Gasoline	Diesel				
			20.00	5.00				
Other Sectors	Commercial/Institutional	10.00	10.00		300.00	200.00	300.00	
	Residential	300.00	10.00		300.00	200.00	300.00	
	Agriculture/Forestry/Fishing	Stationary	300.00	10.00	300.00	200.00	300.00	
		Mobile		5.00				
All Others								

Module		Energy						
Submodule		Non-CO <sub>2</sub> from Fuel Combustion by Source Categories						
Worksheet		1-2						
Sheet		3 of 3 for CH <sub>4</sub>						
Activity		C					D	
		Emissions by Fuel (kg) C=AxB					Total Emissions	
		C1	C2	C3	C4	C5	D=sum(C{1-6}) / 10 <sup>6</sup>	
		Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass		
Energy Industries		20,531.55	484,663.52	0.00	0.00	0.00	0.51	
Manufacturing Industries		420,148.90	235,654.28	169,467.20	0.00	7,259,452.55	8.08	
Transport	Domestic Aviation		2,386.31				0.00	
	Domestic Marine	0.00	83,505.65				0.08	
	Road		Gasoline	Diesel			0.00	
			1,451,473.79	608,363.53			2.06	
Other Sectors	Commercial/Institutional	0.00	63,028.05	0.00	0.00	0.00	0.06	
	Residential	0.00	372,492.77	53,117,778.88	8,061,091.98	11,281,830.25	72.83	
	Agriculture/Forestry/Fishing	Stationary	0.00	108,145.06	0.00	0.00	0.11	
		Mobile					0.00	
All Others								
TOTAL							83.74	

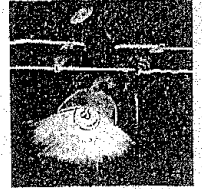


Energy

Energy						
Non-CO <sub>2</sub> from Fuel Combustion by Source Categories						
1-2						
1 of 3 for H-O						
Activity	A					
	Fuel Consumption (TJ)					
	A1	A2	A3	A4	A5	
	Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass	
Energy Industries	20,531.55	161,554.51				
Manufacturing Industries	42,014.89	117,827.14	5,640.91			241,981.75
Transport	Domestic Aviation		4,772.63			
	Domestic Marine		16,701.13			
	Road		Gasoline	Diesel		
			72,573.69	121,672.71		
Other Sectors	Commercial/Institutional		6,302.80			
	Residential		37,249.28		177,059.26	40,305.46
	Agriculture/Forestry/Fishing	Stationary	10,814.51			
		Mobile				
All Others						
	TOTAL	62,546.44	549,468.38	182,708.17	40,305.46	270,597.86

Energy						
Non-CO <sub>2</sub> from Fuel Combustion by Source Categories						
1-2						
2 of 3 for H-O						
Activity	B					
	Emission Factors (kg/TJ)					
	B1	B2	B3	B4	B5	
	Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass	
Energy Industries	1.40	0.60		4.00	4.00	4.00
Manufacturing Industries	1.40	0.60		4.00	4.00	4.00
Transport	Domestic Aviation		2.00			
	Domestic Marine	1.40	0.60			
	Road		Gasoline	Diesel		
			0.60	0.60		
Other Sectors	Commercial/Institutional	1.40	0.60		4.00	4.00
	Residential	1.40	0.60		4.00	4.00
	Agriculture/Forestry/Fishing	Stationary	1.40	0.60		4.00
		Mobile				
All Others						

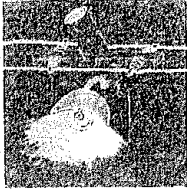
Energy						
Non-CO <sub>2</sub> from Fuel Combustion by Source Categories						
1-2						
3 of 2 for H-O						
Activity	C					D
	Emissions by Fuel (kg)					Total Emissions
	C1	C2	C3	C4	C5	
	Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass	D=sum(C(1-6)) / 10 <sup>6</sup>
Energy Industries	28,744.17	96,932.70	0.00	0.00	0.00	0.13
Manufacturing Industries	58,620.65	70,696.28	22,595.63	0.00	967,927.01	1.12
Transport	Domestic Aviation		9,545.26			0.01
	Domestic Marine	0.00	10,020.68			0.01
	Road		Gasoline	Diesel		
			43,544.21	73,003.62		0.12
Other Sectors	Commercial/Institutional	0.00	3,781.68		0.00	0.00
	Residential	0.00	22,349.57	708,237.05	40,305.46	150,424.40
	Agriculture/Forestry/Fishing	Stationary	0.00	6,488.70	0.00	0.00
		Mobile				
All Others						
	TOTAL					2.31



Module		Energy					
Submodule		Non-CO <sub>2</sub> from Fuel Combustion by Source Categories					
Worksheet		1.2					
Sheet		1 of 3 for CO					
Activity		A					
		Fuel Consumption (TJ)					
		A1	A2	A3	A4	A5	
		Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass	
Energy Industries		20,531.55	161,554.51				
Manufacturing Industries		42,014.89	117,827.14		5,648.91		241,981.75
Transport	Domestic Aviation		4,772.63				
	Domestic Marine		16,701.13				
	Road		72,573.69	121,672.71			
Other Sectors	Commercial/Institutional		6,302.80				
	Residential		37,249.28		177,059.26	40,305.46	37,606.10
	Agriculture/Forestry/Fishing	Stationary	10,814.51				
		Mobile					
All Others							
TOTAL		62,546.44	549,468.38		182,708.17	40,305.46	279,587.85

Module		Energy					
Submodule		Non-CO <sub>2</sub> from Fuel Combustion by Source Categories					
Worksheet		1.2					
Sheet		2 of 3 for CO					
Activity		B					
		Emission Factors (kg/TJ)					
		B1	B2	B3	B4	B5	
		Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass	
Energy Industries		20.00	15.00		1,000.00	1,000.00	1,000.00
Manufacturing Industries		150.00	10.00		2,000.00	4,000.00	4,000.00
Transport	Domestic Aviation		100.00				
	Domestic Marine		150.00	1,000.00			
	Road			8,000.00	1,000.00		
Other Sectors	Commercial/Institutional		2,000.00	20.00		5,000.00	7,000.00
	Residential		2,000.00	20.00		5,000.00	7,000.00
	Agriculture/Forestry/Fishing	Stationary	2,000.00	20.00		5,000.00	7,000.00
		Mobile		1,000.00			
All Others							

Module		Energy					
Submodule		Non-CO <sub>2</sub> from Fuel Combustion by Source Categories					
Worksheet		1.2					
Sheet		3 of 3 for CO					
Activity		C					D
		Emissions by Fuel (kg) C=AxB					Total Emissions
		C1	C2	C3	C4	C5	D=sum(C{1-6}) / 10 <sup>6</sup>
		Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass	
Energy Industries		410,630.96	2,423,317.60	0.00	0.00	0.00	2.83
Manufacturing Industries		6,302,233.45	1,178,271.38	11,297,813.52	0.00	967,927,006.18	986.71
Transport	Domestic Aviation		477,262.77				0.48
	Domestic Marine	0.00	16,701,129.42				16.70
	Road		580,589,514.85	121,672,706.21			702.26
Other Sectors	Commercial/Institutional	0.00	128,056.09	0.00	0.00	0.00	0.13
	Residential	0.00	744,985.55	885,296,314.75	282,138,219.33	188,030,504.09	1,356.21
	Agriculture/Forestry/Fishing	Stationary	0.00	216,290.12	0.00	0.00	0.22
		Mobile					
All Others							
TOTAL							3,065.53

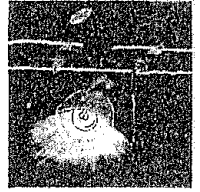


Energy

Activity		A Fuel Consumption (TJ)				
		A1	A2	A3	A4	A5
		Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass
Energy Industries		20,531.55	161,554.51			
Manufacturing Industries		42,014.89	117,827.14	5,648.91		241,981.75
Transport	Domestic Aviation		4,772.63			
	Domestic Marine		16,701.13			
	Road		Gasoline 72,573.69	Diesel 121,672.71		
Other Sectors	Commercial/Institutional		6,302.80			
	Residential		37,249.28		177,059.26	40,305.46
	Agriculture/ Forestry/Fishing	Stationary	10,814.51			
		Mobile				
All Others						
<b>TOTAL</b>		<b>62,546.44</b>	<b>549,468.58</b>	<b>182,708.17</b>	<b>40,305.46</b>	<b>279,587.35</b>

Activity		B Emission Factors (kg/TJ)				
		B1	B2	B3	B4	B5
		Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass
Energy Industries		300.00	100.00	100.00	100.00	100.00
Manufacturing Industries		300.00	200.00	100.00	100.00	100.00
Transport	Domestic Aviation		300.00			
	Domestic Marine	300.00	1,000.00			
	Road		Gasoline 300.00	Diesel 300.00		
Other Sectors	Commercial/Institutional	100.00	100.00	100.00	100.00	100.00
	Residential	100.00	100.00	100.00	100.00	100.00
	Agriculture/ Forestry/Fishing	Stationary 100.00	100.00	100.00	100.00	100.00
		Mobile		1,000.00		
All Others						

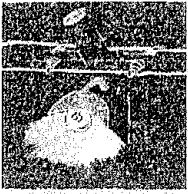
Activity		C Emissions by Fuel (kg)					D Total Emissions
		C1	C2	C3	C4	C5	D=Sum(C[1-6]) / 10 <sup>6</sup>
		Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass	
Energy Industries		6,159,464.41	32,310,901.28	0.00	0.00	0.00	38.47
Manufacturing Industries		12,604,466.91	23,565,427.51	564,890.68	0.00	24,198,175.15	60.93
Transport	Domestic Aviation		1,431,788.32				1.43
	Domestic Marine	0.00	25,051,694.12				25.05
	Road		Gasoline 43,544,213.61	Diesel 97,338,164.97			
Other Sectors	Commercial/Institutional	0.00	630,280.46	0.00	0.00	0.00	0.63
	Residential	0.00	3,724,927.73	17,705,926.29	4,030,545.99	3,760,610.08	29.22
	Agriculture/ Forestry/Fishing	Stationary 0.00	1,081,450.62	0.00	0.00	0.00	1.08
		Mobile					
All Others							
<b>TOTAL</b>							<b>297.70</b>



Energy		Non-CO <sub>2</sub> from Fuel Combustion by Source Categories				
1-2		1 of 3 for NMVOC				
Activity	A					
	Fuel Consumption (TJ)					
	A1	A2	A3	A4	A5	
	Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass	
Energy Industries	20,531.55	161,554.51				
Manufacturing Industries	42,014.89	117,827.14	5,648.91		241,981.75	
Transport	Domestic Aviation		4,772.63			
	Domestic Marine		16,701.13			
	Road		Gasoline	Diesel		
			72,573.69	121,672.71		
Other	Commercial/Institutional		6,302.80			
Sectors	Residential		37,249.28			
	Agriculture/Forestry/Fishing	Stationary	10,814.51			
		Mobile				
All Others						
	TOTAL	62,546.44	549,468.38	182,708.17	40,305.46	279,587.85

Energy		Non-CO <sub>2</sub> from Fuel Combustion by Source Categories				
1-2		2 of 3 for NO <sub>x</sub>				
Activity	B					
	Emission Factors (kg/TJ)					
	B1	B2	B3	B4	B5	
	Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass	
Energy Industries	5.00	5.00	50.00	100.00	50.00	
Manufacturing Industries	20.00	5.00	50.00	100.00	50.00	
Transport	Domestic Aviation		50.00			
	Domestic Marine	20.00	200.00			
	Road		Gasoline	Diesel		
			1,500.00	200.00		
Other	Commercial/Institutional	200.00	5.00	600.00	100.00	500.00
Sectors	Residential	200.00	5.00	600.00	100.00	500.00
	Agriculture/Forestry/Fishing	Stationary	200.00	5.00	600.00	100.00
		Mobile	200.00			
All Others						

Energy		Non-CO <sub>2</sub> from Fuel Combustion by Source Categories					
1-2		3 of 3 for HCl <sub>x</sub>					
Activity	C					D	
	Emissions by Fuel (kg)					Total Emissions	
	C1	C2	C3	C4	C5		
	Coal	Oil	Wood/Woodwaste	Charcoal	Other Biomass	D=sum(C[1-5]) / 10 <sup>6</sup>	
Energy Industries	102,657.74	807,772.53	0.00	0.00	0.00	0.91	
Manufacturing Industries	840,297.79	589,135.69	282,445.34	0.00	12,099,087.58	13.81	
Transport	Domestic Aviation		239,631.39			0.24	
	Domestic Marine	0.00	3,340,225.88			3.34	
	Road		Gasoline	Diesel		0.00	
			108,860,534.04	24,334,541.24		133.20	
Other	Commercial/Institutional	0.00	31,514.02	0.00	0.00	0.03	
Sectors	Residential	0.00	186,246.39	108,235,557.77	4,030,545.99	22,563,660.49	133.02
	Agriculture/Forestry/Fishing	Stationary	0.00	54,072.53	0.00	0.00	0.05
		Mobile				0.00	
All Others							
	TOTAL					284.60	

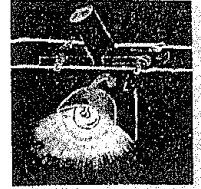


Energy

Energy						
CH <sub>4</sub> Emissions from Coal Mining and Handling						
1-3A						
1 of 1						
Type of Mine	Mining Activity	A	B	C	D	E
		Amt. of Coal Produced (million t)	Emission Factor (m <sup>3</sup> CH <sub>4</sub> / t)	Methane Emissions (million m <sup>3</sup> ) C=AxB	Conversion Factors (0.67 Gg CH <sub>4</sub> /10 <sup>6</sup> m <sup>3</sup> )	Methane Emissions (Gg CH <sub>4</sub> ) E=CxD
Underground Mines	Mining	0.73	17.50	12.72	0.67	8.52
	Post-Mining	0.73	2.45	1.78	0.67	1.19
Surface Mines	Mining	0.72	1.15	0.83	0.67	0.56
	Post-Mining	0.72	0.10	0.07	0.67	0.05
<b>TOTAL</b>						<b>10.32</b>

CH <sub>4</sub> Emissions from Oil and Gas Activities				
1-3B				
1 of 1				
Category	A	B	C	D
	Activity	Emission Factor	CH <sub>4</sub> Emissions (kg CH <sub>4</sub> ) C=AxB	Emissions CH <sub>4</sub> (Gg CH <sub>4</sub> ) D=(C/10 <sup>6</sup> )
<b>Oil</b>				
Exploration	#of wells drilled	(kg CH <sub>4</sub> / well drilled)		
Production	PJ oil produced	(kg CH <sub>4</sub> / PJ)		
	10.69	2650	28,328.50	0.03
Transport	PJ oil loaded in tankers	(kg CH <sub>4</sub> / PJ)		
	506.11	745	377,051.95	0.38
Refining	PJ oil refined	kg CH <sub>4</sub> / PJ refined		
	497.75		0.00	0.00
Storage	PJ oil refined	kg CH <sub>4</sub> / PJ refined		
	497.75	135	67,196.25	0.07
<b>TOTAL CH<sub>4</sub> FROM OIL</b>				<b>0.47</b>
<b>Gas</b>				
Production / Processing	PJ gas produced	(kg CH <sub>4</sub> / PJ)	46000	
Transmission and Distribution	PJ gas consumed	(kg CH <sub>4</sub> / PJ)		
Other leakage				
<b>TOTAL CH<sub>4</sub> FROM GAS</b>				
Venting and Flaring from Oil/Gas Production	PJ oil and gas produced	(kg CH <sub>4</sub> / PJ)		
<b>TOTAL CH<sub>4</sub> FROM OIL AND GAS</b>				





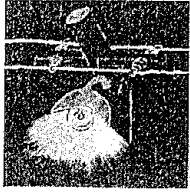
Module Energy				
Submodule GHG Precursors and SO <sub>2</sub> from Oil Refining				
Worksheet 1-3C				
Sheet 1 of 3				
A	B	C	D	E
Crude Oil Throughput (kt)	Pollutant	Emission Factor (kg/t)	Emissions (t)	Emissions (Gg)
			D=AxC	E=D/1000
9,004.00	CO	0.09	810.36	0.81
	NOx	0.06	540.24	0.54
	NM VOC	0.62	5,582.48	5.58
	SO <sub>2</sub>	0.93	8,373.72	8.37

Module Energy				
Submodule GHG Precursors and SO <sub>2</sub> from Catalytic Cracking				
Worksheet 1-3C				
Sheet 2 of 3				
A	B	C	D	E
Catalytic Cracker Throughput (kt)	Pollutant	Emission Factor (kg/t)	Emissions (t)	Emissions (Gg)
			D=AxC	E=D/1000
376.00	CO	42.60	16,017.60	16.02
	NOx	0.20	75.20	0.08
	NM VOC	0.60	225.60	0.23
	SO <sub>2</sub>	1.50	564.00	0.56

Module Energy				
Submodule GHG Precursors and SO <sub>2</sub> from Oil Refining				
Worksheet 1-3C NMVOC Emissions from Storage and Handling				
Sheet 3 of 3				
A	B	C	D	E
Crude Oil Throughput (kt)	Pollutant	Emission Factor (kg/t)	Emissions (t)	NM VOC Emissions (Gg)
			D=AxC	E=D/1000
9,004.00	Secondary Seals	0.20	1,800.80	
	Primary Seals	0.70	6,302.80	
	Fixed roof	4.90	44,119.60	44.12

\*where nothing is known the highest factor should be used.

\*emissions from this source may be higher in countries with a warm climate.

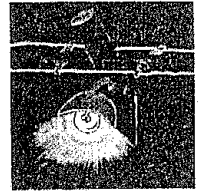


SO<sub>2</sub> EMISSIONS FROM FUEL COMBUSTION

Energy							
SO <sub>2</sub> Emissions from Fuel Combustion by Source Categories							
1-4							
1 of 1							
	A	B	C	D	E	F	G
Fuel Type	Fuel Consumption (TJ)	Sulphur Content of Fuel (%)	Sulphur retention in ash (%)	Abatement Efficiency (%)	Net Calorific Value (TJ/kt)	SO <sub>2</sub> Emission Factor (kg/TJ)	SO <sub>2</sub> Emissions (t)
						$F = 2 \times (B/100) \times (1/E) \times 10^6 \times ((100-C)/100) \times ((100-D)/100)$	$G = (Ax F) / 1000$
Coal*	52,042.20	3	5	0	42.58	1,338.66	69,666.64
Fuel Oil	205,081.76	3	0	0	40.19	1,492.91	306,168.34
Diesel (road)*	120,870.18	0.9	0	0	43.33	369.26	44,632.42
Gasoline (road)*	73,996.36	0.1	0	0	44.8	44.64	3,303.41
Avturbo	7,634.17	0.05	0	0	44.59	22.43	171.21
Fuelwood	5,648.91	0.2	0	0	15	266.67	1,506.38
Other Biomass							
Bagasse	62,592.66	0.02	0	0	8	50.00	3,129.63
Agriwaste	179,389.09	0.02	0	0	15	26.67	4,783.71
<b>TOTAL</b>	<b>707,255.32</b>						<b>433,361.73</b>

MEMO ITEM: CO<sub>2</sub> FROM BIOMASS FUELS

Energy						
Memo Item 1: CO <sub>2</sub> from Biomass Fuel Combustion						
1-5A CO <sub>2</sub> from Residential and Industrial Biomass Fuels						
2 of 2						
	G	H	I	J	K	L
Fuel Type and Sector	Fraction of Carbon Stored	Carbon Stored (Gg C)	Net Carbon Emissions (Gg C)	Fraction of Carbon Oxidized	Actual Carbon Emissions (Gg C)	Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> )
		$H = (F \times G)$	$I = (F - H)$		$K = (I \times J)$	$L = (K \times [44/12])$
<b>Industry*</b>						
Wood/Wood Waste	0.00	0.00	168.90	0.88	148.63	544.99
Charcoal	0.00	0.00	0.00	0.88	0.00	0.00
Bagasse	0.00	0.00	1,871.52	0.88	1,646.94	6,038.77
Agriwaste	0.00	0.00	5,363.73	0.93	4,720.09	17,306.98
Other Solid Biomass	0.00	0.00	0.00	0.98	0.00	0.00
					<b>Total Industry Biomass</b>	<b>23,890.75</b>
<b>Residential**</b>						
Wood/Wood Waste	0.00	0.00	5,294.07	0.88	4,658.78	17,082.21
Charcoal	0.00	0.00	1,205.13	0.88	1,060.52	3,888.56
Crop Residues (Agriwaste)	0.00	0.00	1,124.42	0.98	989.49	3,628.14
					<b>Total Residential Biomass</b>	<b>24,598.91</b>
					<b>TOTAL</b>	<b>48,489.65</b>



Energy						
Memo Item 1: CO <sub>2</sub> from Biomass Fuel Combustion						
1-5A CO <sub>2</sub> from Residential and Industrial Biomass Fuels						
1 of 2						
	STEP 1		STEP 2		STEP 3	
Fuel Type and Sector	A	B	C	D	E	F
	Consumption (ktoe)	Conversion Factor (TJ/ktoe)	Consumption (TJ)	Carbon Emission Factor (t C/TJ)	Carbon Content (t C)	Carbon Content (Gg C)
			$C=(A \times B)$		$E=(C \times D)$	$F=(E \times 10^{-3})$
<b>Industry*</b>						
Wood/Wood Waste	134.92	41.87	5,648.91	29.90	168,902.31	168.90
Charcoal		41.87	0.00	29.90	0.00	0.00
Bagasse	1,495.00	41.87	62,592.66	29.90	1,871,520.53	1,871.52
Agriwaste	4,284.63	41.87	179,389.09	29.90	5,363,733.84	5,363.73
Other Solid Biomass		41.87	0.00	29.90	0.00	0.00
<b>Total Industry Biomass</b>			<b>247,630.66</b>			
<b>Residential**</b>						
Wood/Wood Waste	4,228.99	41.87	177,059.25	29.90	5,294,071.96	5,294.07
Charcoal	962.66	41.87	40,305.46	29.90	1,205,133.25	1,205.13
Crop Residues (Agriwaste)	898.21	41.87	37,606.10	29.90	1,124,422.41	1,124.42
<b>Total Residential Biomass</b>			<b>254,970.82</b>			

\*DOE OEB Sheet  
\*\*UNDP-ESMAP

MEMO ITEM: CO<sub>2</sub> FROM INTERNATIONAL BUNKERS

Energy						
Memo Items						
1-5B Emissions from International Bunkers (Marine and Air Transport)						
1 of 2						
	STEP 1		STEP 2		STEP 3	
Fuel Types	A	B	C	D	E	F
	Quantities delivered (ktoe)	Conversion Factor (TJ/ktoe)	Quantities delivered (TJ)	Carbon Emission Factor (t C/TJ)	Carbon Content (t C)	Carbon Content (Gg C)
			$C=(A \times B)$		$E=(C \times D)$	$F=(E \times 10^{-3})$
Solid Fossil	Coal					
Liquid Fossil	Diesel	30.65	41.87	1,283.35	20.20	25,923.68
	Fuel Oil	62.00	41.87	2,596.02	21.10	54,776.09
	Avturbo	450.93	41.87	18,879.44	21.10	398,356.18
	Others	0.17	41.87	7.00	20.00	139.99
<b>TOTAL</b>			<b>22,765.81</b>			

Energy						
Memo Items						
1-5B Emissions from International Bunkers (Marine and Air Transport)						
2 of 2						
	STEP 4		STEP 5		STEP 6	
Fuel Types	G	H	I	J	K	L
	Fraction of Carbon Stored	Carbon Stored (Gg C)	Net Carbon Emissions (Gg C)	Fraction of Carbon Oxidised	Actual Carbon Emissions (Gg C)	Actual CO <sub>2</sub> Emissions (Gg CO <sub>2</sub> )
		$H=(F \times G)$	$I=(F-H)$		$K=(I \times J)$	$L=(K \times 44/12)$
Solid Fossil	Coal	0.00	0.00	25.92	0.99	94.10
Liquid Fossil	Diesel	0.00	0.00	54.78	0.99	198.84
	Fuel Oil	0.00	0.00	398.36	0.99	1,446.03
	Avturbo	0.00	0.00	0.14	0.99	0.51
	Lube / Grease	0.00	0.00	0.00	0.99	0.00
<b>TOTAL</b>						<b>1,739.48</b>



SUMMARY OF EMISSIONS FROM ENERGY

*GHG Emissions: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O*

Source	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> Equivalent	N <sub>2</sub> O	CO <sub>2</sub> Equivalent	TOTAL EMISSIONS Gg CO <sub>2</sub>
Energy Industries	15,458.02	0.51	10.61	0.13	38.96	15,507.59
Residential	2,544.30	72.83	1,529.50	0.92	285.61	4,359.41
Manufacturing Industries	8,980.12	8.08	169.78	1.12	347.21	9,497.11
Agriculture	1,184.63	0.11	2.27	0.01	2.01	1,188.91
Transport	15,800.63	2.15	45.06	0.14	42.20	15,887.89
Commercial	3,367.66	0.06	1.32	0.00	1.17	3,370.16
Fugitive Emissions		10.79	226.68			226.68
<b>TOTAL</b>	<b>47,335.37</b>	<b>83.74</b>	<b>1,758.54</b>	<b>2.31</b>	<b>717.16</b>	<b>50,037.75</b>

*GHG Precursors: NO<sub>x</sub>, CO, NMVOC*

Source	NO <sub>x</sub>	CO	NMVOC
Energy Industries	38.47	2.83	0.91
Residential	29.22	1,356.21	133.02
Manufacturing Industries	60.93	986.71	13.81
Agriculture	1.08	0.22	0.05
Transport	167.37	719.44	136.77
Commercial	0.63	0.13	0.03
Fugitive Emissions	0.62	16.83	49.93
<b>TOTAL</b>	<b>297.70</b>	<b>3,065.53</b>	<b>284.60</b>