

ANNEX 4

Annex 4: CO₂ reference approach and comparison with sectoral approach, and relevant information on the national energy balance

1.1 Total Emission of CO₂ - Reference approach and comparison with sectorial approach

The total difference of CO₂ emissions between the sectoral approach and the reference approach in 2007 amounted to less than 0.5% which is deemed satisfactory. Difference in energy consumption is due to the non energy use of fuel.

Table 1: Differences in energy consumption (Reference approach/National Approach)

%	1986	1990	1995	2000	2004	2005	2006	2007	2008
liquid	-1.15	3.50	1.86	0.03	0.42	2.27	3.34	-0.12	-0.36
solid	0.24	1.76	0.32	1.18	1.34	-0.49	0.75	0.04	-0.03
gaseous	4.46	4.52	11.11	15.85	14.06	16.49	14.41	4.41	-0.001
total	0.30	2.94	2.69	2.87	2.90	3.60	4.01	0.48	-0.44

Table 2: Differences in CO₂ emissions (Reference approach/National Approach)

%	1986	1990	1995	2000	2004	2005	2006	2007	2008
liquid	-1.33	3.54	1.45	-0.11	-0.24	2.95	0.26	-0.26	0.23
solid	0.17	1.80	0.39	1.22	0.71	-1.15	1.65	1.39	0.12
gaseous	-4.15	-3.34	-0.57	0.17	-0.09	0.58	-0.04	-0.03	0.06
total	-0.80	1.76	0.75	0.45	0.03	0.79	0.54	0.53	-0.28

Table 3: Emissions of CO₂ in Slovenia (reference approach) for the Period 1986 to 2008

Gg CO ₂	1986	1990	1995	2000	2005	2006	2007	2008
Crude Oil	679	710	1610	3	NO	NO	NO	NO
Lubricants	NE	NE	NE	NE	10	0	0	12
LPG	123	97	99	230	253	238	240	243
Gasoline	1330	1654	2149	2509	2065	2036	1984	2016
Jet Kerosene, Kerosene	1	3	2	3	2	2	2	4
Gas Oil	1001	937	1166	1529	2663	3017	3588	4425
Fuel Oil	1486	1815	1799	2693	2147	1971	1372	1637
Petroleum Coke	74	137	94	74	341	176	156	166
Total Liquid Fuels	4682	5342	6912	7026	7482	7439	7341	8504
Sub-bituminous coal	NO	NO	475	800	1144	986	965	941
Other Bitoumnus Coal	123	1	2	0	120	95	160	142
Lignite and domestic Brown Coal	7977	6576	5114	4690	4857	5252	5472	5231
Coke Oven/Gas Coke	695	216	176	146	183	62	163	124
Anthracite	154	88	54	NO	NO	NO	NO	NO
Solid Fuel Totals	8949	6882	5821	5636	6304	6396	6759	64379
Natural gas	1407	1627	1469	1642	1848	1810	1795	1795
Gaseous Fuel Totals	1407	1627	1469	1642	2084	2084	1795	1795
Fuel wood	1320	1872	1819	1959	1796	1809	1729	1802
Biomass Total	1320	1872	1819	1959	1796	1809	1729	1802
TOTAL (w/o biomass)	15174	13993	14377	14577	15634	15644	15895	16744
Stored carbon:								
Natural gas	125	131	173	258	292	261	311	311
Lubricants	10	11	6	14	41	88	34	34
TOTAL (w/o biomass)	15174	13993	14377	14577	15634	15644	15895	16744

Note: Some data in the CRF Reference approach table were found to be missing and therefore there is a small difference between this table and totals from CRF.

Balance of solid, liquid and gas fuels supply, Slovenia, annual.

Domestic lignite (1000 t)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Opening stocks	164	323	93	132	116	356	287	309	336
Production	3743	3448	4048	4222	4198	3945	3934	4079	4032
Import	...	...	...	...	...	...	...	...	...
Export	1	-	1	-	-	-	-	-	-
International Marine Bunkers	...	...	...	...	...	...	...	...	...
Stock change	0	0	0	0	0	0	0	0	0
Statistical difference	0	0	0	0	0	0	0	0	0
Domestic sales	3583	3677	4008	4238	3958	4014	3912	4052	4015
Domestic sales-Transformation-Total	3548	3652	3979	4208	3958	4014	3912	4052	4015
Domestic sales-Transformation-Power plants-Total	3547	3652	3979	4208	3958	4014	3912	4052	4015
Domestic sales-Transformation-Power plants-Main activity producers	3547	3652	3979	4208	3958	4014	3912	4052	4015
Domestic sales-Transformation-Power plants-Autoproducers-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Autoproducers-For electricity	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Power plants-Autoproducers-For heat	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Public heat only plants	1	-	-	-	-	-	-	-	-
Domestic sales-Trade companies	26	16	17	16	-	-	-	-	-
Domestic sales-Final consumers	9	9	12	14	-	-	-	-	-
Final consumption-Total	...	...	...	...	...	...	...	...	...
Final consumption-Energy sector	...	...	...	...	...	...	...	...	...
Final consumption-Manufacturing and construction	...	...	...	...	...	...	...	...	...
Final consumption-Transport	...	...	...	...	...	...	...	...	...
Final consumption-Households	...	...	...	...	...	...	...	...	...
Final consumption-Other consumers	...	...	...	...	...	...	...	...	...
Non-energy use	...	...	...	...	...	...	...	...	...
Closing stocks	323	93	132	116	356	287	309	336	353

Domestic brown coal (1000 t)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Opening stocks	33	28	0	23	14	31	56	41	37
Production	736	685	639	608	611	595	588	483	489
Import	...	...	...	...	...	...	...	...	...
Export	-	-	-	-	-	-	-	-	-
International Marine Bunkers	...	...	...	...	...	...	...	...	...
Stock change	0	0	0	0	0	0	0	0	0
Statistical difference	0	0	0	0	0	0	0	0	0
Domestic sales	741	713	616	617	594	570	603	487	511
Domestic sales-Transformation-Total	730	709	616	617	594	570	603	487	511
Domestic sales-Transformation-Power plants-Total	730	709	616	617	594	570	603	487	511
Domestic sales-Transformation-Power plants-Main activity producers	730	709	616	617	594	570	603	487	511
Domestic sales-Transformation-Power plants-Autoproducers-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Autoproducers-For electricity	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Power plants-Autoproducers-For heat	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Public heat only plants	-	-	-	-	-	-	-	-	-
Domestic sales-Trade companies	4	2	-	-	-	-	-	-	-
Domestic sales-Final consumers	7	2	-	-	-	-	-	-	-
Final consumption-Total	...	...	...	...	...	...	...	...	...
Final consumption-Energy sector	...	...	...	...	...	...	...	...	...
Final consumption-Manufacturing and construction	...	...	...	...	...	...	...	...	...
Final consumption-Transport	...	...	...	...	...	...	...	...	...
Final consumption-Households	...	...	...	...	...	...	...	...	...
Final consumption-Other consumers	...	...	...	...	...	...	...	...	...
Non-energy use	...	...	...	...	...	...	...	...	...
Closing stocks	28	0	23	14	31	56	41	37	15

Liquified petroleum gas (1000 t)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Opening stocks	11880	11085	11463	11422	11304	10629	...	...	...
Production	...	...	...	...	...	...	-	-	-
Import	-	-	-	-	-	-	97	90	100
Export	93	86	86	88	86	87	5	8	13
International Marine Bunkers	-	-	-	-	-	-	...	...	...
Stock change	...	...	...	...	...	...	-9	2	-2
Statistical difference	-1	2	-2	0	-3	2	0	0	0
Domestic sales	0	0	0	0	0	0	83	84	85
Domestic sales-Transformation-Total	92	88	84	88	83	89	-	-	-
Domestic sales-Transformation-Power plants-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Main activity producers	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Autoproducers-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Autoproducers-For electricity	-	-	-	-	-	-	...	...	...
Domestic sales-Transformation-Power plants-Autoproducers-For heat	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Public heat only plants	...	...	...	...	...	...	-	-	-
Domestic sales-Trade companies	-	-	-	-	-	-	...	...	...
Domestic sales-Final consumers	...	...	...	...	...	...	...	...	...
Final consumption-Total	...	...	...	...	...	...	83	84	85
Final consumption-Energy sector	92	88	84	88	83	89	-	-	-
Final consumption-Manufacturing and construction	-	-	-	-	-	-	31	19	21
Final consumption-Transport	12	12	10	19	20	25	-	-	5
Final consumption-Households	-	-	-	-	-	-	34	36	40
Final consumption-Other consumers	41	41	50	50	43	45	18	29	19
Non-energy use	39	35	24	19	20	19	...	...	...
Closing stocks	...	...	...	...	...	...	...	...	...

Unleaded motor gasoline 95 (1000 t)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Opening stocks	...	...	...	...	...	...	...	...	...
Production	24	-	-	-	-	-	-	-	-
Import	670	732	727	731	669	688	642	605	703
Export	47	20	14	16	20	59	74	69	99
International Marine Bunkers	...	...	...	...	...	...	...	...	...
Stock change	-19	9	7	-7	-21	-12	15	24	-23
Statistical difference	7	2	0	0	0	0	0	0	0
Domestic sales	621	719	720	708	628	617	583	560	581
Domestic sales-Transformation-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Main activity producers	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Autoproducers-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Autoproducers-For electricity	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Power plants-Autoproducers-For heat	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Public heat only plants	-	-	-	-	-	-	-	-	-
Domestic sales-Trade companies	...	...	...	...	...	...	...	...	...
Domestic sales-Final consumers	...	...	...	...	...	...	...	...	...
Final consumption-Total	621	719	720	708	628	617	583	560	581
Final consumption-Energy sector	-	-	-	-	-	-	-	-	-
Final consumption-Manufacturing and construction	2	-	-	-	-	-	-	-	0
Final consumption-Transport	619	719	720	708	628	617	583	560	581
Final consumption-Households	-	-	-	-	-	-	-	-	-
Final consumption-Other consumers	-	-	-	-	-	-	-	-	-
Non-energy use	...	...	...	...	...	...	...	...	...
Closing stocks	...	...	...	...	...	...	...	...	...

Unleaded motor gasoline 98 (1000 t)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Opening stocks	...	...	...	...	...	...	...	...	...
Production	-	-	-	-	-	-	-	-	-
Import	12	57	47	40	39	39	58	62	72
Export	0	0	0	0	0	0	1	2	1
International Marine Bunkers	...	...	...	...	...	...	...	...	...
Stock change	0	2	0	0	0	0	0	0	0
Statistical difference	0	4	0	-1	1	0	0	0	0
Domestic sales	12	55	47	41	38	39	57	60	71
Domestic sales-Transformation-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Main activity producers	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Autoproducers-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Autoproducers-For electricity	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Power plants-Autoproducers-For heat	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Public heat only plants	-	-	-	-	-	-	-	-	-
Domestic sales-Trade companies	...	...	...	...	...	...	...	...	...
Domestic sales-Final consumers	...	...	...	...	...	...	...	...	...
Final consumption-Total	12	55	47	41	38	39	57	60	71
Final consumption-Energy sector	-	-	-	-	-	-	-	-	-
Final consumption-Manufacturing and construction	-	-	-	-	-	-	-	-	0
Final consumption-Transport	12	55	47	41	38	39	57	60	71
Final consumption-Households	-	-	-	-	-	-	-	-	-
Final consumption-Other consumers	-	-	-	-	-	-	-	-	-
Non-energy use	...	...	...	...	...	...	...	...	...
Closing stocks	...	...	...	...	...	...	...	...	...

Diesel oil (1000 t)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Opening stocks	...	...	...	...	...	...	...	...	...
Production	25	-	-	-	-	-	-	-	-
Import	519	582	630	689	830	981	1203	1475	1801
Export	87	73	73	49	61	132	286	304	356
International Marine Bunkers	...	...	...	...	...	...	...	...	...
Stock change	-11	-6	11	-20	-19	-3	45	-18	-26
Statistical difference	0	0	0	0	0	0	0	0	0
Domestic sales	446	513	568	621	750	846	962	1153	1419
Domestic sales-Transformation-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Main activity producers	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Autoproducers-Total	-	-	-	-	-	-	-	-	-
Domestic sales-Transformation-Power plants-Autoproducers-For electricity	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Power plants-Autoproducers-For heat	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Public heat only plants	-	-	-	-	-	-	-	-	-
Domestic sales-Trade companies	...	...	...	...	...	...	...	...	...
Domestic sales-Final consumers	...	...	...	...	...	...	...	...	...
Final consumption-Total	446	513	568	621	750	846	962	1153	1419
Final consumption-Energy sector	-	-	-	-	-	-	-	-	-
Final consumption-Manufacturing and construction	33	34	33	46	42	41	65	50	53
Final consumption-Transport	413	479	535	575	708	805	897	1103	1366
Final consumption-Households	-	-	-	-	-	-	-	-	-
Final consumption-Other consumers	-	-	-	-	-	-	-	-	-
Non-energy use	...	...	...	...	...	...	...	...	...
Closing stocks	...	...	...	...	...	...	...	...	...

Light fuel oil (1000 t)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Opening stocks	...	...	...	...	...	...	...	...	...
Production	31	-	-	-	-	-	-	-	-
Import	738	787	747	705	690	660	595	414	550
Export	42	47	14	6	20	9	18	10	33
International Marine Bunkers	...	...	...	...	...	...	...	...	...
Stock change	-21	26	-33	-3	11	-21	14	17	-3
Statistical difference	0	0	0	0	0	0	0	0	0
Domestic sales	675	766	700	696	681	630	591	421	514
Domestic sales-Transformation-Total	6	25	7	7	6	6	9	10	6
Domestic sales-Transformation-Power plants-Total	2	22	4	4	2	3	5	6	3
Domestic sales-Transformation-Power plants-Main activity producers	2	22	4	4	2	3	5	6	3
Domestic sales-Transformation-Power plants-Autoproducers-Total	0	0	0	0	0	0	0	0	0
Domestic sales-Transformation-Power plants-Autoproducers-For electricity	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Power plants-Autoproducers-For heat	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Public heat only plants	4	3	3	3	4	3	4	4	3
Domestic sales-Trade companies	...	...	...	...	...	...	...	...	...
Domestic sales-Final consumers	...	...	...	...	...	...	...	...	...
Final consumption-Total	700	741	693	689	675	624	582	411	508
Final consumption-Energy sector	-	-	-	-	-	-	0	0	0
Final consumption-Manufacturing and construction	129	86	48	63	58	70	70	53	46
Final consumption-Transport	-	-	-	-	-	-	-	-	-
Final consumption-Households	334	313	372	414	397	345	334	243	267
Final consumption-Other consumers	237	342	273	212	220	209	178	115	195
Non-energy use	...	...	...	...	...	...	...	...	...
Closing stocks	...	...	...	...	...	...	...	...	...

Fuel oil (1000 t)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Opening stocks	...	...	...	...	...	...	...	...	...
Production	42	-	-	-	-	-	-	-	-
Import	88	110	82	63	52	71	84	78	85
Export	3	1	0	0	2	0	0	10	3
International Marine Bunkers	...	...	...	...	...	22	30	49	67
Stock change	0	3	0	-2	2	3	-2	0	2
Statistical difference	0	0	0	0	0	0	0	0	0
Domestic sales	127	112	82	61	52	52	52	19	17
Domestic sales-Transformation-Total	10	10	10	9	7	8	9	2	2
Domestic sales-Transformation-Power plants-Total	10	10	10	8	6	6	6	2	2
Domestic sales-Transformation-Power plants-Main activity producers	2	1	2	2	2	2	2	1	1
Domestic sales-Transformation-Power plants-Autoproducers-Total	8	9	8	6	4	4	4	1	1
Domestic sales-Transformation-Power plants-Autoproducers-For electricity	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Power plants-Autoproducers-For heat	...	...	...	...	...	...	...	...	...
Domestic sales-Transformation-Public heat only plants	0	0	0	1	1	2	3	0	0
Domestic sales-Trade companies	...	...	...	...	...	...	...	...	...
Domestic sales-Final consumers	...	...	...	...	...	...	...	...	...
Final consumption-Total	117	102	72	52	45	44	43	17	15
Final consumption-Energy sector	14	-	-	-	-	-	-	-	-
Final consumption-Manufacturing and construction	96	82	50	52	45	44	43	17	15
Final consumption-Transport	-	-	-	-	-	-	-	-	-
Final consumption-Households	-	-	-	-	-	-	-	-	-
Final consumption-Other consumers	7	20	22	-	-	-	-	-	-
Non-energy use	...	...	...	...	...	...	...	...	...
Closing stocks	...	...	...	...	...	...	...	...	...

Natural gas (mio Sm3)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Opening stocks	...	...	...	...	...	...	...	...	...
Production	7	6	6	5	5	4	4	3	3
Import	1007	1038	1001	1109	1099	1137	1101	1120	1076
Export	...	...	...	...	...	...	...	...	...
International Marine Bunkers	...	...	...	...	...	...	...	...	...
Stock change	...	...	...	...	...	...	...	...	...
Statistical difference	...	...	...	...	...	...	...	...	...
Domestic sales	1014	1044	1007	1114	1104	1141	1105	1123	1079
Domestic sales-Transformation-Total	164	161	156	180	155	165	154	166	171
Domestic sales-Transformation-Power plants-Total	76	79	72	92	77	71	82	110	117
Domestic sales-Transformation-Power plants-Main activity producers	1	13	44	69	49	46	60	85	92
Domestic sales-Transformation-Power plants-Autoproducers-Total	75	66	28	23	28	25	22	25	25
Domestic sales-Transformation-Power plants-Autoproducers-For electricity	42	46	28	23	27	24	21	24	24
Domestic sales-Transformation-Power plants-Autoproducers-For heat	33	20	0	0	1	1	2	2	2
Domestic sales-Transformation-Public heat only plants	88	82	84	88	78	94	72	56	54
Domestic sales-Trade companies	...	...	...	...	...	...	...	...	...
Domestic sales-Final consumers	...	...	...	...	...	...	...	...	...
Final consumption-Total	850	883	851	934	949	976	951	957	908
Final consumption-Energy sector	7	6	6	5	5	4	4	4	3
Final consumption-Manufacturing and construction	604	563	529	613	628	665	676	674	646
Final consumption-Transport	-	-	-	-	-	-	-	-	-
Final consumption-Households	72	76	84	106	112	121	115	105	126
Final consumption-Other consumers	23	98	112	59	68	31	17	13	15
Non-energy use	144	140	120	151	136	155	139	161	118
Closing stocks	...	...	...	...	...	...	...	...	...

Source: Statistical office of the Republic of Slovenia.
Use and publication of data is allowed provided the source is acknowledged.

FUEL:

Domestic lignite (1000 t): Sulphur from year 2000 to 2006 is 1,36 %.

Domestic brown coal (1000 t): Sulphur by years: 1.53% (in 2000), 1.53% (in 2001), 2.47% (in 2002), 2.99% (in 2003), 3.07% (in 2004), 2,49 % (in 2005), 2,88 % (in 2006).

Liquefied petroleum gas (1000 t): Liquefied Petroleum Gases (LPG): LPG are light saturated paraffinic hydrocarbons derived from the refinery processes, crude oil stabilisation and natural gas processing plants. They consist mainly of propane (C₃H₈) and butane (C₄H₁₀) or a combination of the two. They are normally liquefied under pressure for transportation and storage.

Unleaded motor gasoline 95 (1000 t): Unleaded motor gasoline is motor gasoline where lead compounds have not been added to enhance octane rating. It may contain traces of organic lead. We distinguish between unleaded 95-octane motor gasoline and unleaded 98-octane motor gasoline.

Unleaded motor gasoline 98 (1000 t): Unleaded motor gasoline is motor gasoline where lead compounds have not been added to enhance octane rating. It may contain traces of organic lead. We distinguish between unleaded 95-octane motor gasoline and unleaded 98-octane motor gasoline.

Diesel oil (1000 t): Diesel oil for diesel compression ignition (cars, trucks, marine, etc.), is primarily one of medium distillates of Fuel Oil.

Light fuel oil (1000 t): Fuel oil, light is primarily a medium distillate and is used in heating systems for warmth and heat for industrial and commercial uses

Fuel oil (1000 t): Fuel oil covers all residual (heavy) fuel oils (including those obtained by blending). Kinematic viscosity is above 10 cSt at 80°C. The flash point is always above 50°C and density is always more than 0.90 kg/l.

Low sulphur content: Heavy fuel oil with sulphur content lower than 1%.

High sulphur content: Heavy fuel oil with sulphur content of 1% or higher.

Natural gas (mio Sm³):

Natural gas is a fossil fuel comprised of gases, occurring in underground deposits, whether liquefied or gaseous, consisting mainly of methane. Gas consumption is measured with gas meters in Sm³.
GCV = 37862 kJ/Sm³

FUEL:

Natural gas (mio Sm³):

CATEGORY:

Domestic sales-Transformation-Power plants-Autoproducers-Total: Only fuel use for electricity and heat production for sale is included.

FUEL:

Natural gas (mio Sm³):

CATEGORY:

Non-energy use: Non-energy use for previous years is included in consumption of other consumers.

1.2 Reference approach – by fuel

1.2.1 Crude Oil

The only importer and processor of crude oil in Slovenia is Nafta Lendava, therefore data on production, import and export of crude oil are taken from its balance sheets.

Table 1: Crude Oil Consumption and Calculation of Emission of CO₂ from Oil Consumption in Slovenia for the period 1986 to 2008.

	1986	1990	1995	2000	2005	2006	2007	2008
Production (kt)	3	3	2	1	NO	NO	NO	NO
Import (kt)	107	128	496	NO	NO	NO	NO	NO
- From other YU Rep. (kt)	370	412						
Import+ YU Rep. (kt)	477	540						
Export (kt)	269	304	NO	NO	NO	NO	NO	NO
Stock Change (kt)	-8	11	-19	NO	NO	NO	NO	NO
Consumption (kt)	218	228	517	1	NO	NO	NO	NO
NCV (TJ/kt)	42.9	42.9	42.9	42.9	NO	NO	NO	NO
Consumption (TJ)	9350	9777	22168	37	NO	NO	NO	NO
Carbon content.(t C/TJ)	20	20	20	20	NO	NO	NO	NO
Emission (Gg C)	187	196	443	1	NO	NO	NO	NO
Oxidised Fraction	0.99	0.99	0.99	0.99	NO	NO	NO	NO
Conversion factor C - CO₂	3.6667	3.6667	3.6667	3.6667	NO	NO	NO	NO
Emission (Gg CO₂)	679	710	1609	3	NO	NO	NO	NO

Data source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Tg/5 and electronic files ZBIRNA E8 YYYY.xls from SORS for 2004-2008.

Emission Factor Source: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13

In IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.16 -I.20), the suggested conversion factors from natural units to Joules range from 40.4 to 43.0 TJ/1000 t, for former Yugoslavia 42.75 TJ/1000 tonnes. LEG documents specify for all those years a conversion factor of 42.9 TJ/1000 t. (Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Tg/5). Calculations take into account the emission factor of Ministry of the Economy.

For the year 2004 we have obtained data from SORS in electronic format (file name E_8_2004.xls).

Emission of CO₂ has been calculated on the basis of the formula and factors from IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.13., I. 30)

Basic sources do not specify any uncertainties. All utilized input data are taken from official inventories, while calculations take into account the factor of calorific value of a fuel as specified by the Ministry of the Economy of the Republic of Slovenia, hence the uncertainties are supposed to be low. For emission factors, the uncertainties are somewhat higher. The

emission factors applied are taken from IPCC methodology (and are not obtained by measurements performed in Slovenia).

Table 2: Estimate of Uncertainty of Utilized Data (in %)

Estimate of Uncertainty of Input Data	5%
Estimate of Uncertainty of Calorific Values	5%
Estimate of Uncertainty of Emission Factors	10%

Source: Author's estimate

1.2.2 Liquefied Petroleum Gas (LPG)

The calculation of consumption of LPG in Slovenia has been done on the basis of data taken from Table Zb/1, Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy. For the period 2004-2008 we have obtained data from SORS in electronic format (file name E_8_2004.xls).

Table 3: Consumption of LPG and Calculation of Emission of CO₂ from Consumption of LPG in Slovenia for the period 1986 to 2008.

	1986	1990	1995	2000	2005	2006	2007	2008
Production (kt)	0	0	0	0	0	0	0	0
Import (kt)	41	34	34	82	87	97	90	100
- From other YU Rep. (kt)	0	1	0	0	0			
Import+ YU Rep. (kt)	41	33	34	82	87	97	90	100
Export (kt)	NO	NO	NO	NO	1	5	8	13
Stock Change (kt)	-2	0	0	2	-2	9	-2	-2
Consumption (kt)	43	34	35	80	88	83	83	85
NCV (TJ/kt)	46.05	46.05	46.05	46.05	46.05	46.05	46.05	46.05
Consumption (TJ)	1971	1561	1593	3684	4055	3804	3844	3891
Carbon content.(t C/TJ)	17.2	17.2	17.2	17.2	17.2	17.2	17.2	17.2
Emission (Gg C)	34	27	27	63	70	65	66	67
Oxidised Fraction	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Conversion factor C - CO₂	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667
Emission (Gg CO₂)	123	97	99	230	253	238	240	243

Data source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Zb/1 and electronic files ZBIRNA E8 YYYY.xls from SORS for 2004-2007.

Emission Factor Source: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13

IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.21) suggest a conversion factor from natural units to Joules 47.3 TJ/1000 t. LEG documents specify for all these years a conversion factor of 46.05 TJ/1000 tonnes

Emission of CO₂ has been calculated on the basis of the formula and factors from IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.13., I. 30)

Basic sources do not specify any uncertainties. All utilized input data are taken from official inventories, while calculations take into account the factor of calorific value of fuels as specified by the Ministry of the Economy of the Republic of Slovenia, hence the uncertainties are supposed to be low. For emission factors, the uncertainties are somewhat higher. The emission factors applied are specified in IPCC methodology (and are not a result of measurements in Slovenia).

Table 4: Estimate of Uncertainty of Utilized Data (in %)

Estimate of Uncertainty of Input Data	5%
Estimate of Uncertainty of Calorific Values	5%
Estimate of Uncertainty Of Emission Factors	10%

Source: Author's estimate

1.2.3 Gasoline

Preparing consumption balances for this report took a relatively long period, 17 years. During this period, the modes of presentation and aggregation of data on the consumption of gasoline (motor gasoline and primary gasoline), jet kerosene (kerosene), fuel oil, and gas oil have in part undergone a change. Consequently, this necessitated a different approach to the calculation of consumption for individual years.

Balances of consumption for those fuels have been done on the basis of the following presumptions:

PERIOD 1986 to 1990

Gasoline consumption is split into two groups, one comprising auto and primary gasoline, the other aviation gasoline for turboprop and piston engine aircraft.

1. Under the category Purchase for motor gasoline, quantities reported in LEG-85 to 90 are the sum of purchases in other republics of the former Yugoslavia and total production in Slovenia. The balances on pages Tg/1 (LEG) are illogical, since they make it appear as if there was no production of oil products in Slovenia for the period 1986 to 90, which is not correct. It is evident that the category "Purchase" includes the total production of Nafta Lendava (both quantities sold in Slovenia as well as internal consumption and sales in other republics of the former Yugoslavia) from the reports for the period 1991 to 1996, when the entire production has been presented in the category "Production" (compare Tables Tg/1 in LEG 1986 - 1990 to tables Tg/1 in LEG 1991 - 2003).

Not so for the primary gasoline: quantities produced in Nafta Lendava have not been reported in the category Purchase. Consequently, these quantities are not subtracted later (item 3).

2. This is how total available quantities of an individual refined petroleum product in Slovenia have been obtained.

3. From the total available quantity of an individual refined petroleum product in Slovenia, the total final production of Nafta-Lendava, which has been taken into account in category Purchase in LEG, Table Tg/5, is subtracted. Thus:

- production of auto gasoline sold in Slovenia
- production of auto Gasoline exported.

The production of primary gasoline, which is reported under items Processing and Internal Consumption is not taken into account, since these quantities are processed further into other products.

Outline of the Calculation of Consumption of Oil Products 1986 to 1990

Purchase	Purchase in other republics of the former Yugoslavia. This category for the period 1986 to 1990 includes also production in Slovenia
+Import	
=Available quantities	
- Production in Nafta Lendava (i.e. production in Slovenia)	Subtract all quantities of motor gasoline produced in Nafta Lendava (sold in Slovenia, in other republics of the former Yugoslavia or used for internal consumption). These quantities are subtracted because they are reported in the category Purchase (and should not be). Primary gasoline is not reported in the category Purchase, and is therefore not subtracted here (!!!!!).
Real Import	Thus are obtained quantities which are available in Slovenia and the emissions of which are taken into account in the processing of crude oil.
- Real Export	It is necessary to subtract quantities which are not used in Slovenia and which have been taken into account for emissions from the processing of crude oil. This is the quantity that is exported – that part of the production of refined petroleum products of Nafta Lendava, which is sold to other republics of the former Yugoslavia: motor gasoline and primary gasoline. Export is also that quantity of motor gasoline that is sold to other republics of the former Yugoslavia as reported by Elektrogospodarstvo (LEG, Tg/1 and Tg/2) – i.e. sales of Istrabenz in other republics of the former Yugoslavia. For gasoline for the period 1986 to 1991, the sum of both exports is taken into account (from tables Tg/1 and Tg/5). Taken into account is also the export of motor gasoline (emissions from its consumption will be reported by the country which will retail this gasoline) and export of raw gasoline (which will be processed into motor gasoline in the exporting country and reported within the framework of the consumption of motor gasoline in that country). In the same way, the export of fuel oil and gas oil is calculated.
- (+) Stock Change	
Consumption in Slovenia	The result are quantities consumed in Slovenia which have not been taken into account for the processing of crude oil, minus quantities of refined petroleum products, which are exported.

4. Quantities obtained are the actual import and purchase from other republics of the former Yugoslavia. The produced quantities of auto gasoline are subtracted because CO₂ emissions from them have already have been taken into account in the processing of crude oil. Should they not be subtracted, then they are presented twice: in the category Oil Products (gasoline, gas oil and fuel oil) and Crude Oil Consumption.

5. Subsequently all exported values must be subtracted since these emissions do not arise in Slovenia,

- export or sales outside the Republic of Slovenia, as reported by Nafta-Lendava (Table Tg/5 – for gasoline the export of motor gasoline and primary gasoline is taken into account).
- values that are reported as export by Elektrogospodarstvo: these are the quantities, which are exported by Istrabenz to its agencies abroad.

Export of oil products (gasoline, gas oil and fuel oil) must therefore be subtracted twice: firstly because the quantities consumed have already been reported in the category Purchase, and secondly, because emissions have already been taken into account in the consumption of crude oil.

Stock change is obtained by subtracting the stocks for the end of the period from stock at the beginning of the period.

6. The obtained quantities are taken into account for the calculation of emissions of CO₂.

Data calculated as the consumption of oil products for 1990 in this report differ from those specified in Seljak 1998, where those quantities of refined petroleum products which had been sold by Istrabenz in other republics of the former Yugoslavia or abroad have not been taken into account as export.

YEAR 1991

In calculating the consumption of refined petroleum products in Slovenia for 1991, an error has occurred in LEG. Production of Nafta Lendava has been reported twice: under the category Purchase (as was the case in LEG 1986-1990) and under the category Production (as reported since 1992). Consequently, the quantities of motor gasoline, gas oil, fuel oil and residual fuel oil, which were produced in Nafta Lendava, have been subtracted from the category Purchase (or import from other republics of the former Yugoslavia) of motor gasoline (or gas oil / fuel oil).

Table 5: Calculation of Purchase of Oil Products in other Republics of the Former Yugoslavia in 1991

	Quantities reported in LEG (TG/1)- tonnes	Sales in Slovenia – LEG /Tg/5	Real Purchase in other Republics of the Former Yugoslavia
Motor Gasoline	324000	113932	210068
Gas oil	251401	104717	146684
Fuel Oil and Residual Fuel Oil	494219	235106	259113
Fuel Oil	302524	143885	158577
Residual Fuel Oil	191695	91221	100536

The ratio has been calculated on the basis of reported quantities in column: Reported Quantities in LEG (TG/1): 38.8 % residual fuel oil – 61.2 % fuel oil.

The export of oil products in 1991 is obtained by summing up the export as reported by Nafta Lendava (motor gasoline and primary gasoline) and export as reported by Elektrogospodarstvo (sales of Istrabenz in other republics of the former Yugoslavia).

PERIOD 1992-2003

1. In LEG 1992-1996 under the category Purchase, only those values were reported which had actually been purchased in other republics of the former Yugoslavia (since 1994 these quantities are no more). Under the category Production, the quantities produced in Slovenia

(Nafta Lendava) are reported. Calculations must not take into account the oil products that were produced in Slovenia (since both calorific values as well as emissions of CO₂ have already been taken into account for the consumption of crude oil). Hence, further calculations take into account only quantities either purchased in other republics of the former Yugoslavia or imported.

2. Subtract all export from the obtained quantities. This is the value that was provided by Elektrogospodarstvo as sales into other republics of former Yugoslavia (until 1993) as well as export (since 1994).

Stock changes are obtained by subtracting the stocks for the end of the period from the stocks for the beginning of the period.

3. Thus are obtained the quantities taken into account in calculating emissions of CO₂.

Outline of Consumption of Oil Products 1992-2000

Purchase	Under this category in LEG-91 to 96 the quantities purchased in other republics of the former Yugoslavia have been reported
+Import	Import from other countries
Real Import	Quantities which have been available in Slovenia and which have not been taken into account in processing of crude oil.
- Real Export	Minus quantities which have not been consumed in Slovenia and which have been taken into account for emissions from the processing of crude oil. This quantity is exported. For gasoline, the export of both motor gasoline as well as primary gasoline is subtracted.
- (+) Stock Change	
Consumption in Slovenia	Quantities which have been consumed in Slovenia and which have been taken into account for the processing of crude oil, minus quantities of refined petroleum products that have been exported.

IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.21) suggest a conversion factor from natural units to Joules of 44.8 TJ/1000 t. The factors specified in LEG for individual years ranged from 42.87 to 43.14 TJ/1000 t (Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-1996, Ljubljana: Ministry of the Economy, Table Zb/1). Based on measurements, the emission factor of the Ministry of the Economy has been taken into account in calculations for individual years. For the year 2004 we have obtained data from SORS in electronic format (file name E_8_2004.xls).

The emission of CO₂ has been calculated on the basis of the formula and emission factors from IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.13., I. 30)

Table 6: Consumption of Gasoline and Calculation of Emission of CO₂ from Consumption of Gasoline in Slovenia for the Period 1986 to 2008.

	1986	1990	1995	2000	2005	2006	2007	2008
Purchase (kt)	445	497	0	0	0	0	0	0
Production of Motor Gasoline (kt)								
Import (kt)	6	78	697	902	727	700	666	775
Available Quantity in Slovenia (kt)	451	575	697	902	727	700	666	775
- Production of Motor Gasoline by Lendava, sold in Slovenia	17248	40204						
- Export of Gasoline by Lendava								
- Internal Consumption of Gasoline	0	0						
Total production of Motor Gasoline in Slovenia	17	40	0	0	0	0	0	0
Real Import (kt)	434	535	697	902	727	700	666	666
Export, as reported by Elektro gospodarstvo - Sales of Istrabenz Abroad (kt)	7	9						
Export, as Reported by Nafta Lendava (kt)								
Export - Total (kt)	7	9	25	78	59	75	71	100
Stock Change (kt)	5	0	-12	26	10	-15	-25	-23
Consumption in Slovenia minus Production of Lendava (kt)	422	527	684	798	657	639	620	652
Factor MJ/kg	43.19	43.07	43.08	43.08	43.08	43.08	43.08	43.08
Consumption (TJ)	18228	22677	29445	34378	28290	27546	27182	28076
Emission Factor (t C/TJ)	20.10	20.09	20.11	20.11	20.11	20.108	20.108	19.778
Emission (Gg C)	366	456	592	691	569	554	547	555
Oxidised Fraction	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Conversion of C to CO ₂	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667
Emission (Gg CO ₂)	1330	1654	1654	2149	2509	2065	2011	2011

Data Source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Tg/1, Tg/5 and electronic files ZBIRNA E8 YYYY.xls from SORS for 2004-2008.

Source of Emission Factors: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13, estimates of an expert group.

Basic sources do not specify any uncertainties. The utilized input data are calculated on the basis of two balances: the balance sheets of Nafta Lendava and Elektro gospodarstvo Slovenije. With regard to the fact that many categories of consumption and of production have not been harmonized, the estimated total uncertainty of input data amounts to 10 %. The uncertainty of input data differs for individual years:

- 5% for the period 1993 to 2004,
- 10 % for the period 1986 to 1990, 1992
- 20 % for year 1991.

Calculations account for the factor of calorific value of fuels issued by the Ministry of the Economy of the Republic of Slovenia, hence the uncertainties are supposed to be low. For emission factors, the uncertainties are somewhat higher. The emission factors applied are taken from IPCC methodology (and are not a result of measurements in Slovenia).

Table 7: Estimate of Uncertainty of Utilized Data (in %)

Estimate of Uncertainty of Input Data for the Period 1993 to 2004	5 %
Estimate of Uncertainty of Input Data for the Period 1986 to 1990, 1992	10%
Estimate of Uncertainty of Input Data for 1991	20 %
Estimate of Uncertainty of Calorific Values	5%
Estimate of Uncertainty of Emission Factors	10%

Source: Author's estimate

1.2.4 Jet kerosene, Kerosene

Calculation of consumption of jet kerosene and kerosene in Slovenia has been done on the basis of data from the tables Tg/1 and Tg/5, Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy. For the period 2004-2007 we have obtained data from SORS in electronic format (file name E_8_YYYY.xls).

Table 8: Consumption of Jet Kerosene and Calculation of Emission of CO₂ from Consumption of Jet Kerosene in Slovenia for the period 1986 to 2008.

	1986	1990	1995	2000	2005	2006	2007	2008
Purchase (kt)	22	25	0					
Import (kt)	10	3	24	25	21	25	32	34
Real Import (kt)	33	28	24	25	21	25	32	34
Real Export (kt)	NO	2	4	0	0	1	0	1
Stock Change (kt)	1	0	0	0	-1	0	1	2
International bunkers (kt)	32	26	19	23	21	24	31	33
Consumption in Slovenia (kt)	0	0	1	1	0	0	0	1
Factor MJ/kg	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
Consumption (TJ)	9	-17	28	40	-3	0	0	59
Emission Factor (t C/TJ)	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5
Emission (Gg C)	0	0	1	1	0	0	0	1
Oxidised Fraction	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Conversion of C to CO ₂	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667
Emission (Gg CO ₂)	1	-1	2	3	0	0	0	4

Data Source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Tg/2, Tg/4 and electronic files ZBIRNA E8 YYYY.xls from SORS for 2004-2008.

Source of Emission Factors: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13

IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.21) suggest a factor of 44.6 TJ/1000 tonnes. LEG documents specify for all those years a conversion factor of 42.8 TJ/1000 tonnes (Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Zb/1). Based on measurements, the emission factor of the Ministry of the Economy has been taken into account in calculations.

Emission of CO₂ has been calculated on the basis of the formula and factors from IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.13., I. 30)

Most jet kerosene is consumed outside the territory of Slovenia in international transport in the so-called international bunkers, and that is why these quantities are not included in the calculation of national emissions for Slovenia. Quantities, which are specified in LEG under the category of aviation gasoline for turboprop engines, are considered as being mostly consumed in international transport, (except jet kerosene used for Army and Police), while quantities under the Aviation Gasoline for Piston Engine Aircraft category is considered as consumption in Slovenia. After independence, the consumption of jet kerosene in international transport fell strongly (likewise the number of transported passengers diminished from 1.7 million in 1987 to 0.55 million in 1995 – Source: Statistical Office of the Republic of Slovenia: Letni pregled prometa in zvez, Ljubljana: Statistical Office of the Republic of Slovenia 1995).

Basic sources do not specify any uncertainties. All utilized input data are taken from official inventories, while calculations take into account the factor of calorific value of a fuel as specified by the Ministry of the Economy of the Republic of Slovenia, hence the uncertainties are supposed to be low. For emission factors, the uncertainties are somewhat higher. The emission factors applied are specified in IPCC methodology (and are not a result of measurements in Slovenia).

Table 9: Estimate of Uncertainty of Utilized Data (in %)

Estimate of Uncertainty of Input Data	5%
Estimate of Uncertainty of Calorific Values	5%
Estimate of Uncertainty of Emission Factors	10%

Source: Author's estimate

1.2.5 Gas/Diesel oil

The calculation of consumption of gas oil in Slovenia has been done on the basis of data from tables Tg/1 and Tg/5, Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy. Consumption has been calculated on the basis of presumptions, which for secondary fuels are presented in the chapter on gasoline. For the periode 2004-2007 we have obtained data from SORS in electronic format (file name ZBIRNA_E_8_YYYY.xls).

IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I. 21) specify a factor of 43.3 TJ/1000 t. For all those years, a conversion factor of 42.7 TJ/1000 tonnes has been specified in LEG reports (Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-1996, Ljubljana: Ministry of the Economy, Table Zb/1). Based on measurements, the emission factor of the Ministry of the Economy has been taken into account in calculations.

Emission of CO₂ has been calculated on the basis of the formula and emission factors from IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.13., I. 30)

Table 10: Consumption of Gas Oil and Calculation of Emission of CO₂ from Consumption of Gas Oil in Slovenia for the Period 1986 to 2008.

	1986	1990	1995	2000	2005	2006	2007	2008
Purchase (kt)	336	349	0	0	0	0	0	0
Production (kt)	0	0	0	0	0	0	0	0
Import (kt)	45	7	359	549	981	1203	1465	1801
Purchase +Import (kt)	381	356	359	549	981	1203	1465	1801
- Production of Lendava, sold in Slovenia (kt)	53	48						
- Export Lendava								
- Internal Consumption (kt)	0	169						
Total Production in Slovenia (kt)	53	48	0	0	0	0	0	0
Real Import (kt)	328	307	359	549	981	1203	1465	1801
Export, as reported by Elektroindustrija - Sales of Istrabenz abroad (kt)	4	9						
Export, as reported by Nafta Lendava (kt)	0	0	0	0	0	0	0	0
Export - Total (kt)	4	9	2	87	132	286	304	356
Stock Change (kt)	6	0	-14	-24	2	-45	18	-26
Consumption in Slovenia minus Production of Lendava (kt)	318	298	371	486	847	962	1143	1418
Factor MJ/kg	42.7	42.7	42.7	42.7	42.7	42.7	42.7	42.6
Consumption (TJ)	13584	12719	15825	20752	36155	41061	48707	60423
Emission Factor (t C/TJ)	20.29	20.29	20.29	20.29	20.29	20.29	20.29	20.18
Emission (Gg C)	276	258	321	421	734	831	988	1219
Oxidised Fraction	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Conversion of C to CO ₂	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667
Emission (Gg CO ₂)	1001	937	1166	1529	2663	3017	3588	4425

Data Source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Tg/1, Tg/5 and in the electronic files ZBIRNA_E8_YYYY.xls for 2004-2007

Source of Emission Factors: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13

Basic sources do not specify any uncertainties. The utilized input data are calculated on the basis of two sources: the balance sheets of Nafta Lendava and Ministry of the Economy, hence the input data uncertainties are higher. Calculations take into account the factor of calorific value of fuels specified by the Ministry of the Economy of the Republic of Slovenia, hence the uncertainties are low. For emission factors, the uncertainties are higher. The emission factors applied are specified in IPCC methodology (and are not a result of measurements in Slovenia).

Table 11: Estimate of Uncertainty of Utilized of Data (in %)

Estimate of Uncertainty of Input Data for the Period 1993 to 1996	5 %
Estimate of Uncertainty of Input Data for the Period 1986 to 1990, 1992	10%
Estimate of Uncertainty of Input Data for 1991	20 %
Estimate of Uncertainty of Calorific Values	5%
Estimate of Uncertainty of Emission Factors	10%

Source: Author's estimate

1.2.6 (Residual) Fuel Oil

Table 12: Consumption of (Residual) Fuel Oil and Calculation of Emission of CO₂ from Consumption of Fuel Oil in Slovenia for the Period 1986 to 2008.

	1986	1990	1995	2000	2005	2006	2007	2008
Purchase (kt)	572	629						
Production (kt)								
Import (kt)	81	103	577	944	726	679	492	627
Purchase +Import (kt)	652	732	577	944	726	679	492	627
- Production of Lendava, sold in Slovenia (kt)	162	99						
- Export Lendava	89	75						
- Internal Consumption (kt)								
Total Production in Slovenia (kt)	252	174						
Real Import (kt)	400	557	577	944	726	679	492	627
Export, as reported by Elektrogospodarstvo - Sales of Istrabenz abroad (kt)	2	4						
Export, as reported by Nafta Lendava (kt)	89	75						
Export - Total (kt)	91	79	1	46	9	18	19	36
Stock Change (kt)	2	36	-9	21	17	-13	-17	-1
Consumption in Slovenia minus Production of Lendava (kt)	307	442	585	877	699	644	441	524
Factor MJ/kg	41.02	41.30	41.61	41.58	41.77	41.67	42.32	42.55
Consumption (TJ)	12594	18266	24374	36463	29194	26833	18651	22308
Emission Factor (t C/TJ)	20.61	20.48	20.33	20.35	20.26	20.30	20.26	20.22
Emission (Gg C)	259	373	495	742	591	545	378	451
Oxidised Fraction	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Conversion of C to CO ₂	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667
Emission (Gg CO ₂)	942	1358	1798	2693	2147	1971	1372	1637

Data Source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Tg/1, Tg/5 for the period 2004 we have obtained data from SORS in electronic format (file name E_8_2004.xls).

Source of Emission Factors: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13

Because of the differing definitions for individual categories within the category "Fuel Oil" (extra light, light, residual) a direct presentation of separate data for the production of fuel oil and residual fuel oil is not possible. Those data after 1992 are not even necessary for the presentation of consumption in the reference approach. For the period 1986 to 1991, estimation is necessary. LEG (Table TG/5) brings only data for the total production of fuel oil and residual fuel oil in Nafta Lendava. The Statistical Office of the Republic of Slovenia (Statistical Office of the Republic of Slovenia: SL-86 to 91) publishes data on the production of fuel oil in its publications. However, data on the production of residual fuel oil are reported under the category Fuel Oil (cf. data on production for the period 1992 to 2002 in LEG and SL-96, p. 287). For the period 1986 to 1991 data have been estimated:

1.2.7 Bitumen and Lubricants

IPCC methodology (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.21) enables reporting the consumption of secondary fuels or products only in the case of their being imported. In Slovenia, there are no exact data on the import of bitumen and lubricants. This section takes into account the presumption that all consumed quantities of bitumen have been imported (or produced from imported raw materials), since there are no reports on the production of bitumen in Slovenia (Statistical Office of the Republic of Slovenia: Annual Industry Survey 1986-2003). The consumption of imported bitumen has no influence on the final emissions of CO₂. The imported quantities of bitumen have no influence on emissions of CO₂: they have to be added up in the chapter on the consumption of bitumen and subtracted in the chapter on carbon, which was stored in products.

For the consumption of lubricants, only imported quantities should be specified, since emissions of other quantities have already been taken into account for the processing of crude oil. Since these data (on import) are available in Slovenia only for 2004-2007 in satisfactory quality, the quantities on the consumption of lubricants are not specified for other years. Imported quantities of lubricants have no influence on emissions of CO₂: they have to be added up in the chapter on the consumption of lubricants and subtracted in the chapter on stored carbon. The chapter on stored carbon therefore reports only the consumed quantities of lubricants that have been produced in Slovenia.

1.2.8 Petroleum Coke

The calculation of consumption of petroleum coke in Slovenia has been done on the basis of data from the research of the Institute of Metals and Technology (Breskvar, Torkar 1999) and the report of the Treibacher Schleifmittel d.o.o. (Nekrep 1999). No adequate data are available for Slovenia, which would enable presentation similar to that for other secondary liquid fuels. Most petroleum coke is consumed in Talum, Kidričevo for the production of electrodes and in Salonit for cement production, whereas until 1994 small quantities were used in the production of silicon carbide by Tovarna Dušika Ruše. The balance for Slovenia has been done on the basis of the reports of those three enterprises.

Table 13: Consumption of Petroleum Coke and Calculation of Emission of CO₂ from Consumption of Petroleum Coke in Slovenia for the Period 1986 to 2007.

	1986	1990	1995	2000	2005	2006	2007	2008
Production (kt)								
Import (kt)	24	44	30	24	110	132	108	120
Purchase (kt)								
Import + Purchase (kt)	24	44	30	24	110	132	108	120
Export (kt)	NO	NO	NO	NO	NO	NO	11	15
Stock Change (kt)	NO	NO	NO	NO	NO	5	-5	NO
Consumption (kt)	24	44	30	24	110	127	102	105
Factor MJ/kg	31.00	31.00	31.00	31.00	31.00	31.00	31.00	34,49
Consumption (TJ)	745	1372	938	742	3419	3937	3162	3622
Emission Factor (t C/TJ)	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
Emission (Gg C)	20	38	26	20	94	108	87	100
Carbon stored (Gg C)	NO	NO	NO	NO	NO	60	44	54
Oxidised Fraction	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Conversion of C to CO₂	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667
Emission (Gg CO₂)	74	137	94	74	341	176	156	166

Data Source:

Breskvar B., Torkar M.: Določitev emisij toplogrednih plinov v proizvodnji aluminija, železa in jekla ter ferozlitin, Institute of Metals and Technology, Ljubljana 1999

Nekrep K: CO₂ Emisije v proizvodnji SiC (working material), Treibacher Schleifmittel, Ruše 1999

Reports from enterprises (cement producers)

For the period 2004-2008 we have obtained data from SORS in electronic format (file name ZBIRNA E_8_YYYY.xls).

Source of Emission Factors: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13, 1. 23

In IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. 1.13 and 1. 23), the suggested conversion factor from natural units to Joules amounts to 31.00 TJ/1000 t, and the emission factor amounts to 27.5 t C/TJ.

The emission of CO₂ has been calculated on the basis of the formula and emission factors from IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. 1.13., 1. 30)

Basic sources do not specify any uncertainties. All utilized input data are taken from reports of the enterprises using petroleum coke; hence, the uncertainty is somewhat higher. The calorific values of fuels and emission factors are specified in IPCC methodology (and are not a result of measurements in Slovenia); hence, the uncertainty is also somewhat higher than for other secondary fuels.

Table 14: Estimate of Uncertainty of Utilized Data (in %)

Estimate of Uncertainty of Input Data	10%
Estimate of Uncertainty of Calorific Values	10%
Estimate of Uncertainty of Emission Factors	10%

Source: Author's estimate

1.2.9 Hard Coal

The calculation of the consumption of hard coal in Slovenia has been done on the basis of data from Table P/1, Statistični letopis energetskega gospodarstva republike Slovenije 1986-1996, Ljubljana: Ministry of the Economy.

IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. 1.14 -1.20) suggest a conversion factor from natural units to Joules from 18.00 to 33.5 TJ/1000 t, for the former Yugoslavia from 23.6 to 30.7 TJ/1000 tonnes. LEG reports specify for different years emission factors from 25 to 27.86 TJ/1000 tonnes (Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Zb/1). Based on measurements, the emission factor of the Ministry of the Economy has been taken into account in calculations for individual years.

Table 15: Consumption of Black Coal and Calculation of Emission of CO₂ from Consumption of Black Coal in Slovenia for the Period 1986 to 2008.

	1986	1990	1995	2000	2005	2006	2007	2008
Production (kt)								
Import (kt)	63	1	1	NO	49	47	76	75
Purchase (kt)								
Import + Purchase (kt)	63	1	1	NO	49	47	76	75
Export (kt)	15	NO	NO	NO	NO	1	1	1
Stock Change (kt)	-1	NO	NO	NO	NO	NO	9	-11
Consumption (kt)	48	1	1	NO	49	46	66	63
Factor MJ/kg	27.57	27.57	25.00	25.00	25.00	25.77	24.46	24.32
Consumption (TJ)	1329	14	23	NO	1215	1185	1614	1532
Emission Factor (t C/TJ)	25.80	25.80	25.80	25.80	25.80	25.80	25.80	25,80
Emission (Gg C)	34	0	1	NO	34	33	45	40
Oxidised Fraction	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Conversion of C to CO₂	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667
Emission (Gg CO₂)	123	1	2	NO	120	118	160	142

Data Source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Pr/1 and for period 2004-2008 the statistical data are available in electronic file ZBIRNA_E_10_YYYY.xls.

Source of Emission Factors: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13

Emission of CO₂ has been calculated based on the formula and factors from IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.13., I. 30)

Basic sources do not specify any uncertainties. All utilized input data are taken from official inventories, while calculations take into account the factor of calorific value of a fuel as specified by the Ministry of the Economy of the Republic of Slovenia, hence the uncertainties are supposed to be low. For emission factors, the uncertainties are somewhat higher. The emission factors applied are taken from IPCC methodology (and are not a result of measurements in Slovenia).

Table 16: Estimate of Uncertainty of Utilized Data (in %)

Estimate of Uncertainty of Input Data	5%
Estimate of Uncertainty of Calorific Values	5%
Estimate of Uncertainty of Emission Factors	10%

Source: Author's estimate

1.2.10 Lignite and Brown Coal

The calculation of consumption of brown coal and lignite in Slovenia has been done on the basis of data from Table Zb/1. , Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy. For the year 2004 we have obtained data from SORS in electronic format (file names: E_10_2004.xls, E_11_2004.xls).

Lignite (CRF) = Lignite (LEG) + Domestic Brown Coal (LEG)
 Sub bituminous coal (CRF) = Imported Brown Coal (LEG)

IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.14 -I.20) suggest a conversion factor from natural units to Joules from 7.8 to 20.0 TJ/1000 t, for former Yugoslavia from 8.9 to 16.7 TJ/1000 t.

LEG reports for individual years specify a calorific value from 9.39 to 10.66 TJ/1000 t for lignite, from 11.25 to 12.76 for domestic brown coal, whereas no factors are specified for imported brown coal. (Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Tables Zb/1, Pr/1 and EL/7-0). Calorific values for domestic coal have been taken from SORS.

For 2004-2008 data in electronic format have been obtained from SORS.

For imported brown coal (from America, Russia, Indonesia and the Czech Republic), calorific values have been calculated on the basis of data from main importers.

The imported coal has thus been disaggregated into three consumption segments. Data for the biggest consumer of imported coal, the combined heat and power plant Ljubljana, have been obtained directly from this consumer.

In industry, imported coal is practically used by only one enterprise; consequently, data for the net calorific value (NCV) as reported by that enterprise have been taken into account. For lesser quantities of coal, consumed in general consumption, average net calorific values as reported by the providers to the Statistical Office of the Republic of Slovenia have been considered.

1.2.11 Lignite (CRF)

Table 17: Consumption of Lignite (CRF) and Calculation of Emission of CO₂ from Consumption of Lignite in Slovenia for the Period 1986 to 2008

	1986	1990	1995	2000	2005	2006	2007	2008
Production (kt)	6791	5583	4884	4480	4540	4522	4535	4520
Import (kt)	160	20	12	NO	NO	NO	70	141
Purchase (kt)	781	210	0	0	0	0	0	0
Import + Purchase (kt)	941	231	12	NO	NO	NO	70	141
Export (kt)	168	66	3	NO	NO	NO	NO	NO
Stock Change (kt)	-15	-309	-56	-34	16	-122	-66	-60
Consumption (kt)	7579	6055	4948	4513	4524	4644	4671	4601
Factor MJ/kg	10.00	10.53	10.44	10.36	10.50	11.10	11.32	11.04
Consumption (TJ)	75781	63751	46779	52672	49081	50494	47509	50772
Emission Factor (t C/TJ)	29.29	28.71	27.55	27.90	28.45	28.36	28.79	28.67
Emission (Gg C)	2220	1830	1423	1305	1352	1462	1523	1456
Oxidised Fraction	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Conversion of C to CO ₂	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667
Emission (Gg CO ₂)	7976	6576	5114	4690	4857	5252	5472	5231

Data Source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Zb/1 and for period 2004-2008 the statistical data are available in electronic file ZBIRNA_E_10_YYYY.xls.

Source of Emission Factors: National emission factors for domestic lignite for the period 1986-2003, Elektroinštitut Milan Vidmar, 2004

All factors for Lignite (CRF) totals have been calculated on the basis of the weighted arithmetic mean for Lignite (LEG) and imported brown coal (LEG).

Basic sources do not specify any uncertainties. All utilized input data are taken from official inventories, while calculations take into account the factor of calorific value of a fuel as specified by the Ministry of the Economy of the Republic of Slovenia, hence the uncertainties are supposed to be low.

Table 18: Estimate of Uncertainty of Utilized Data (in %)

Estimate of Uncertainty of Input Data	5%
Estimate of Uncertainty of Calorific Values	5%
Estimate of Uncertainty of Emission Factors	10%

Source: Author's estimate

1.2.12 Sub bituminous coal

Table 19: Consumption Sub bituminous coal and Calculation of Emission of CO₂ from Sub bituminous coal in Slovenia for the Period 1986 to 2007.

	1986	1990	1995	2000	2005	2006	2007	2008
Production (kt)	NO	NO	NO	NO	NO	NO	NO	NO
Import (kt)	NO	NO	329	455	544	549	497	694
Purchase (kt)	NO	NO	0	0	0	0	0	0
Import + Purchase (kt)	NO	NO	329	455	544	549	497	694
Export (kt)	NO	NO	NO	NO	NO	34	2	2
Stock Change (kt)	NO	NO	58	32	-19	-5	-32	-32
Consumption (kt)	NO	NO	271	423	563	521	527	527
Factor MJ/kg	NO	NO	17.68	19.06	20.48	19.09	18.60	18.60
Consumption (TJ)	NO	NO	4793	8064	11530	9945	9802	9802
Emission Factor (t C/TJ)	NO	NO	27.6	27.6	27.6	27.6	27.6	27.6
Emission (Gg C)	NO	NO	132	223	318	274	268	262
Oxidised Fraction	NO	NO	0.98	0.98	0.98	0.98	0.98	0.98
Conversion of C to CO ₂	NO	NO	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667
Emission (Gg CO ₂)	NO	NO	475	800	1144	986	965	941

Data Source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-1996, Ljubljana: Ministry of the Economy, Table Zb/1 and for period 2004-2008 the statistical data are available in electronic file ZBIRNA_E_10_YYYY.xls.

Source of Emission Factors: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13

Basic sources do not specify any uncertainties. All utilized input data are taken from official inventories, while calculations take into account the factor of calorific value of a fuel as specified by the Ministry of the Economy of the Republic of Slovenia, hence the uncertainties are supposed to be low.

Table 20: Estimate of Uncertainty of Utilized Data (in %)

Estimate of Uncertainty of Input Data	5%
Estimate of Uncertainty of Calorific Values	5%
Estimate of Uncertainty of Emission Factors	10%

Source: Author's estimate

1.2.13 Coke Oven/Gas Coke

The calculation of the consumption of coke in Slovenia was done on the basis of data from Table Pr/1, Statistični letopis energetskega gospodarstva republike Slovenije 1986-1996, Ljubljana: Ministry of the Economy. This chapter takes into account the total consumed quantities of coke: both those consumed in production processes as well as those consumed in power generation.

In IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.14 -I.20) the suggested conversion factors from natural units to Joules range from 20.8 to 30.1 TJ/1000 t, for former Yugoslavia 26.9 TJ/1000 t. LEG reports specify for all those years a conversion factor of 29.3 TJ/1000 t (Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Zb/1). Since the conversion factor is specified on the basis of measurements, the calculations take into account the factor of the Ministry of the Economy. For the period 2004-2007 we have obtained data from SORS in electronic format (file name ZBIRNA_E_10_YYYY.xls).

Table 21: Consumption of Coke and Calculation of Emission of CO₂ from Consumption of Coke in Slovenia for the Period 1986 to 2008.

	1986	1990	1995	2000	2005	2006	2007	2008
Production (kt)	0	0	0	0	0	0	0	0
Import (kt)	7	0	58	48	56	49	49	34
Purchase (kt)	218	68	0	0	0	0	0	0
Import + Purchase (kt)	225	68	58	48	56	49	49	34
Export (kt)	0	0	0	0	0	0	0	0
Stock Change (kt)	2	-2	1	1	-2	-7	-3	5
Consumption (kt)	224	70	57	47	59	56	52	39
Factor MJ/kg	29.3	29.3	29.3	29.31	29.31	29.31	29.31	29.87
Consumption (TJ)	6557	2039	1664	1380	1728	1649	1534	1165
Emission Factor (t C/TJ)	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
Emission (Gg C)	193	60	49	41	51	49	45	34
Oxidised Fraction	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Conversion of C to CO ₂	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667
Emission (Gg CO ₂)	695	216	176	146	183	175	163	123

Data Source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-1996, Ljubljana: Ministry of the Economy, Table Pr/1 and for period 2004-2008 the statistical data are available in electronic file ZBIRNA_E_10_YYYY.xls.

Source of Emission Factors: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13

Emission of CO₂ has been calculated on the basis of the formula and factors from IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.13., I. 30)

Basic sources do not specify any uncertainties. All utilized input data are taken from official inventories, whilst calorific values are in the majority of cases the results of measurements. For the consumption of coke, the major problem is the consumption of petroleum coke, which in some inventories is accounted for while in others it is not. Consequently, the uncertainty is higher than for other solid fuels. The emission factors applied have been taken from IPCC methodology (and are not a result of measurements in Slovenia).

Table 22: Estimate of Uncertainty of Utilized Data (in %)

Estimate of Uncertainty of Input Data	10%
Estimate of Uncertainty of Calorific Values	5%
Estimate of Uncertainty of Emission Factors	10%

Source: Author's estimate

1.2.14 Anthracite

The calculation of the consumption of anthracite in Slovenia has been done on the basis of data from Table Pr/1, Statistični letopis energetskega gospodarstva republike Slovenije 1986-1996, Ljubljana: Ministry of the Economy. This chapter takes into account the total consumed quantities of anthracite: both those consumed in production processes, as well as those consumed in power generation.

In IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.14 -I.20) the suggested conversion factors from natural units to Joules range from 20.8 to 30.1 TJ/1000 t, for former Yugoslavia 26.9 TJ/1000 t. Emission factors specified in LEG range from 29.3 to 31.9 TJ/1000 t (Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy, Table Zb/1). Based on measurements, the emission factor of the Ministry of the Economy has been taken into account in calculations. For the year 2004 we have obtained data from SORS in electronic format (file name E_10_2004.xls).

Emission of CO₂ has been calculated on the basis of the formula and factors from IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.13., I. 30)

Table 23: Consumption of Anthracite and Calculation of Emission of CO₂ from Consumption of Anthracite in Slovenia for the Period of 1986 to 2005

	1986	1990	1995	2000	2005	2006	2007	2008
Production (kt)								
Import (kt)	45	21	19	NO	NO	NO	NO	NO
Purchase (kt)								
Import + Purchase (kt)	45	22	19	NO	NO	NO	NO	NO
Export (kt)	NO	NO	NO	NO	NO	NO	NO	NO
Stock Change (kt)	-10	-9	NO	NO	NO	NO	NO	NO
Consumption (kt)	55	31	19	NO	NO	NO	NO	NO
Factor MJ/kg	29.25	29.25	29.25					
Consumption (TJ)	1594	913	556	NO	NO	NO	NO	NO
Emission Factor (t C/TJ)	26.8	26.8	26.8					
Emission (Gg C)	43	24	15	NO	NO	NO	NO	NO
Oxidised Fraction	0.98	0.98	0.98					
Emission (Gg C)	42	24	15	NO	NO	NO	NO	NO
Conversion of C to CO₂	3.6667	3.6667	3.6667					
Emission (Gg CO₂)	154	88	54	NO	NO	NO	NO	NO

Data Source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-1996, Ljubljana: Ministry of the Economy, Table Pr/1 and for the period 2004-2007 from electronic files ZBIRNA_E_10_YYYY.xls.

Source of Emission Factors: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13

Basic sources do not specify any uncertainties. All utilized input data are taken from official inventories, while calculations take into account the factor of calorific value of a fuel as specified by the Ministry of the Economy of the Republic of Slovenia, hence the uncertainties are supposed to be low. For emission factors, the uncertainties are somewhat higher. The emission factors applied are taken from IPCC methodology (and are not a result of measurements in Slovenia).

Table 24: Estimate of Uncertainty of Utilized Data (in %)

Estimate of Uncertainty of Input Data	5%
Estimate of Uncertainty of Calorific Values	5%
Estimate of Uncertainty of Emission Factors	10%

Source: Author's estimate

1.2.15 Natural Gas

The calculation of the consumption of natural gas in Slovenia has been done on the basis of data from Table Z/1, Statistični letopis energetskega gospodarstva republike Slovenije 1986-2003, Ljubljana: Ministry of the Economy. For the period 2004-2007 we have obtained data from SORS in electronic format (file name ZBIRNA_E_9_YYYY.xls).

Table 25: Consumption of Natural Gas and Calculation of Emission of CO₂ from Consumption of Natural Gas in Slovenia for the Period of 1986 to 2008.

	1986	1990	1995	2000	2005	2006	2007	2008
Production (MSm ³)	7	25	18	6	4	4	3	3
Import (MSm ³)	824	880	878	1007	1137	1101	1120	1120
Purchase (MSm ³)	0	8	0	0	0	0	0	0
Import + Purchase (MSm ³)	824	888	878	1007	1137	1101	1120	1120
Export (MSm ³)	NO	NO	NO	NO	NO	NO	NO	NO
Stock Change (MSm ³)	NO	-24	23	NO	NO	NO	NO	NO
Consumption (mSm ³)	832	937	873	1013	1141	1105	1124	1124
Factor MJ/Sm ³	33.5	34.10	34.10	34.08	34.08	34.08	34.08	34.08
Consumption (TJ)	27858	31955	29759	34523	38900	37656	38286	38286
Emission Factor (t C/TJ)	15.074	15.074	15.074	15.074	15.07	15.07	15.07	15.07
Emission (Gg C)	420	482	449	520	586	567	577	577
Oxidised Fraction	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
Carbon stored (Gg C)	34	36	47	70	80	71	85	85
Emission (Gg C)	386	446	402	450	506	496	492	492
Conversion of C to CO ₂	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667	3.6667
Emission (Gg CO ₂)	1407	1627	1465	1642	1848	1810	1795	1795

Data Source: Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-1996, Ljubljana: Ministry of the Economy, Table Zb/1 and for the period 2004-2008 from electronic file ZBIRNA_E_9_YYYY.xls.

Source of Emission Factors: Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p.1.13

IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996) have required from the very beginning inventories to be compiled in Joules and therefore suggested no conversion factors from natural units to Joules. The factors of calorific value specified in LEG range from 33.5 to 34.1 TJ/1000 t (Ministry of the Economy: Statistični letopis energetskega gospodarstva republike Slovenije 1986-2002, Ljubljana: Ministry of the Economy, Table

Zb/1). Based on measurements, the emission factor of the Ministry of the Economy has been taken into account in calculations.

Emission of CO₂ has been calculated on the basis of the formula from IPCC guidelines (Intergovernmental Panel on Climate Change: Greenhouse Gas Inventory - Reference manual, UNEP-OECD-IEA-IPCC, Bracknell 1996, p. I.13., I. 30). Emission factors have been taken from the documents of the Institute of Energy Industries (Gasperič M., Dornik M.: Določitev emisijskega faktorja CO₂ pri energetski izrabi ter emisijskega faktorja CH₄ pri transportu in distribuciji zemeljskega plina, Ljubljana: Institute of Energy Industries, 1998).

Basic sources do not specify any uncertainties. All utilized input data are taken from official inventories, while calculations take into account the factor of calorific value of a fuel as specified by the Ministry of the Economy of the Republic of Slovenia, hence the uncertainties are supposed to be low. For emission factors, the uncertainty is low since they are the result of measurements in Slovenia.

Table 26: Estimate of Uncertainty of Utilized Data (in %)

Estimate of Uncertainty of Input Data	5%
Estimate of Uncertainty of Calorific Values	5%
Estimate of Uncertainty of Emission Factors	5%

Source: Author's estimate