

# Comparison of energy data from the IEA energy statistics and the UNFCCC reference approach

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*Detailed discussion based on data of the year 2010.*

## General considerations

### Net calorific value

The net calorific values used by IEA differ from those used in the GHG inventory. The table below lists the NCV used in the GHG inventory and those presumably used by IEA. There is a particularly large difference in the case of gasoline, where a country-specific value of 42.5 TJ/Gg is used, while IEA uses 44.0 TJ/Gg. In order to avoid differences caused by the conversion with different NCV, the comparison is made in Gg.

	CRF	IEA
Crude oil	43.20	43.23
Gasoline	42.50	44.00
Jet kerosene	43.00	42.90
Gas/Diesel oil	42.67	42.60
Residual fuel oil	41.20	40.00
LPG	46.00	46.00
Petroleum coke	31.78	32.00
Anthracite	25.46	28.10
Bituminous coal	25.46	28.10
Lignite	23.56	20.10

Table 1 Net calorific values used in the Swiss greenhouse gas inventory and by the IEA (in GJ/t).

### Stock changes and statistical differences

Stock changes as reported by IEA are only including primary stocks (IEA, 2005), while the reporting in the CRF includes secondary and tertiary stocks. This results in a particularly large difference for gas oil, as retailers and end-consumers hold considerable amounts of heating fuel on stock. The IEA subsumes secondary and tertiary stock changes under statistical difference.

### Liechtenstein

All data regarding liquid fuel consumption reported by the IEA includes fuel consumption in Liechtenstein (Geographical coverage in IEA, 2012). For reporting purposes under the UNFCCC, consumption of Liechtenstein is subtracted.

### Data sources

- Switzerland's greenhouse gas inventory 1990-2011, submission of 15. April 2013, CRF table 1.A(b), FOEN, 2013.
- Energy statistics of OECD countries (2012 Edition), IEA, 2012.
- Energy statistics manual, IEA, 2005.
- Gesamtenergiestatistik 2010, SFOE, 2011.

## **Liquid fuels**

The total amount of liquid fuel consumption as reported in the greenhouse gas inventory is 11'052 Gg. There is a difference of 13 Gg (0.1%) between CRF and IEA. This difference is primarily caused by the different methodology used for aviation bunkers (see below).

### **Crude oil**

Crude oil in the reference approach contains additives, while IEA lists them separately (data in italics in the table below). The difference between CRF and IEA is smaller than 0.1% if the sum of additives, refinery feedstocks and crude oil is considered.

### **Gasoline**

The comparison is made for motor gasoline only. Aviation gasoline is included under aviation fuels. Gasoline reported by IEA includes gasoline used in Liechtenstein (LIE), which is subtracted for reporting under the UNFCCC. The difference between CRF and IEA is approximately 0.1%, if the consumption of LIE is taken into account.

### **Aviation fuels**

The different aviation fuels are aggregated in the greenhouse gas inventory. For comparison of IEA and reference approach, all aviation fuels are summed up. The difference between IEA and reference approach if considering the apparent final consumption is 12 Gg (approximately 1% of imports). This difference is largely due to a different methodology used to estimate international bunker. Aviation bunkers have to be reported monthly to the IEA. As the tier 3 approach used for the greenhouse gas inventory is not available on a monthly basis, the international bunker fuel estimate of IEA consists of the total consumption at the two international airports in Zurich and Geneva, while all remaining fuel use is considered domestic. The reporting in the national greenhouse gas inventory is based on a much more detailed approach, where information on single flights is taken into account. Due to the different approach, the numbers are somewhat different. However, the order of magnitude is the same, and the information in the inventory is based on a higher-tier method and presumably more accurate.

### **Diesel and gas oil**

The IEA numbers include diesel and gas oil used in Liechtenstein. Furthermore, stock changes are reported differently in the CRF and by the IEA. Secondary and tertiary stock changes are subsumed under statistical difference by the IEA, while they are included in the stock change reported in the reference approach. If the statistical difference is taken into account, the difference in the apparent consumption is less than 0.1%.

### **Residual fuel oil**

Data agree between IEA and UNFCCC. It seems as if there is a rounding error in the imported amounts, leading to an apparent difference of 1 Gg. According to the foreign trade statistics, 33'693t of residual fuel oil had been imported in 2010.

### **Bitumen**

Bitumen is a main feedstock in the greenhouse gas inventory. Data between IEA and the reference approach compare well. Again, small differences are likely due to the use of rounded values, leading to apparent differences of the order of 1-2 Gg.

### **Petroleum coke**

There are considerable differences (26 Gg) in the reported numbers for petroleum coke import. The reason for this apparent difference is that for IEA, all petroleum coke is reported together. In the greenhouse gas inventory, however, only the petroleum coke used as a fuel is reported under petroleum coke, while calcined petroleum coke is reported together with “other oil” as feedstocks. This is largely a consequence of the treatment of fuels and feedstocks in the Swiss energy statistic (SFOE, 2011).

### **Lubricants**

There are small differences between IEA and the reference approach, as the data reported to the IEA comprises a slightly different set of customs tariff headings for lubricants to the one used for the Swiss energy statistic. The substances not reported under lubricants in the reference approach are reported under other oil.

### **LPG**

The reporting of LPG in the greenhouse gas inventory includes white spirit and lamp oil. As for petroleum coke, IEA numbers include fuels that are used as feedstocks, while in the reference approach, only LPG, white spirit and lamp oil used as fuels are reported under LPG. The difference in apparent consumption between IEA and the reference approach is 3 Gg (0.03% of total liquid fuel consumption).

### **Other oil products**

In the greenhouse gas inventory, all other oil products are reported together, while IEA has a finer degree of disaggregation. As already mentioned above, the share of petroleum coke that is used as a feedstock is reported under other oil in the greenhouse gas inventory. Therefore, the difference between IEA and the reference approach corresponds largely to the difference in apparent consumption of petroleum coke.

### **Solid fuels**

Solid fuels play only a minor role in Switzerland (246 Gg) and are reported in good agreement.

### **Gaseous fuels**

Gaseous fuels are reported in good agreement.

CRF vs. IEA (2010) Gg	Import		Export		Bunker		Stock change		Stat.diff.		LIE	Consumption	
	IEA	CRF	IEA	CRF	IEA	CRF	IEA	CRF	IEA	CRF		IEA	CRF
Crude oil	<i>4'488</i>	<i>4'546</i>					0	1	0			<i>4'488</i>	<i>4'547</i>
Refinery feedstocks	3						1		2			6	
Additives/blending components	51						-1		2			52	
												<b>4'546</b>	<b>4'547</b>
Motor gasoline	1'850	1'838					-9	-6	4	15		<b>1'830</b>	<b>1'832</b>
Aviation gasoline	7						-2		-1			4	
Kerosene type jet fuel	<i>1'354</i>	<i>1'362</i>			-1'367	-1'352			2	6		-7	12
Other Kerosene	3											3	
												<b>0</b>	<b>12</b>
Gas/diesel oil	3'510	3'485	-21	-39	-10	-11	38	1'072	1'020	27		<b>4'510</b>	<b>4'507</b>
Fuel oil	33	34	-323	-316			-17	-17	7			<b>-300</b>	<b>-299</b>
Liquefied petroleum gases (LPG)	50	54	-24	-25						0.1		26	29
White spirit & SBP	7								-1			6	
												<b>32</b>	<b>29</b>
Bitumen	317	318	-2	-2								<b>315</b>	<b>317</b>
Lubricants	86	72	-38	-16					7			<b>55</b>	<b>56</b>
Petroleum coke	73	47										<b>73</b>	<b>47</b>
Naphtha	1						5		-1			5	
Paraffin waxes	1											1	
Non-specified oil products / other oil	4	63	-	-23			-	-6				4	33
												<b>10</b>	<b>33</b>
<b>Liquid fuels</b>												<b>11'039</b>	<b>11'052</b>
Anthracite	7											7	
Other bituminous coal	123	152					36	32				159	184
Lignite	66	62					-4					62	62
Coke oven coke	18											18	
<b>Solid fuels</b>												<b>246</b>	<b>246</b>
<b>Natural gas (TJ, NCV)</b>	126'014	126'016										<b>126'014</b>	<b>126'016</b>

Table 2 Comparison of the IEA energy statistic with the reference approach for the year 2010. Numbers in italics are fuels that are reported in a finer disaggregation in the IEA energy statistic than in the reference approach. Numbers in bold aggregate the data to the level of disaggregation used in the reference approach.

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 [IEA-Reference approach Jan2013](#)