

Annex 3.C

On Industrial Processes. CRF sector 2

Lime production

CRF source category 2.A Mineral Products, 2. Lime Production.

SNAP source category 040614. Lime (decarbonizing).

Source category description

This source includes CO₂ emissions from production of lime and bricks and represents as such a combined activity in the CRF tables. This Annex serves to explain the source.

The source is not a key source neither for the trend nor for the level key source analyses in this report.

The production of lime has a slightly falling trend in the time-series 1990-2002, while the production of bricks is slightly increasing. As a result the CO₂ emission for the combined activity in year 2002 is almost the same as in 1990, refer to the table below.

Methodology

The CO₂ emission from production of Lime is calculated according to the IPCC guidelines, Reference Manual p2.8, with the emission factor of 0.79 kg CO₂ / kg Lime. This emission factor is multiplied by activity data from production statistics published by Statistics Denmark, refer the Table below.

The emission factor from production of yellow bricks is calculated the following way. When limestone (CaCO₃) is heated it decomposes into lime (CaO) and CO₂. Using the molecular weights, implies that 44 kg of CO₂ is emitted for every 100 kg CaCO₃ decomposed. Since clay used to produce yellow bricks contains 18% of limestone, the emission factor is $0.18 \times 0.44 = 0.079$ kg CO₂ / kg yellow bricks. This emission factor is multiplied by activity data from production statistics published by Statistics Denmark. This Statistics accounts for the number of bricks produced, the average weight of a brick is estimated to 2 kg. Refer to the Table below for the data and the emissions calculated.

The activity data and the resulting emissions from production of lime and bricks are aggregated in the CRF, in Table 2(I).A-G sheet 1. The underlying data and the resulting aggregated data are given in the table below.

Table. Production of Lime and Bricks, CO₂ emission factors and CO₂ emissions.

Year	Lime		Yellow Bricks		Lime and Bricks		
	Production	CO2 emission	Production	CO2 emission	Production	CO2 emission	Combined emission factor
	(1) (t)	(2) (Mg)	(3) (t)	(4) (Mg)	(5) (kt)	(5) (Gg)	(5) (t/t)
1990	126706	99555	291348	23016	418,05	122,57	0,29
1991	86226	67749	291497	23028	377,72	90,78	0,24
1992	104526	82128	301908	23851	406,43	105,98	0,26
1993	106587	83747	278534	22004	385,12	105,75	0,27
1994	112480	88377	389803	30794	502,28	119,17	0,24
1995	100929	79301	365149	28847	466,08	108,15	0,23
1996	95028	74665	397206	31379	492,23	106,04	0,22
1997	102587	80604	419431	33135	522,02	113,74	0,22
1998	88922	69867	423254	33437	512,18	103,30	0,20
1999	95137	74751	405241	32014	500,38	106,76	0,21
2000	92002	72287	412082	32554	504,08	104,84	0,21
2001	96486	75810	351955	27804	448,44	103,61	0,23
2002	122641	96361	346633	27384	469,27	123,74	0,26

- Notes:
- (1) Statistics Denmark: Sales Statistics for manufacturing industries.
 - (2) Emission factor 0,786 kgCO₂/kg; 1996 IPCC guidelines; reference manual p. 2.8
 - (3) Statistics Denmark: Sales Statistics for manufacturing industries, assuming that of the bricks produced and sold, 50% is yellow bricks each with an average weight of 2 kg.
 - (4) Emission factor 0,079 kgCO₂/kg, further information in the text.
 - (5) Corresponding to the values in the CRF Table 2(I).A-Gs1, A.2. in this report for the respective years (apart from roundings).

Source specific planned improvements

The review team in their report on the April 15 2003 submission made a note on the implied emission factor in the CRF tables on this activity. We have considered reporting the two activities separately in the CRF. However, we find the activities so much related both being a decarbonizing process that we find a combination of the activities justified with the explanations given in this Annex.