

Lime application in Swiss Agriculture

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Air Pollution / Climate

1. Lime application in Swiss Agriculture

Major Provider of lime for Swiss agriculture are the sugar beet refining industry, transshipment companies (imports), gravel plants and atomic power plants with cooling towers (Grünig 2009). Estimates for total lime application are given in Table 1. Estimates for RICOTER, FENACO-LANDOR and the atomic plants (Leibstadt and Gösigen) are based on information by the respective companies or retailers. At the time being no specific information is available for KIWE-CA (Gravel plants) and Peter Briner AG. Therefore estimates were made based on indications made by third parties. Only lime applied as CaCO_3 or $\text{CaMg}(\text{CO}_3)_2$ is considered in this report. While carbonate limes are the dominant liming material used, oxides and hydroxides of lime, which do not contain inorganic carbon, are used to a limited extent for agricultural liming but are not included here.

Due to the only rough estimates mainly based on expert judgement the resulting number of total lime application in agriculture is highly uncertain. A relative uncertainty of $\pm 40\%$ can be used as an approximation (95% confidence interval).



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Table 1: Estimated amount of lime applied in Swiss agriculture in t of CaCO₃ or CaMg(CO₃)₂ (1990-2008).

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
RICOTER	27'500	27'653	27'806	27'958	28'111	28'264	28'417	28'569	28'722	28'875
FENACO-LANDOR	8'000	8'889	9'778	10'667	11'556	12'444	13'333	14'222	15'111	16'000
KKW (Leibstadt, Gösgen)	11'800	11'800	11'800	11'800	11'800	11'800	11'800	11'800	11'800	11'800
KIWE-CA	0	0	0	0	0	0	0	0	0	0
Peter Briner AG	3'000	3'000	3'000	3'000	3'000	3'000	3'000	3'000	3'000	3'000
Total	51'300	51'342	52'383	53'425	54'467	55'508	56'550	57'592	58'633	59'675

	2000	2001	2002	2003	2004	2005	2006	2007	2008	
RICOTER	29'028	29'181	29'333	29'486	29'639	29'792	29'944	30'097	30'250	
FENACO-LANDOR	16'889	17'778	18'667	19'556	20'444	21'333	22'222	23'111	24'000	
KKW (Leibstadt, Gösgen)	11'800	11'800	11'800	11'800	11'800	11'800	11'800	11'800	11'800	
KIWE-CA	0	0	0	0	5'000	5'000	5'000	5'000	5'000	
Peter Briner AG	3'000	3'000	3'000	3'000	3'000	3'000	3'000	3'000	3'000	
Total	60'717	61'758	62'800	63'842	69'883	70'925	71'967	73'008	74'050	

2 Detailed information on lime providers in Switzerland

Producer

Reference

RICOTER

"Ricoter Erdaufbereitungs AG" is commercializing lime that results as a by-product in the sugar beet refining industry (Ricokalk). Yearly quantities are estimated at 50'000t for 1990 and 55'000t for 2008 with fluctuations according to fluctuations in sugar beet harvests. Lime content is in average approximately 55% resulting in total lime application of **27'500t and 30'250t for 1990 and 2008** respectively.

Würsch 2009

FENACO-LANDOR

FENACO-LANDOR is a fertilizer transshipment company. The amount of lime imported and commercialized via FENACO-LANDOR is estimated to be in the order of **24'000t for 2008 and 8'000 for 1990**.

Eicher 2009,
Schaufelberger 2009

KKW (Leibstadt, Gösgen)

Atomic plants with cooling towers are a major producer of lime. Before the water enters into the cooling system it has to be decalcified. The amount of lime (CaCO₃) produced by a plant with a thermal capacity of 3 GW is approximately 10t per day. There are two atomic plants with the respective cooling towers in Switzerland: Leibstadt with a capacity of 9.3 GW (2008) and Gösgen with 7.6 GW (mean 1990-1999). The according amount of lime is 20'440t, lying close to the 20'000t estimated by Würsch (2009). Due to the lack of precise data 10'000t are assumed for the Gösgen plant. For Leibstadt more detailed information is available from Leureko AG (Leuenberger 2009). 7'200t are exported to Germany and 1'800t are sold in Switzerland. Accordingly the total amount of lime originating from atomic power plants is **11'800t**. The same number is applied for the whole time series.

KKL 2008, KKG 2000,
Leuenberger 2009,
Wikipedia 2009

KIWE-CA
Kieswerke

KIWE-CA is a provider of lime from gravel plants. The KIWE-CA cooperative was founded in July 2004 and is probably of minor importance compared to other providers. Meanwhile an amount of 5'000t per year from 2004 onward is estimated.

Gex 2009

Peter Briner AG

Peter Briner AG is a provider of lime east of Winterthur. Detailed data is not available but total amounts are probably of minor importance. A total amount of 3'000t per year is estimated.

Gex 2009

Thomasmehl

"Thomasmehl" is a by-product of the steel industry. Its composition is on average: 14–16 % P₂O₅, 45–55 % CaO, 2–4 % MgO, 6–8 % SiO₂, 12–16 % Ironoxides, 1–2 % Al₂O₃ and 5–10 % Manganoxides. CaO is not causing any CO₂ emissions and "Thomasmehl" used as fertilizer is therefore not reported here. Thomasmehl has been commercialized in Switzerland until 1997. Therefore a subsequent increase of lime application in the form of CaCO₃ is plausible.

Gex 2009, Asu-
arbeitsmedizin 2009

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