Nordkalk

Environmental Report 2000

PARTEK

Nordkalk and the environment

Nordkalk extracts and refines limestone. The environmental impact of these operations is continuously monitored and evaluated in accordance with the company's environmental policy, which covers the whole of Nordkalk. In this report we give an account of the influence that our operations have on the environment and what measures have been taken and are planned to reduce any adverse effects.

Nordkalk aims at sustainable development with environmental aspects being taken into account in the company's planning strategies. Products and processes are developed so that the environmental impact of the company's extraction and refining operations are kept to a minimum. The environmental plans form part of Nordkalk's corporate annual and strategic planning. Environmental work is monitored continuously with regular inspections. Responsibility for production-related environmental matters lies with the division's management while Nordkalk's environmental director supervises the policy to ensure that it is complied with throughout the company.

In addition to the environmental measures taken in production, Nordkalk also participates in environmental training programmes for its customers. When drawing up contracts with entrepreneurs and sub-contractors Nordkalk now requires an assurance that its demands on environmental policy will be met. The sub-contractors are checked regularly in connection by means of environmental audits.

The main principles of Nordkalk's environmental policy

Values and aims
- sustainable development with man as the focus of attention
- environmental legislation and regulations must be complied with
- environmental aspects of operations identified
- information about development, measures and results

Continuous improvement
- environmental impact taken into account when developing products and processes
- environmental plans form part of strategic planning and cover environmental aspects, aims and investments
- investment plans include an evaluation of the environmental impact of the investments
- environmental work is audited on a regular basis

Advances in environmental management

The divisions for ground limestone and quick lime in Finland were awarded ISO 14001 certificates for their environmental management systems in year 2000. This means that all production plants in Finland have now been certificated. In Sweden implementation of the environmental management system continued during the year and certification for the remaining plants is planned for 2001.

During the year Nordkalk joined the energy-saving agreement that the Confederation of Finnish Industry and Employers has concluded with the Ministry of Trade and Industry. The aim is to use energy more efficiently and so reduce costs. A long-term and systematic plan for more efficient use of energy is at the same time also a good way to reduce harmful emissions.

At Lappeenranta, Finland, an environmental report describing the situation covering the whole factory site including Nordkalk's neighbours has been completed. The old industrial refuse dump for dry waste at Lappeenranta has been closed and will be covered according to plan.

Nordkalk participates in a project which aims to improve environmental conditions of the Archipelago Sea. The program has been drawn up by Environmental Centre for Southwestern Finland, the Association for Finland Proper and the labour and employment centre in Finland Proper. Nordkalk is involved in the working group, which in the year 2000 charted emissions from merchant vessels and their environmental impact on the Archipelago Sea.




Environmental measures at production plants

Different development projects are under way all the time at Nordkalk's production plants, and monitoring and control systems are subject to steady improvement.

Air
Dust is one of the most important environmental aspects of Nordkalk's operations and measures to reduce dust emissions are subject to continuous review.

At the lime kiln at Tytyri in Finland a further 2,000m^2 of the factory area have been covered with asphalt. Dust-reduction equipment has been renewed at the crushing and packing plants. Better planning of traffic in the factory area has led to reduced amounts of dust and greater safety.

The quarry at Pargas in Finland has renovated the older section of its stone-sorting operations, and the amounts of dust indoors have been markedly reduced. Outside a sprinkling system has been built to bind the dust when handling stone in dry and windy weather. Altogether 3,800m^2 of roads and industrial spaces have been asphalted.

The textile parts of the filters at the lime kiln in Luleå, Sweden, have been renewed, and filtering has been improved.

At the lime kiln at Rakke in Estonia two new dust filters have been installed.

Most of the plants participate in a dust programme at their respective operating sites.

Water
Production processes at the flotation plant in Lappeenranta have been improved, which has reduced discharges from the dams for flotation tailings.

To reduce the risk of oil polluting the ground water the oil depot at the Vimpeli quarry in Finland has been moved and control of the pumping of quarry waste-water improved.

Waste and by-products
The environmental management systems have resulted in safer handling of oil and better waste sorting. The environmental programme for the mines and quarries covers methods for exploiting waste stone in by-products.

The Pargas quarry increased its use of waste stone for by-products to a total of 426,000 tonnes during the year. Only 170,000 tonnes of stone was deposited on tips.

In Lappeenranta it has been possible to increase the use of flotation tailing, for restoring rubbish tips, for example. The carbon dioxide from the lime kiln is recycled as a raw material for the precipitation of paper pigment (PCC).

At Louhi, Finland, there has been investment in methods for filling disused quarry areas with unused waste products.

Environmental investments
In the year 2000 a total of 1.4 million euros was invested with the aim of reducing the environmental impact without any demand on profitability.

Reinstatement

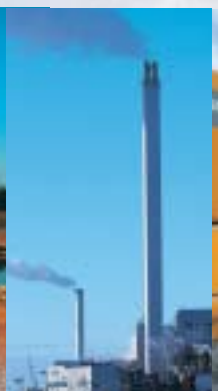
Waste stone dumps have been covered with soil and trees planted at Pargas and Vampula, Finland.

Environment-related incidents

In February there was a landslide at the Pargas quarry in Finland and some 2,500 m^3 of stone and clay were dislodged from the edge of the quarry. The slide caused only economic losses, which were covered by insurance. As a consequence of the slide the existence of clay pockets around the quarry has been thoroughly charted.

Tests with vegetable oils

At Storugns on the Swedish island of Gotland experiments have for some years been carried out with easily degradable vegetable oils in trucks and loading machines. These have proved, however, to damage the gaskets and pumps in the hydraulic system, causing increased maintenance costs and leakage. It has therefore been necessary once more to adopt the mineral oil.


Production processes and their impact on the environment

The majority of Nordkalk's plants are situated in towns and conurbations, which means that the surroundings place great demands on the operations.

Close to Storugns on Gotland there is a nature reserve, which restricts to some extent the quarrying of limestone there. Nordkalk's operations in Lappeenranta lie partly within a protected area for ground water; this means increased responsibility and extra control of operations. The quarrying of limestone at the Vesterbacka quarry at Vimpeli in Finland is covered by the Decree for the Protection of Natural Copses and the Ancient Monuments Act.

The most disturbing aspects of Nordkalk's are noise, vibration, dust and different forms of discharges. In addition to these there is also the problem with waste stone and other waste materials from the production processes together with environmentally hazardous waste. The last consists primarily of different forms of waste oils that are collected and treated in accordance with current legislation and regulations. At the calcite and wollastonite flotation plants in Lappeenranta the use of water is an important environmental consideration.

Extraction and rough handling
Limestone is mined from the bedrock in either quarries or underground mines. It is then transported for preliminary treatment and sorting, after which it goes on to be further processed. These operations give rise to vibration, noise and dust. Nordkalk extracts limestone at eight different sites in Finland, five in Sweden, three in Estonia and three in Poland.

The quarries change the appearance of the landscape in a very obvious manner. In addition to the stone that is actually used, waste stone is often produced as a by-product. To some extent this can be used for making macadam but some has to be deposited in large dumps that are eyesores on the landscape.

Ground water seeps by way of cracks in the bedrock down into the mines. Added to this, in the quarries there is also the problem of seepage of surface water. This may affect the ground water level in the area.

Production of quicklime
When lime is burned, crushed and sorted limestone is heated to some 1000°C in a rotating or shaft kiln. The limestone ($CaCO_3$) is broken down into calcium oxide, i.e. quicklime (CaO), and carbon dioxide (CO_2).

Quicklime is in granular or powder form and is sifted into different fractions or ground. The end-products are used in the manufacture of iron and steel, in processing sulphide ore, in making paper pulp, and for cleaning drinking and waste water. Flue gases from coal-fired power stations are also cleaned with quick lime. When quick lime is made, coal, oil and gas are used as fuels. The gases that result contain oxides of nitrogen (NO_x), carbon dioxide (CO_2) and sulphur dioxide (SO_2) in varying amounts.

The process also causes dust. To reduce the amounts of dust the flue gases from the kilns are passed through electric or fabric filters with a high degree of separation. There are no discharges into waterways from the lime-burning process.

Nordkalk produces quicklime at five sites in Finland, three sites in Sweden and one in Estonia.

Production of slaked lime
The lime is slaked by adding water to quick lime. The calcium oxide reacts with the water and is transformed to calcium hydroxide ($Ca(OH)_2$), i.e. slaked lime, which is a dry, light-coloured and powder-like flour.

Slaked lime is used for cleaning drinking and waste water and in the metallurgical and building industries, for example.

In the course of manufacturing slaked lime heat and steam are discharged into the atmosphere. Thanks to efficient dust-reducing, however, the release of particles is negligible.

Nordkalk produces slaked lime at two sites in Finland and two in Sweden.

Carbonate products
Carbonate products include limestone, i.e. calcium carbonate ($CaCO_3$), which is crushed, ground and sifted.

The products are used for soil improvement in order to neutralise acidity, for cleaning flue gases in coal-fired power plants, for alkalising water, in animal feeds and as fillers in asphalt, paper and plastics, for example.

The grinding of the limestone is a dry process and consequently dust is the main source of environmental damage at the limestone plants.

The dust can, however, be controlled by using a closed process and cleaning the discharged air with filters.

Nordkalk produces limestone products at nine sites in Finland, five in Sweden, three in Estonia and three in Poland.

Other production
Nordkalk refines calcite and wollastonite from its own quarry. The processed calcite is further refined for use as paper pigment. The raw material comes from Nordkalk's mine in Lappeenranta.

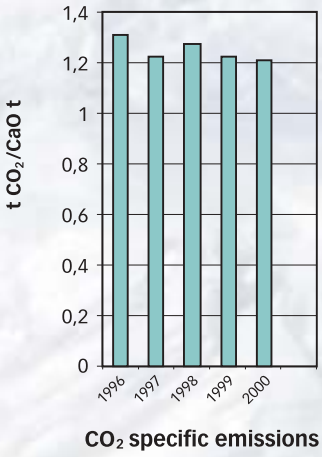
Environmental products

Nordkalk develops and markets also products for environmental care. Various limestone-based products make it possible to preempt and to solve different environmental problems. Environmental products accounted for 12 percent of net sales in 2000.

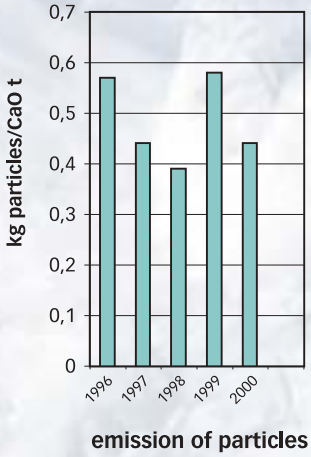
In environmental care a new product, Nordkalk Velox, was launched. It has been developed for more efficient composting and reducing the smell that results when handling refuse and treating sewage. Nordkalk Velox is well adapted to handling bio-waste and different kinds of sewage and industrial sludge in composts and open pit composting. No corresponding limestone-based product has hitherto existed on the European market.

Specific Emissions in Air

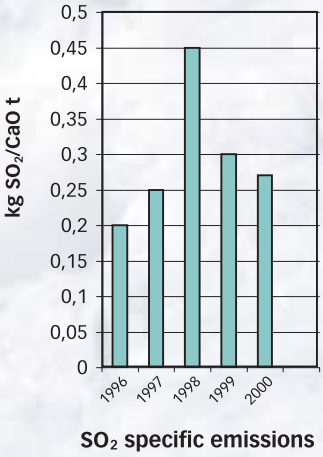
Quicklime



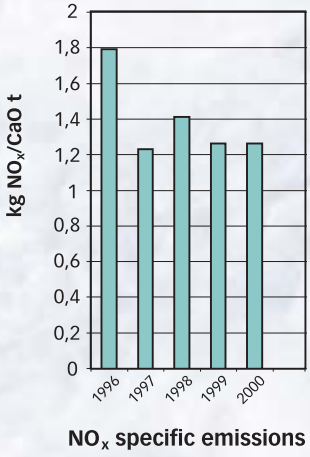
CO_2 specific emissions



emission of particles

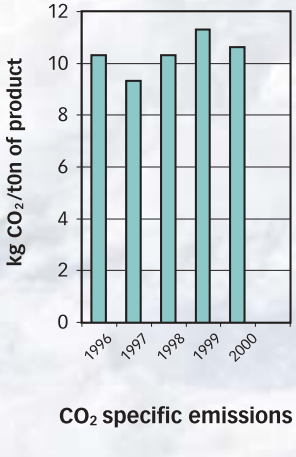


SO_2 specific emissions

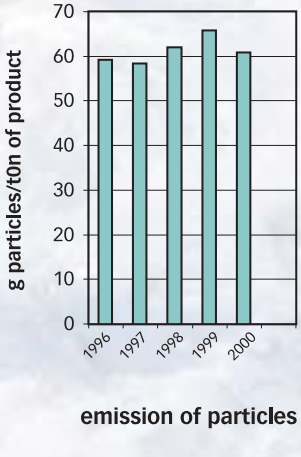


NO_x specific emissions

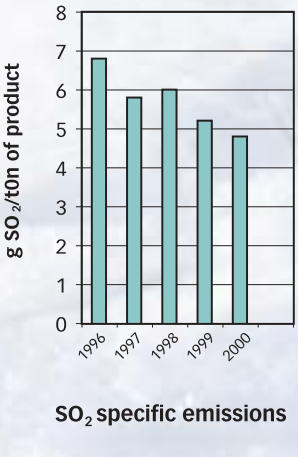
Carbonate products



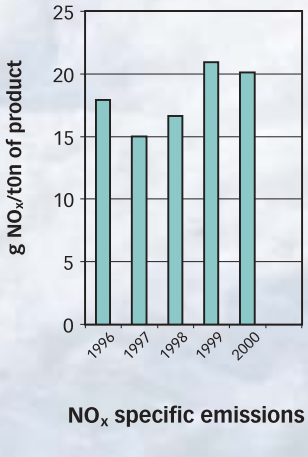
CO_2 specific emissions



emission of particles



SO_2 specific emissions



NO_x specific emissions

The diagrams are based partly on measurements, partly on calculations.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Emissions

FINLAND		1995	1996	1997	1998	1999	2000
emission in air:	CO_2 (t)	350 000	350 000	561 950	593 732	638 979	670 079
	particles (t)	343	394	387	349	347	464
	SO_2 (t)	44	87	158	175	68	122
	NO_x (t)	424	464	415	514	468	514
emission in water:	solid material (t)	13	24		14	16	80
	Fe (kg)	522	522	-	-	-	-
	fluorides (kg)	23	20	-	-	-	-
	BOD_7 ATU (t)		4		3	2	8
by-product:	electrofilter dust (t)	25 389	31 700	41 716	37 902	41 863	46 681
	* utilized (t)	5 700	20 100	20 589	16 730	27 071	29 592
	slaking residue (t)	16 871	21 500	19 986	25 709	21 108	20 425
	* utilized (t)		11 000	11 786	14 949	12 739	13 174
	waste stone (t)	262 000	921 850	1 290 936	1 443 681	1 122 884	1 454 576
	* utilized (t)	4 000	500 800	811 956	953 242	829 746	1 148 527
	refining waste (t)	134 900	127 900	171 196	185 760	119 183	119 922
	* utilized (t)	27 518	22 158	24 628	19 287	15 000	25 000
environmentally hazardous waste:	oils+greases (t)	52	93	43	53	49	58

SWEDEN		1995	1996	1997	1998	1999	2000
emission in air:	CO_2 (t)	311 330	291 000	344 551	475 243	385 248	437 790
	particles (t)	56	113	92	101	135	99
	SO_2 (t)	31	43	61	205	162	128
	NO_x (t)	276	485	545	705	644	682
by-product:	electrofilter dust (t)	18 700	33 580	33 303	34 727	27 547	23 637
	* utilized (t)	15 900	29 580	29 578	30 421	23 057	18 317
	slaking residue (t)			2 200	1 705	1 390	1 599
	* utilized (t)			2 200	1 705	1 390	1 599
	waste stone (t)	7 117	5 940	10 803	14 003	39 814	52 343
	* utilized (t)			10 803	14 003	39 814	52 343
	washing sludge (t)	49 000	70 000	0	0	26 022	26 028
	* utilized (t)					0	0
	quick lime (t)	2 000	4 700	4 463	2 051	1 899	2 695
	* utilized (t)						500
environmentally hazardous waste:	oils+greases (m^3)	51	39	26	46	59	54

ESTONIA		1999	2000
emission in air:	CO_2 (t)	28 959	25 502
	particles (t)	350	127
	SO_2 (t)	2	2
	NO_x (t)	21	19
by-product:	electrofilter dust (t)	0	1 500
	* utilized (t)	0	1 500
	kiln residue (t)	480	480
	* utilized (t)	0	0
	process waste (t)	71 300	30 500
	* utilized (t)	71 300	30 500
environmentally hazardous waste:	oils+greases (m^3)	0	5

POLAND		1999	2000
emission in air:	CO_2	75	706
	particles (t)	0,40	5,80
	SO_2 (t)	0,15	0,47
	NO_x (t)	0,15	1,43
by-product:	process waste (t)	1 265	2 300
environmentally hazardous waste:	oils+greases (m^3)	not noticed	not noticed

Photo: Tiina Weppling

Counting of Emissions in Air

Emissions of sulphurdioxide
(oil vessel)
$M_s = 0.02 \times s \times M_a$ (t/a)
where M_s = emission of sulphurdioxide (t/a)
s = sulphur content of fuel
M_a = fuel consumption (t/a)

Emissions of particles
(oil vessel)
$M_h = 0.04 \times Q \times M_a/1000$ (t/a)
where M_h = emission of particles (t/a)
Q = emission of particles (70 mg/MJ, if not measured)

Emissions of carbondioxide
Burning of limestone releases
- about 360 kg CO_2 /tons fed ($CaCO_3$ content about 85 %)
- about 400 kg CO_2 / tons fed ($CaCO_3$ content about 95 %)
about 700 kg CO_2 /ton CaO

CO_2 emission coefficients

Fuel	kg CO_2/GJ
petrol	69,3
diesel, light oil	74,1
heavy oil, waste oil	77,4
liquid gas	63,1
coal	94,6
coke	108,0
anthracite	94,6
natural gas	56,1
blast-furnace gas	252,0
coking plant gas	110,1
peat	106,0

Thermal value of fuel

Fuel	thermal value
coal (GJ/t)	29,0
fuel oil (GJ/t)	42,0
natural gas (MJ/m^3)	36,0
liquid gas (GJ/t)	46,4

Emissions of nitric oxide

Fuel	NO_x coefficient (mg/MJ)
heavy oil	150
light oil	150
natural gas	100
liquid gas	100

100-year contract

Just north of the town of Nokia in Finland not far from Tampere lies Lake Alinenjärvi with its water system. The area is one of great wild natural beauty and it has high recreational value.

To celebrate its hundredth anniversary in 1998 Partek and Partek Nordkalk decided to honour the company's roots by taking the initiative for a liming project to improve the quality of the water in the Alinenjärvi water course. The project is being carried out in collaboration with the town of Nokia and the environmental authorities. The results are monitored each spring and autumn.

Samples taken in 2000 show that the quality of the water has steadily improved and that further liming is not necessary at present. Liming is concentrated to the upper course of the system and, as expected, the results can now be detected in the lower course of the lake system.

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