





# Nordkalk Group's Operating Policy

Nordkalk extracts, processes and delivers limestone, and offers services related to these operations.

## Guidelines for operations

The working environment shall be good and safe for everybody.  
 We comply with environmental legislation, regulations and agreements.  
 We strive to minimise the environmental impact of our operations.  
 Our values - Trust, Competence and Quality - guide our operations.  
 We deliver the right product, quality and service at the agreed time.

## Continuous improvement

Our aim is to continuously improve our products, services and processes, while taking the economic aspects, environmental impact and energy consumption of our operations into consideration.

We maintain active communication with our customers and we improve our performance by investigating all found deficiencies.

As part of our strategic and annual planning, we make plans for improvements that cover the work environment, quality and environmental aspects and energy related costs together with goals, measures and investments related to these. When an investment is evaluated at Nordkalk, an assessment of its impact on the working environment and the environment must be carried out.

We regularly monitor our goals defined for the working environment, quality and environmental impact.

## Responsibility

All persons in supervisory positions are required to ensure that the personnel understand their role and have the authority and competence needed for their work. We all bear a duty to point out defects and errors. Nordkalk's President has the overall responsibility for ensuring that the operating policy is followed.

## Communication

This policy is reviewed regularly and updated when necessary. It is distributed to the personnel and is also available to Nordkalk's stakeholders.

*Bertel Karlstedt*  
 President and CEO

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In this report we describe the effects of our operations on the environment, and our actions, either planned or accomplished, to reduce environmental impact in all our countries of operation. Nordkalk has been publishing environmental reports since 1996.

# Nordkalk's production meets a natural demand

PHOTO: TERHI ANTILA

Nordkalk produces lime products necessary for many of society's basic functions. Our products serve an important purpose in neutralization and purification, as fillers and as substitutes for various valuable substances. Our products are used to neutralize agricultural soil to optimize crops and to neutralize water systems. Lime products are also used in both municipal water treatment and by the process industry. Flue gases from municipal waste incineration, power generation and similar basic industrial processes are cleaned using lime products. Steel is purified by using lime to bind impurities in slag. In papermaking, lime-based products are used to replace valuable forest fibers and they also play an important role in the manufacturing of plastic, paint and asphalt. Using lime in soil stabilization makes it possible to build infrastructure on inferior clay soil, hence reducing the dependence to high quality construction land. All of these end uses require the quarrying of limestone and processing it into products suitable for all of the above-mentioned applications. For geological reasons limestone is to be quarried where there is stone which limits the choice of areas. All in all, however, the benefits offered to society by our limestone-based products far outweigh the effects on the exploited areas.

## Nordkalk lives up to its social responsibilities

Sustainability is comprised of three elements that must be taken into account in all industrial operations: environmental concerns, social responsibility and economic realities. All business enterprises have to be profitable in order to live up to their commitment to their customers, satisfy employee needs and fulfil environmental requirements. It goes without saying that the company's employees have the right to a working environment that guarantees their well-being and makes it possible for them to continue working until their normal age of retirement. All companies are mutually dependent on the communities in which they operate. Companies offer employment opportunities and pay taxes. Society lays down the rules by which the business community plays. Just as society places demands on companies, companies have expectations of how the authorities should act in order to guarantee the conditions for functional business activities. This can be anything from expedient and predictable granting of permits to regulations supporting minimizing the volumes of discarded material. Regulations should support the use of all material flows instead of creating obstacles. It is in the best interest of any industrial operation to minimize its waste production. The more raw materials processed into end products for the markets, the lower the costs. The same reasoning holds true for energy consumption. Processes need to be as energy-efficient as possible, a fact directly connected to costs. Use of residual materials from other industries contributes to an even more efficient fuel supply.

## Key performance indicators pave the way for improvement

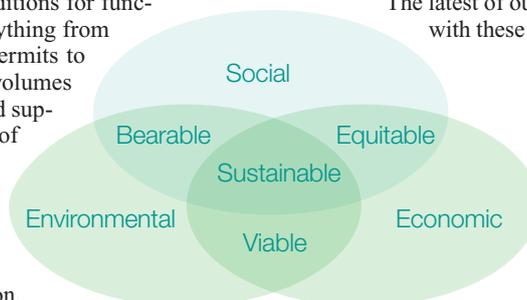
A widely acknowledged phenomenon is that "you get what you measure". In order to stay in control of our internal business performance, we at Nordkalk have developed KPI measurement both



in terms of our production, OHS, environmental issues and energy consumption. Our goal is to compare our performance both internally between our units and with general industry BAT values (Best Available Technology). The measurements serve as a starting point for continuous improvement in accordance with the international quality, environmental and OHS standards in place at Nordkalk.

The latest of our units to have been certified in accordance with these standards is our production plant in Russia.

*Håkan Pihl*  
Vice President  
Geology and Environment



Source: Adams, 2006.  
*Sustainability is comprised of three elements: environmental concerns, social responsibility and economic realities.*

*Nordkalk complies with the international standards for quality, environment and occupational health and safety.*



# Limestone is part of

*Nordkalk is the leading producer of high-quality limestone-based products in Northern Europe. The company's roots are in Pargas, Finland, where limestone has been extracted industrially since 1898. Today, Nordkalk has quarries and production plants in Finland, Sweden, Norway, Poland, Estonia and Russia. Nordkalk is a member of the Rettig Group.*

## Lime is needed everywhere

Nordkalk extracts and refines limestone for industry, agriculture and environmental care. Quantitatively measured, industry is the biggest customer segment, where lime products are used mainly in building materials, in the making of steel and paper and in the chemical industry. Lime is of great importance to agriculture as it increases profitability and reduces the strain on the environment. Nordkalk's environmental products can be used for cleaning flue gases and water.

Nordkalk's turnover continued to increase in 2011. Intensive work is being carried out at Nordkalk to make processes more effective, to increase the use of alternative fuels and to minimize the impacts of the operations on the surrounding environment. One of the goals of R&D is to increase the utilization degree of quarried stone to 100%.

## Lime helps the environment

Lime can be used both to prevent and treat environmental problems. Over the last few years, Nordkalk has developed many new products for environmental care. Lime plays an important role in the fight to improve the state of the Baltic Sea.

Fostop®Struktur is Nordkalk's new agricultural and environmental product in Sweden. It gives the soil a better structure, thus decreasing the eutrophication of the watercourse. In a field treated with structure lime the phosphorus will remain in the soil rather than wash away with rain and melted snow or ice. A similar product is still lacking from Finland, but there are ongoing studies on how this product would suit the Finnish circumstances.

## Lime fills, purifies and stabilizes

The chemical qualities of lime are needed in many different processes, serving as a filler, purifier and stabilizer. Lime is an important component when constructing buildings and roads. Limestone is an important element in the manufacture of many of the products we use on a daily basis. On an ordinary breakfast table, for example, one can find steel, as well as glass and paper products, bread, eggs and purified water.

Nordkalk's lime products improve the quality of water and air, as well as the well-being of people, animals and plants. Lime is needed for purifying drinking water and for cleaning waste water generated by industry, urban areas and private properties in sparsely populated areas.

With the help of lime, air pollution can be reduced and watercourses can be protected. The liming of fields reduces the amount of nutrient salts that get washed into watercourses. Plants can make better use of nutrients in limed soil, which decreases the need for fertilizers. Lime products are also suitable for treating polluted soil. With the help of different lime products, an optimal pH value can be achieved, which in turn decreases the leachability of harmful substances.

## NORDKALK COOPERATES WITH ENVIRONMENTAL PRIZE WINNER

**Fredrik Andersson** from Tarby farm and **Johan Lindgren** from Backa farm in Vallentuna, outside Stockholm, are the Swedish winners of the WWF's Baltic Sea Farmers of the Year Award for 2011. Their farms are part of an environmental campaign initiated by the WWF 10 years ago. The campaign strives to improve the environment in and around the Baltic Sea and to engage farmers in cooperation in order to get results.

Fredrik and Johan are involved in the local division of the Federation of Swedish Farmers and they actively work to involve all farmers in the area in the environmental work. They improve the environment through structural liming, sampling and

soil surveys, to name a few. The areas in need of liming in Vallentuna are large, and the liming is done in cooperation with Nordkalk. The substantial amounts of lime that are required are delivered from Nordkalk's plant in Köping.

Nordkalk's product for structural liming is called Fostop®Struktur. Structural liming decreases the leaching of phosphorus from the fields and thereby also the eutrophication of the watercourse. As it also gives the farmer better crops and lowers energy



*Fredrik Andersson (left) and Johan Lindgren.*

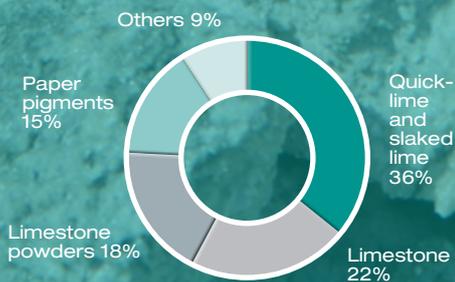
consumption, one can say it's a win-win situation, in which both the farmer and the environment benefit from the result.

# our everyday life

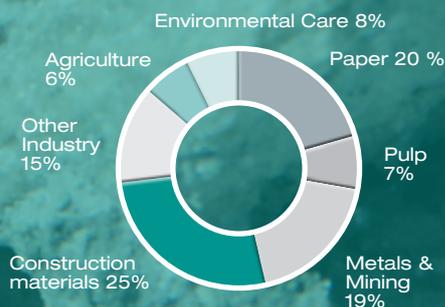
PHOTO: TENNOBERT HAABU



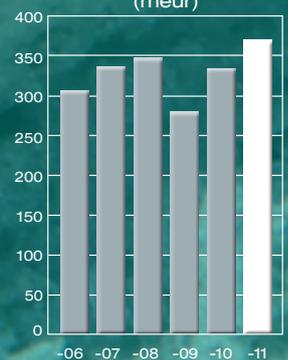
**SALES BY PRODUCT GROUPS 2011**  
(% of turnover)



**SALES BY CUSTOMER SEGMENTS 2011**  
(% of turnover)



**TURNOVER**  
(meur)



# Health and safety

PHOTO: SEILO RISTIMÄKI



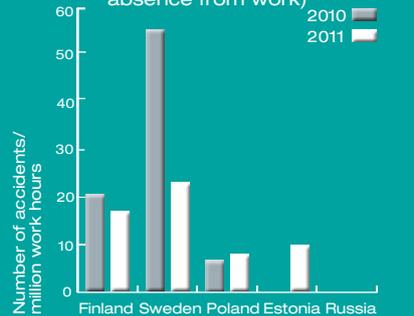
In the beginning of 2012, a campaign was started in the whole of Nordkalk to prevent eye injuries. This means that everyone is to have access to eye and face protectors that are suitable for different work situations.

In the photo are serviceman Pekka Männikkö (left), process operator and chiefshop steward Yngve Mattsson and Health & Safety Manager Matti Bergbacka outside the lime kiln in Pargas, Finland.

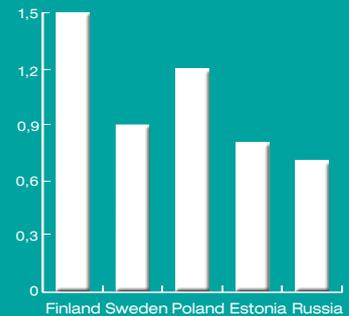
**PERSONNEL AMOUNT BY COUNTRY**  
(Total 1186)



**ACCIDENT RATE**  
(including accidents that have not caused absence from work)



**SAFETY OBSERVATIONS**  
(per employee)



# first on the agenda

*One of the cornerstones of Nordkalk's way of working is a sense of responsibility. In the same way that one takes responsibility for the surrounding environment, one also takes responsibility for the internal working environment and the health and safety of the employees.*

## Systematic work

In 2011 Nordkalk continued its systematic efforts to promote health and safety at work. The number of occupational accidents increased from 45 in 2010 to 49 when including accidents involving the personnel of subcontractors working on Nordkalk premises. There are still differences in reporting between different countries, but the efforts to standardize it are steadily moving forward. Personnel are encouraged to report safety observations as a way of improving the safety of their own work environment. In 2011, more than 1.200 safety observations were reported, which is an average of one per employee. Thanks to these observations, risk factors at work sites can be eliminated and many accidents can be prevented. Systematic reporting also contributes to a safety mindset and improves the flow of information.

On 1 November a tragic accident took place at the lime kiln in Luleå, Sweden, where two contractor companies were working. Seven employees of the contractors were injured, and one of them died later of his injuries. The cause of the accident is being investigated by the authorities and by Nordkalk. The company is reviewing all safety management routines in the whole group and especially at work sites where some of the work is done by contractors.

The certification according to the OHSAS 18001 standard was completed in Russia in the beginning of 2012. This means that all Nordkalk countries have H&S certification, with the exception of Norway. Auditing is a good way of improving procedures and a safety mindset at the sites.

## Attitude and education increase safety

Nordkalk's international H&S Network develops new methods to continuously improve occupational safety. In 2011, new high-visibility work clothes were introduced group-wide. Personnel are offered training in H&S issues according to the targets of the "Zero Accidents" program. The zero tolerance campaign for drugs and alcohol, which was launched in 2009, also continued in all countries. The main messages of the campaign are the right attitude and each employee's personal responsibility for collective safety.

The personnel's development plan is based on the results of a personnel survey carried out in 2010. The goal of the development actions is to create an appreciative, confidential and fair atmosphere at the workplace. This will be achieved, for example, by training foremen in good leadership.

The Nordkalk Future program is aimed at newly recruited experts and managers whose work involves international networking. In 2011, twenty Nordkalk employees from different countries took part in the program and received training in strategy, marketing, economics, leadership and communications over a total of ten days.

## Nordkalk takes responsibility for its surroundings

The efforts being made to improve health and safety do not involve only the internal conditions of the company. The safety guidelines issued to personnel also apply to the contractors and subcontractors that work at the production plants. Everywhere Nordkalk has activities it takes into consideration the safety of its neighbors and strives for a pleasant and safe living environment.

## IN POLAND WE INVEST IN "SAFE STOP"

In Poland the country's general accident statistics as well as that of other countries were analyzed, and it was concluded that every year many industrial workers are injured when repairing machines and other electrical equipment. Many of these accidents occur when the machine unintentionally and uncontrollably has started up while under repair.

A simple but extremely effective way to avoid similar accidents is to install a lockable switch on all electrical

devices. In practice, this means that the person repairing the machine will lock the switch up and take the key with them. It is then impossible to accidentally switch the machine on, and no other mechanic can unlock it.

Similar safety locks have now been installed at all of Nordkalk's plants in Poland and, as a combination of good routines and the right attitude, this is yet another step towards the goal of zero accidents.



# The operational prerequisites

PHOTO: SVEN FOLIN



**Nordkalk's geologist Kenneth Fjäder studies the bedrock around the prospective Bunge quarry. The decision to open a new limestone quarry in just Bunge is based on many years of research by both outside experts and Nordkalk's own specialists.**

# of mines must be ensured

*Limestone must be quarried where there are large enough deposits and the quality is right. Clearly there needs to be a balance between the interest in nature conservation and the extraction of mineral-based raw materials needed in today's society.*

Major demands are being made on mining companies when it comes to environmental issues. Quarrying must have as small an effect on the environment as possible, and the exploitation of ore or stone must take place without disturbing the neighboring residents or the habitats of plants and animals. Nevertheless, only a negligible proportion of land is being used for mineral excavation: in Finland the area was 0.02% in 2011.

## EU ensures access to raw material

The European Union's raw material initiative of 2008 strives to increase awareness of the need to ensure access to mineral-based raw materials. The initiative stresses the importance of access to land, which means that mining acts and land-use planning must consider the interests of all interested parties. The EU is not striving to create mining directives or some other type of common legislation for the entire union. It is up to each member state to make their own laws to meet regional and national demands.

As a result of the raw material initiative, the EU countries invested in 2010 in identifying critical mineral-based raw materials, which include limestone. Special attention was paid to white calcite, which is used in the making of paper pigment. Access to the raw material can also be regionally emphasized, which is the case with limestone on the island of Gotland in Sweden. It is an irreplaceable raw material for the Nordic steel industry. In Sweden limestone is a land-owner mineral and is not included in the Minerals Act, but is solely regulated by environmental regulations.

In June 2010, the EU published a guidance document that clarifies the rules for mineral extraction within the Natura 2000 areas where there are deposits of minerals worth extracting. In Northern Gotland, for example, there are several Natura 2000 areas bordering on Nordkalk's deposits. The new guidelines state that it is possible to extract in these areas provided that the operations are run in a sustainable manner.

## A new mining act in Finland

In line with the EU's raw material act, Finland has devised its own mineral strategy that includes 12 action proposals. It provides an account of the rules that apply to mineral resources and access to raw materials as well as to the environmental aspects of extraction. The new Mining Act entered into force in Finland in July 2011. It gives more rights to the land owner, but for the mining industry the new legislation means limited rights, more bureaucracy and higher ore exploration costs. Many elements in the new legislation, such as the aftercare of the mines, are already taken into consideration in the operations today. A major problem for the mining industry is the long permit procedures: it can take years to get a permit that really should take only months to get.

## A mine is a part of the community

Nordkalk has a Mine Closure Policy to define how to carry out aftercare. For each mine a plan is drawn up, taking into account the characteristics of the mine and the environment as well as the needs of the community. The characteristics that a mine or a quarry offers can even be utilized in many other ways: as a museum, a concert arena, a testing shaft for lifts or as a motorsports track, to name a few examples.

## IT IS POSSIBLE TO COMBINE ENVIRONMENTAL INTERESTS AND INDUSTRY

Opening a new quarry is a long process. The present limestone quarry on Gotland in Sweden will run out of stone in 2013, and since the mid-1990s the company has been searching for a new deposit. After investigating a large number of possible sites, Nordkalk decided on the deposit in Bunge in Northern Gotland. The permit application has been handled by several different authorities and it was approved by the Swedish Environment Court of Appeal, but Nordkalk is still waiting for the conditions to be decided upon. The company plans to invest about 60 million euros in the new site and the operations can continue for many years, which is of great importance both to the local economy and to the Nordic primary industry.

In Northern Gotland people are concerned that the new deposit will affect the watercourse and nature in the area. Nordkalk is convinced that nature and industry can coexist. Experts in hydrology have given their assurance that the water issue will not pose problems. Nordkalk has also committed to an extensive control program and a range of compensation measures, such as research in *Pilosella dichotoma* (gaffelfibbla in Swedish). The company has previously abandoned plans for potential quarry sites for the benefit of the Natura 2000 area.

In order to transport the stone as economically and environmentally friendly



as possible, an 8.7-km-long conveyor belt will be built from Bunge to Storugns. The belt will mostly be covered, which will reduce both noise and dust emissions. It will also be raised to permit free passage by people and wildlife alike.

# The goal is an environmentally

PHOTO: TENNOBERT HAABU

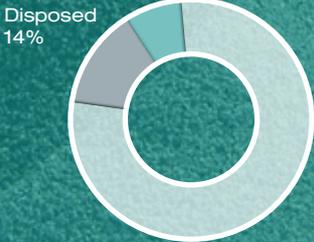


In Nordkalk's quarry in Kurevere in Southern Estonia, investments were made last year to lower noise level in the environment. Crushers were equipped with rubber sheets to dampen sound, and the metal in the strainers was switched to polyurethane. Proper noise barriers were also built between the quarry and the village. Procedures led to the noise level decreasing by about 5 dB.

### MATERIAL EFFICIENCY

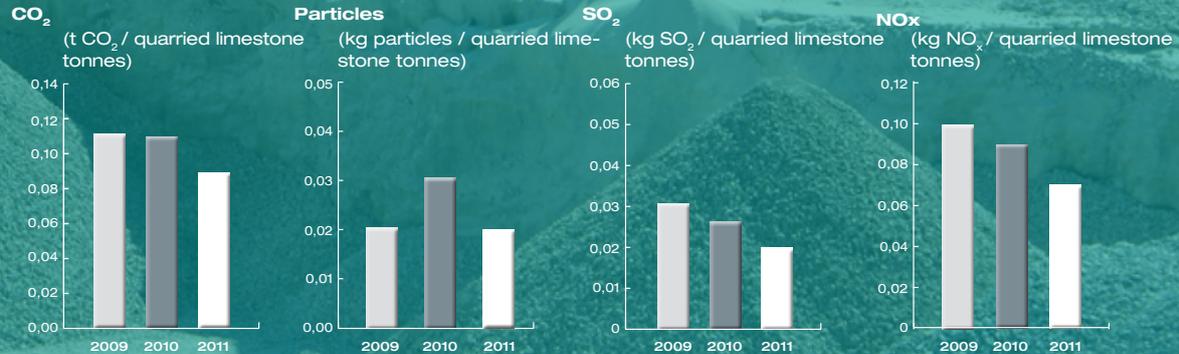
(Utilization of stone-based material in 2011)

Used secondary products 7%



Processed and sold limestone 79%

### EMISSIONS IN AIR, NORDKALK GROUP



Nordkalk's production process releases particles (dust) into the air, and flue gases from the process contain oxides of nitrogen (NO<sub>x</sub>), carbon dioxide (CO<sub>2</sub>) and varying amounts of sulphur dioxide (SO<sub>2</sub>). The figures are based on measurements and calculations for Nordkalk's plants in the whole Group. In 2011 the values decreased because of various factors e.g. the increased amount of quarried limestone and the humidity and quality of coal and stone. In 2010 the particle emissions increased due to a filter problem at one of the lime kilns. It has been fixed and now the emissions at the kiln are only 4% of the previous years emissions.

# efficient production process

*Nordkalk works actively to minimise its operations' impact on the surrounding environment as well as on the personnel's working environment. Processes are made more efficient and raw materials are utilised to as high a degree as possible.*

## Deposits are utilised efficiently

Limestone is quarried from bedrock, either in open quarries or underground mines. The stone is then transported to preliminary crushing and sorting, after which it is forwarded to further processing.

In addition to the actual commercial stone, surplus stone is also quarried, which can be used as filling material in the building of infrastructure. The annual amount of surplus stone depends on e.g. geological factors. The goal is to further increase the utilisation of surplus stone and to quarry in an environmentally friendly manner. The utilization percentage of stone-based material in Nordkalk Group is 86%, and all Nordkalk quarries have their own plan for the treatment and storage of surplus stone according to production waste regulations. In addition to the surplus stone that is created in the Finnish quarries, many other quarries have excess fines, and there is continuous work done to find market areas for it.

## Limestone is crushed, ground or burnt

Limestone products are crushed, ground or sifted limestone, i.e., calcium carbonate ( $\text{CaCO}_3$ ). In grinding plants, noise and dust are the greatest inconvenience for the surrounding areas.

When lime is burnt, crushed and sorted limestone is heated to about 1100°C in a rotary kiln or a shaft kiln. Lime burning creates carbon dioxide emission, of which two thirds originates from the burnt

lime and one third from fossil fuels. Intensive work is carried out on all lime kilns to minimise this emission. The lime is slaked by adding water to the burnt lime. Calcium oxide ( $\text{CaO}$ ) reacts with water, forming calcium hydroxide ( $\text{Ca(OH)}_2$ ), that is, hydrated lime, which is a dry light powder. Heat and water vapour is released in the production process. As a result of effective dust separation, particle emission into air is insignificant.

Nordkalk processes calcite and wollastonite in Lappeenranta. Subsidiary company Suomen Karbonaatti processes the concentrated calcite into paper pigment. The flotation process is mainly closed.

## Continuous environmental work at production facilities

The operations cause vibrations, noise and dust, and an open quarry changes the landscape. Other impacts are surplus stone created in limestone quarrying, and secondary products from production processes. Surplus stone is unsuitable for the above described processes. Continuous work is carried out in all facilities to maintain and form routines that benefit the working environment as well as the environment surrounding the facilities.

Dust can be efficiently controlled by purifying outgoing air with a filter that is serviced regularly and renewed when needed. The watering of roads and stone mounds, careful cleaning and, in many cases, asphaltting helps to keep production areas dust-free. Truck tires can also be washed to prevent lime dust from spreading onto roads. Sound insulation at facilities is improved, and the sound level of the surrounding area is monitored. Air quality is inspected regularly at large facilities. Vibration measurements, as well as inspections of neighbouring properties, are carried out regularly.

## AIMING AT 100%

**Maija Nurmi**, who studies environmental science and technology at the University of Jyväskylä, wrote her thesis for Nordkalk. It deals with, from a Finnish point of view, how legislation and environmental authorities can impact material efficiency in limestone quarrying. Within the EU, for example, surplus stone and unutilized material is considered waste after being stocked for longer than three years. One of the aims of the thesis was to identify any bottlenecks in the legislation. One assumption was that land use planning could steer material exploitation to existing depots, but it turned out that legislation does not allow this. It is currently problematic that the objectives set by society for sustainable development and a high level of material exploitation do not always coincide with the existing legislation on the treatment of, say, surplus stone.

Four main approaches can be identified in getting the surplus stone out onto the market:

1. Procedure for surplus stone › productization › byproducts to be processed constantly and marketed as independent products.
2. EoW › productization according to the "End of Waste" procedure, which is registered in the waste legislation and describes how material classified as waste can be converted into a product.
3. Environmental permission procedure – application for a particular environmental permit for the exploitation of material classified as waste – which is a time-consuming process, therefore difficult to apply.

4. When using materials listed in the MARA act (VNa, (Government Decree) 591/2006), a notification procedure is enough in earth construction.

The procedure that best applies depends on the place and material.



PHOTO: TERHI ANTILA

# Use of alternative fuels

*Nordkalk uses various forms of energy to manufacture its products and is engaged in continuous efforts to improve energy efficiency at all of its production plants. This is an important aspect when considering new investments and our existing production processes are being optimized to decrease energy consumption.*

Coal, oil and natural gas have traditionally been used in lime burning, but we are now working intensely to discover alternative forms of fuel. Electricity is used for crushing and grinding, while fuel oil or gas is required for the drying process. Nordkalk invests in the development of new, environmentally friendly technology and more efficient processes. A significant part of Nordkalk's energy savings are achieved through improved equipment and new work-site practices, for instance operating mining vehicles as economically as possible. In addition to major investments, small improvements are continuously implemented at the plants.

## Recycling and lower emissions

Nordkalk is actively participating in research into the reduction of carbon dioxide emissions as well as recovery and permanent storage of carbon dioxide. More than half of the emissions from the lime burning process derive from the raw material, i.e. limestone, that is refined into quicklime. The rest of the emissions result from the use of fossil fuels. Carbon capture means recovering carbon dioxide, for instance from a plant's flue gases. The captured carbon dioxide is then stored in such a way that it does not enter the atmosphere, for instance in a depleted natural gas reservoir. Carbon dioxide can also be used in different products; the paper pigment PCC, for example, is produced by restoring the carbon dioxide released during combustion into the end product.

## Use of biofuels increasing

In Finland a development project is under way to start using biofuels at the lime kiln in Pargas, which also requires developing the kiln's

combustion process. The grinding plant in Vampula uses biogas supplied through a 1.5 km pipeline by the local biogas producer Vambio. The gas is produced from by-products of the food industry, slaughterhouses and livestock-breeding as well as wastewater sludge. The lime kiln in Köping, Sweden, has already been running on alternative fuels for several years. Nordkalk is also involved in an on-going development project with Cortus, a Swedish company planning to build a pilot scale biofuel gasification plant in Köping.

## Lime industry depends on free emissions allowances

The EU's revised emissions trading directive for 2013–2020 has been published. The lime industry has been guaranteed free emission allowances with a benchmark value of 0.954 t CO<sub>2</sub> per ton of quicklime. In 2011, Nordkalk worked actively to reach this target by optimizing processes, testing new alternative fuels and finding new fuel suppliers. The free emissions allowances are crucial for the competitiveness of the products and therefore the profitability of lime producers.

The taxes on several fuels were raised in Finland in 2011 and new energy and fuel taxes will also be introduced during 2012 in Sweden, Poland and Estonia. This undermines the lime industry's operating conditions and reduces profitability, requiring efforts to adapt the operations and find new solutions. The trade associations are actively working to enable decision-makers to comprehend the consequences of these decisions and the challenges they create.

## Annual environment award

The Vampula plant was awarded Nordkalk's internal Environmental Achievement Award for 2011 for its successful biogas implementation. The Vampula plant has successfully substituted most of the fossil fuel oil used earlier with a renewable carbon-neutral biogas. The locally produced gas lowers the grinding mill's fossil CO<sub>2</sub> emissions significantly.

## KÖPING TESTS ALTERNATIVES

In Köping in Sweden the highest quality of lump lime is burnt in the kiln. In 2005, in order to reduce carbon dioxide emission and keep energy expenses low, Nordkalk invested in a new burner that enables the use of different kinds of fuels. A large part of coal was quickly replaced with recycled waste oil, and the next challenge was to utilise solid fuels, such as plastics waste, and especially bio fuels. Waste fuels mean a reduced outtake of non-renewable resources, whereas bio fuels have the significant advantage of not causing any environmental effects in the form of fossilised CO<sub>2</sub> emission. The economic effect varies according to fuel market prices. Even the fact that regulations are made stricter makes it all the more important to reduce fossil fuel CO<sub>2</sub> emissions.

The introduction of new technology goes seldom without problems, especially when one is the first on the path. Process developer **Stellan Karlsson** is fortunately not one to give up easily. His and the whole production personnel's hard work has resulted in that, in November 2011, 16% of the kiln's energy came from alternative solid fuels.

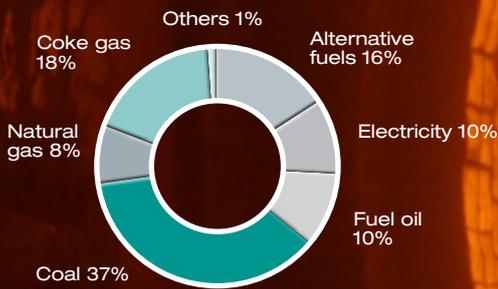
In recent years, a variety of different fuels have been tested in Köping: crushed computer cases, cable plastic, fishing nets and refrigerator insulation. Used bio fuels include paper fluff, wood chips, rape and oil palm shells. Not all of these have worked, but e.g. briquettes of polyurethane foam and plastic, wood and paper pellets have given very good results.



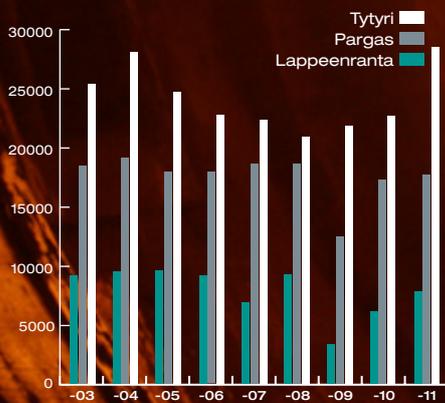
# on the rise

PHOTO: MARKUS FAGERVIK

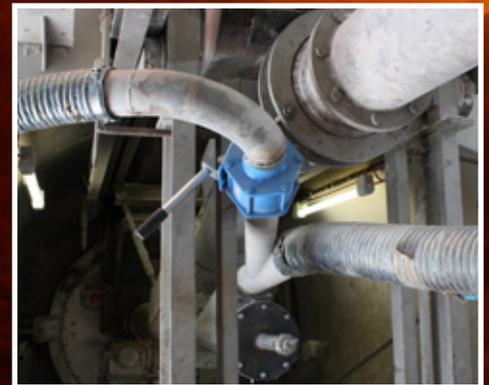
**SOURCES OF ENERGY (2011)**



**WASTE HEAT OF LIME KILNS USED IN DISTRICT HEATING NETWORKS (MWh)**



At the lime factory in Pargas, a development project is taking place where the possibility of using biofuels in the production of burnt lime is evaluated. During a test drive in the spring, a part of the coal was replaced with sawdust. This project is one stage of Nordkalk's aim to find carbon dioxide neutral fuel alternatives for its production processes.



# Environmental work is seen at production facilities

In environmental work, new goals are continuously being set for improvements, and their fulfilment is followed. This is done within the framework of the environmental management system maintained in co-operation with line organisations.

The below table shows the environmental work's goals for the year 2011 and what measures have been taken at facilities to reduce the environmental effects of their operation.

	Raw material	Energy	Vibration, noise, dust	After-care of quarries
	<b>Goal</b>			
	Increase the utilisation level of quarried stone to 90% by year 2013. Find new fields of application for secondary products.	Reduce energy consumption by 5% by year 2016 compared to year 2008. Reduce the use of fossil fuels in lime production: 2-5% during years 2009-2013.	Reduce vibrations, noise and dust caused by production.	All Nordkalk's quarries have an after-care plan. Closed quarries get new fields of application. Operations are integrated into the society.
	<b>Measures 2011</b>			
<b>FINLAND</b>	Vimpeli: 85% of all quarried stone has been utilised. In Sipoo, 95.8% of quarried stone was utilised. Tytyri: All quarried surplus stone has been crushed and sold. Raahe: All stone has been utilised. In Lappeenranta, surplus stone and flotation sand was utilised for earth-moving and field liming.	A new compressor in Vimpeli reduces energy consumption by up to 25% compared to the old one. In Vampula most of fuel oil has been replaced by biogas. The compressed air network was improved in the Sipoo factory. In Tytyri, the pipe for the quarry's water pumping was renewed. The compressor station got a system that recovers waste heat and leads it to the district heating network. Lappeenranta: Water line at the calcite flotation plant has been improved.	Pargas: A new dust filter has been installed in the sorting plant. Raahe: One filter has been replaced and technical improvements have been made to two. Sipoo: a new filter was installed at the renewed screening plant. Lappeenranta: Dust formation from the flotation sand basin has reduced with the help of a snow cannon. Installation of a computer-controlled vibration meter.	The after-care plans for quarries in Pargas, Vimpeli, Vampula and Sipoo were completed. The Mustio quarry is being restored alongside with quarrying.
<b>SWEDEN</b>	Storugns: Continuous work to reduce the amount of fines (<25 mm). However, because the quarry will soon run out of stone, there is a slight increase in the material. Köping: Consumption for all material. In the Fostop project, there is an increased use of filter lime.	Storugns: Electricity consumption has reduced by 11% from 2008 and fuel consumption by 6% from 2007. Köping: The energy saving plan for 2012 has been started. A separate project with focus on reduced compressed air usage is also in place. Utilisation of alternative solid fuels has increased in 2011 and is estimated to have been 9% of the whole year's energy. About 80% is pellets whose bio share is 50%.	<b>KPAB has improved sound insulation.</b> Storugns monitors vibration at neighbours with fixed detectors. Noise is similarly measured. Times for unloading and restoration work have been changed to meet the noise conditions. Landskrona: Dust reduction with new unloading bellows as well as improved filter in product silos. Ignaberga: Renovation of the silo unloading to reduce dust has been completed. Construction of a new material transportation line to reduce dust and noise was started.	Storugns restores the area of the quarry that will not be quarried any more.
<b>POLAND</b>	In the Polish quarries, stone is utilised well: Miedzianka: 96.7%, Wolica: 90.9% and Slawno: 100%	Wolica: Installation of variable frequency drive at the mill decreases energy consumption by 5%.		Miedzianka has a team that reports twice a year on the conditions of nature in the quarry area.
<b>ESTONIA</b>	In Kurevere 100%, and in Karinu 95%, of all quarried stone can be utilised.	Kurevere: Water runs out of the quarry via channel without pumping.	Noise from crushing in Kurevere has been reduced with rubber sheets and polyurethane strainers. Noise barriers have been built between the quarry and the village. In Rakke, the building of a new environmentally friendly facility has begun. Dust will be reduced, water and flue gas purification will be more efficient.	In Vasalemma: New surplus stone mounds have been placed inside the quarry for the coming restoration needs (energy saving). Most of the eastern part of the quarry in Karinu has been restored.
<b>RUSSIA</b>		Alekseevka: New automation in the shaft kiln reduced gas consumption by 1%.	Pneumatic transportation reduces dust in Alekseevka. Bag filters installed in the silos and in the production of lump lime. The grinding plant's filter has been repaired, which has reduced dust by 10%.	An after-care plan has been compiled for Alekseevka.

Nordkalk is the leading producer of high quality limestone-based products in Northern Europe. The products are used mainly in the paper, steel and building materials industries as well as in environmental care and agriculture. Nordkalk employs some 1,200 people at more than 30 locations e.g. in Finland, Sweden, Norway, Poland, Estonia and Russia. Nordkalk is a member of the Rettig Group.

-  Grinding
-  Sales/office
-  Quarry
-  Kiln
-  Own harbour/depot





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