



# NORDKALK AND SUSTAINABILITY REPORT 2014



*Member of Rettig Group*

## NORDKALK AND SUSTAINABILITY, REPORT 2014

Nordkalk has been publishing environmental reports since 1996. Now the report is called Nordkalk and Sustainability, reflecting our aim to describe our operations from the three dimensions of sustainability: environmental, financial and social. The main focus of the report remains, however, on our actions to reduce environmental impacts – those of our customers as well as our own – in all of our countries of operation.

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◀ Cover: Marketing Manager Anna-Kaisa Haapajärvi and Sales Manager Timo Kanerva in Sipoo, Finland.  
(Photo: Veikko Somerpuro)





▶ Jarkko Kaplin (right) succeeded Bertel Karlstedt as Nordkalk's CEO on 1 January 2015. Between them is the first CEO Otto Moberg, who founded Pargas Kalkbergs Aktiebolag in 1898. (Photo: Terhi Anttila)

## CEO: VALUE FOR GENERATIONS

“What doesn't grow must be dug”

When did you last use a product that was manufactured using limestone? If you are reading this off our printed brochure, you are holding in your hands high-quality paper that contains pigment processed from limestone. When you look at the screen of your computer or smartphone, you are making use of several mining industry products, without which our modern society would not exist. Limestone is a key refining agent in the various stages of metals and minerals processing. Limestone also neutralises, fills and stabilises, which is why it is needed by customers in various fields of industry, as well as by municipal water treatment plants and private gardeners – now and in the future.

The mission of our owners, the Finnish Rettig Group, is to produce value for future generations through sustainable, long-term growth. For us at Nordkalk, this means the quarrying and processing of limestone in an environmentally feasible manner with respect for people, and also new products and applications through which we help our customers create added value with a smaller environmental impact. The task of Nordkalk's product development is also to ensure that the by-products resulting from our processes and those of our customers are efficiently reused. Authorities can help by promoting this type of development, for example, through the European Union's waste hierarchy, according to which by-products must be utilised prior to the creation of new products.

The above combined with cost-effectiveness helps us to grow sustainably and to strengthen our position as the leading producer of limestone-based products in Northern Europe.

Improving our operations and environmental work is a continuous process for which we have set monthly and annual goals in, for example, energy efficiency, emissions reduction and the utilisation of raw materials. These goals are all geared towards a reduction in our environmental impact, which usually also results in a decrease in costs. In March 2015, we brought into play a new tool for reporting and monitoring quality, environmental and safety observations, which ensures the transparency of our operations and embeds best practices throughout Nordkalk.

As the CEO of Nordkalk, I wish to continue along the path of continuous improvement that my predecessor Bertel Karlstedt emphasised, which lays down a foundation for sustainable development.

Jarkko Kaplin



► Liming of waters can save an acidic lake or wetland. In Nokia, Finland, the lake Alinenjärvi area was treated with lime in October 2014, in order to raise the water's pH to a healthy level (over 6). Limestone powder was spread from a boat equipped with a special technique from Sweden, where liming of lakes is more common than in Finland. (Photo: Anna-Kaisa Haapajärvi)

## CLEANER ENVIRONMENT WITH LIMESTONE-BASED PRODUCTS

Limestone is needed in the production of many daily necessities, either as a raw material or as a purifying agent in the production process. Through industrially made materials – such as paper, steel, plastics and glass – each of us uses daily products that have some connection with limestone. Through environmental applications, limestone-based products contribute to the basic prerequisites of life: clean air, pure water and fertile soil.

The use of limestone-based products in cleantech applications is becoming all the more important as growing environmental awareness leads to new regulations limiting emissions into water and air. Nordkalk has long experience in flue-gas desulphurisation (FGD) in large power plants and waste incineration plants. A new application in this field is FGD on vessels, an answer to the Sulphur Emission Directive that entered into force at the beginning of 2015. Nordkalk's solution consists of granules made of calcium hydroxide (slaked lime) that react with sulphur compounds from the exhaust gases in a dry scrubber. The first delivery agreement was signed in September 2014.

Nordkalk offers a turnkey solution, with lime granules delivered to the harbour and used granules taken away. The used absorbent consists mostly of calcium carbonate and gypsum, and it can be recycled for use in e.g. the construction materials industry. Nordkalk is investing in a

granulation plant in Landskrona in southern Sweden to serve a wide range of customers – on land and sea: in addition to vessels, such as industrial operations affected by more stringent regulation. Treatment of agricultural runoff water, mine water and peat harvesting areas are also potential granule applications.

### Lime stops phosphorous runoff



Among new products launched in 2014 in Finland is a coarse garden lime, part of the Nordkalk Aito® product family.

In agriculture, liming reduces the soil's acidity, which improves the plants' living conditions and allows them to use nutrients more efficiently, resulting in bigger crops and reduced nutrient runoff into watercourses. Despite the benefits of liming being well known, fields in general are not

limed enough.

In Poland, new products and informative marketing have made Nordkalk the leader in agricultural liming products, and the company will continue to diversify its product palette and increase capacity. Nordkalk is also active in the Polish Lime Association, which is working on launching a national liming programme in the future.

In addition to traditional soil-improvement lime, Nordkalk has developed the Fostop® concept to tackle the challenge of phosphorous runoff. Fostop is used for the structure liming of fields, the stabilisation of sludge, and for lime filters and drains that help to reduce leakage and contribute to the recycling of phosphorus. This is extremely important because world's known phosphorus reserves are running out.

In Sweden, more than 6,000 hectares were structure-limed in 2014. One of Nordkalk's many phosphorus-

related research projects is also under way in Sweden, in co-operation with Stockholm Water. It involves structure liming and testing Fostop filter drains in the fields surrounding lake Bornsjön near Stockholm. Nordkalk continues to further develop the different Fostop products, e.g. Fostop Filters for minimising phosphorus leakage in agricultural “hotspots” and for sewage treatment from single households, as well as for treating runoff waters from animal paddocks.

**More value with less environmental impact**

In recent years, Nordkalk has developed new filler products based on patented technology for various industries. The aim is to provide cost-effective and environmentally sound alternatives to customers. One of these new-generation product families is Nordkalk E-Series tailored for high performance in coatings and adhesives. The products improve the properties of the end applications, e.g. wear resistance. They also make it possible to significantly reduce the volume of raw materials with a high carbon footprint.

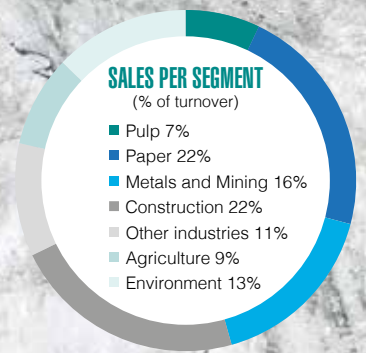
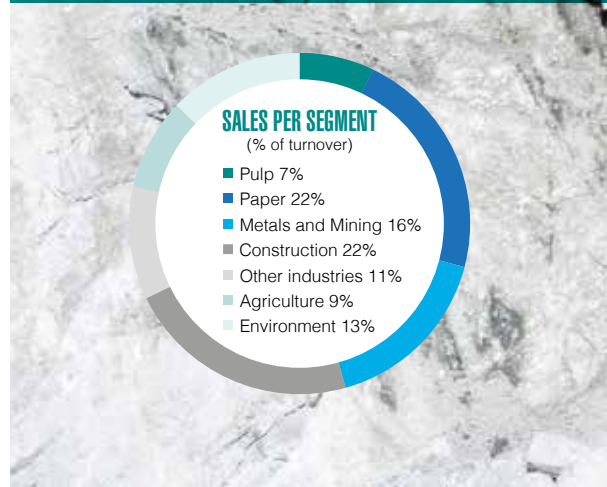
As an answer to global warming, the European Union plans to cut CO<sub>2</sub> emissions drastically. Carbon capture and carbon storage are methods studied by Nordkalk together with industrial and scientific partners.

**YEAR IN BRIEF:  
STEADY PROFITABILITY DESPITE DECREASED MARKET**

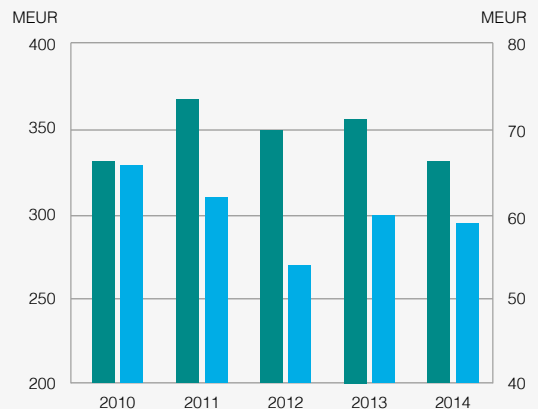
The difficult market situation in 2014 affected several of Nordkalk’s customers, leading to decreased demand for limestone-based products. Nordkalk’s turnover decreased by 7 per cent to EUR 331.6 million (EUR 357.8 in 2013). The result, however, remained on the previous year’s level: EBITDA was EUR 59.1 million (59.7), thanks to continued improvements in cost-efficiency.

Nordkalk’s total sales dropped, but in three of the six main customer segments, Nordkalk managed to maintain the sales on the same level as in 2013. In the construction and other industries segments, including the chemical industry, sales increased slightly, with new product launches contributing to the increase. In the agriculture segment, sales in Finland suffered from the weather conditions, but the positive development in Poland lifted total sales to the level of 2013.

A significant drop took place in the metals and mining segment, because Nordkalk’s long-term agreement with SSAB in Luleå, Sweden, expired at the end of 2013, and the lime kiln in Luleå was sold back to SSAB. Sales decreased also in the segments of environmental care and pulp and paper, where structural changes continued as a consequence of decreased consumption of graphic paper.



**TURNOVER**



**EBITDA**



## CONTINUOUS IMPROVEMENT IS A COMMON EFFORT

During the past two years, Nordkalk has concentrated on continuous improvements in all fields of operations in order to improve its operational efficiency. In 2014, the result reached the same level as in the previous year, even though turnover decreased significantly, which shows that the efforts are paying off. Nordkalk's CIP, continuous improvement process, led to considerable savings in 2014.

CIP aims at improved operational efficiency, whether relating to energy costs, products, supply chain, purchasing, or fixed costs. CIP is a common effort of the entire personnel, and new target-setting, reporting tools and ways of communicating have been created. Nordkalk's enterprise resource planning system has been upgraded. The employees are encouraged to share their ideas for improvements. Continuous improvement is included in Nordkalk's incentive programme. It ensures that we learn from the reported deviations and share best practices.

One of the focal points of CIP has been capacity utilisation in the production network, supported by effective supply chain operations. Improvement of these enabled Nordkalk to close down the two old lime kilns in Lappeenranta in May.

### Number of personnel decreased

The average number of personnel decreased from 1,091 to 1,037 in 2014, as an outcome of the operational restructuring realised throughout Nordkalk and especially in Finland. In Estonia, the quarry operations at Vasalemma was

outsourced in the beginning of 2014.

On Gotland, Nordkalk started co-determination negotiations in May, due to uncertainty regarding the mining permits at the current quarry of Klinthagen and the planned new quarry in Bunge Ducker (see page 9). After Nordkalk was granted a new permit for Klinthagen in November, new co-determination negotiations resulted in January in the cancellation of 35 of the agreed 53.5 redundancies. Production in the quarry takes place in one shift now.

### Well-being at work

Annual development discussions are an important part of HR management. Last year, the number of employees who had the discussion with their foreman increased, representing an improvement from 2013. The obvious goal is to include 100 per cent of both white and blue collar employees.

In all countries, many activities emphasising well-being at work took place, including lectures and training, and investments in facilities. Age management programmes are in place, and in Poland medical care for 55+ employees was improved last year. In Finland, early care was

emphasised, meaning that any signs of trouble with an employee's physical or mental health are taken care of at an early stage.

The third edition of Nordkalk Future, an internal training programme with 16 participants, was started in co-operation with Turku University School of Economics. Other training programmes covered topics such as the effectiveness of the supply chain, a leadership academy and change management. Health and safety education, as well as IT courses are organised on a regular basis.



► Health & Safety training in Miedzianka, Poland.

## Record number of safety observations

Safety first – at Nordkalk, safety is an integral part of all we do. One demonstration of this is the record number of safety observations made by personnel in 2014. A total of 2,349 observations were registered, which translates to 2.4 observations per employee. This means that workplace safety at Nordkalk is truly developed together.

All safety observations are studied, and eventual corrective actions are taken within two months at the latest. A safety observation can also be a positive one, drawing attention to best practices that can be copied from one location to another.

Nordkalk's daily Health & Safety Management complies with the OHSAS 18001 standard. In addition, special safety programs have been created, such as "See you safely" against eye injuries and "Tidy, Safe and Efficient". The latter was introduced from the beginning of 2014, and it emphasises cleanliness and order, not only as a comfort and health and safety factor, but also as a means for achieving improved efficiency.

In 2014, a total of 43 accidents (35 in 2013) were reported, counting all incidents that required a visit to health care services, whether sick leave was needed or not (LTA0). The number includes accidents that happened to the employees of subcontractors. Of all accidents, 21 led to an absence of one or more sick days (LTA1). Nordkalk's accident rate measurement is based

on the number of LTA1 accidents experienced by the company's personnel per million work hours. This rate was 9.9 in 2014 (8.7). New actions have been taken to turn the trend back towards zero accidents, which has been Nordkalk's long-term goal since 2003.

Several locations have successfully worked with zero accidents for many years: in Kokkola, Finland, the milestone of 10 years was reached on 7 February 2015. Kurevere in Estonia has gone more than 8 years without accidents, and Wolica in Poland 7 years.

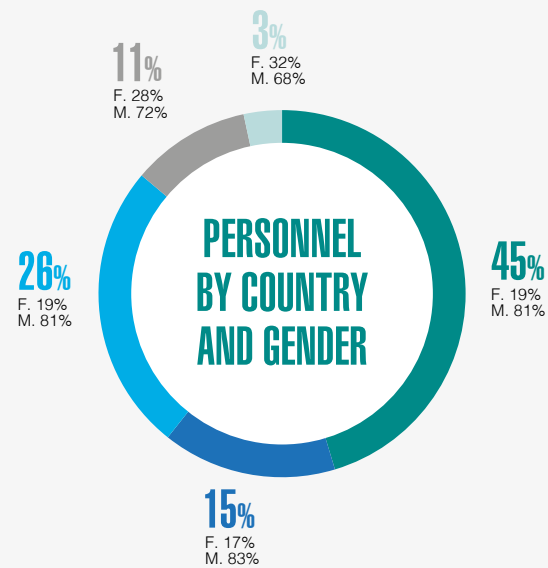
## Material damage in Norway and Sweden

At Nordkalk's subsidiary NorFraKalk AS in Verdal, Norway, a silo containing quicklime collapsed partly on 7 September. Because of the danger of a full collapse, the industrial area was evacuated within a 500-metre radius from the site. No one was harmed in the partial collapse, and no lime dust was released in the incident. Production was disrupted and the material losses were considerable. The cause of the accident was structural failure. Remaining silos with similar construction have been strengthened.

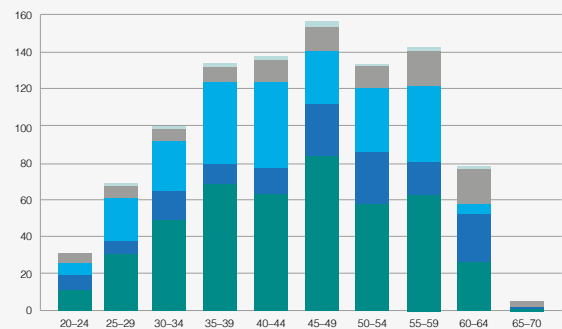
In Landskrona, Sweden, a fire broke out next to Nordkalk's plant in May 2014 in a storage area containing wood pellets. Nobody was hurt, and Nordkalk's plant was saved from the fire, but the conveyor transporting stone from the harbour was damaged, leading to a redirection of customer deliveries for some time.

◀ Nordkalk encourages its employees to take care of their health by means of physical exercise. In the spring of 2014, the company gave each employee a jacket suitable for outdoor activities. Once the jackets had been received, photos were sent in from locations, like this one from Rakke, Estonia. (Photo: Natalia Andrejeva)

**FINLAND** **SWEDEN** **POLAND**  
**ESTONIA** **OTHER** Russia, Germany, Ukraine, Norway, Lithuania

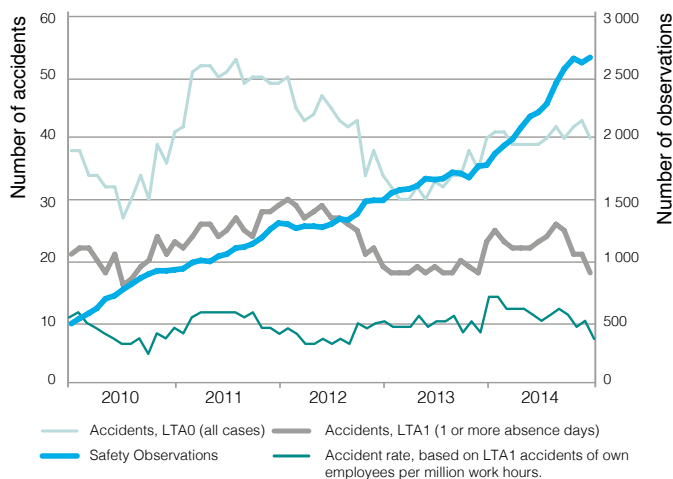


## AGE DISTRIBUTION



## AVERAGE YEARS OF SERVICE: 15

|         |    |         |    |
|---------|----|---------|----|
| Finland | 16 | Poland  | 15 |
| Sweden  | 18 | Estonia | 11 |



▶ Number of accidents of own and subcontractors' employees during 2010-January 2015.



## PART OF THE COMMUNITY

Nordkalk's values – openness, fairness, modesty, trust and respect – form the foundation for dialogue with our stakeholders. We believe that by showing people what we do and who we are, we gain and strengthen social acceptance of our activities.

In 2014, Nordkalk again organised and participated in various events, welcomed visitors and increased communication efforts to achieve greater visibility in the media. On Gotland, a newsletter was started and mailed to all inhabitants to provide information about Nordkalk's activities, products and the planned new quarry in Bunge Ducker.

Nordkalk's facility in Storugns on Gotland was visited by different stakeholder groups on several occasions, for example:

In April, leaders of the Gotland County visited Storugns along with their colleagues from five counties around the Mälardalen region in Central Sweden. They heard about the importance of limestone supply from Gotland for the companies of Mälardalen, where Nordkalk services a large number of customers. The visit ended with a tour of the Klinthagen quarry.

In July, a delegation from the metal workers' union IF Metall visited Nordkalk. They were invited by the local IF Metall in Storugns to learn more about the prolonged mining permit processes and redundancies on Gotland.

The production site of Ignaberga in Southern Sweden celebrated its 100th year of operation, as Ignaberga Kalksten was founded in 1914. Everything has since been modernised, but the location is the same – where limestone was quarried as early as the 17th century as an additional occupation to farming.

### Meeting local residents in Finland

In Finland, Nordkalk organises meetings with local residents on regular basis. In 2014, for example, a meeting took place in Sipoo and in Tytyri, Lohja. The participants heard about Nordkalk's products, operations and plans. The topics included a discussion of environmental aspects, such as noise and vibration, which are occasionally noticed (see page 12). In Sipoo, the meeting was in connection with a jazz concert (photo above): it was the 21st time that front-line jazz musicians performed on a stage set up in the industrial setting by the sea at Nordkalk's Kalkkiranta harbour.

In Pargas, a renovated outlook point on the edge of the quarry was opened in June, offering a view over the 70-hectare open pit mine where limestone has been extracted since 1898. Nordkalk also participated

in local "Pargas Day" celebrations by organising tours to the quarry, guided by the company's personnel. In conjunction with Pargas Day, a local sports association celebrated its 100th anniversary. As many generations of Nordkalk employees have been – and still are – members of the association, the company was a visible sponsor of the event.

### Exhibition in Vantaa, Finland

At the Science Centre Heureka in Vantaa in Finland, an exhibition called "Going underground" continues until August 2015. Themes of the exhibition include mining, geology and underground construction, and they are examined from the viewpoint of society and the everyday life of the visitor. One feature of the exhibition is called "The Face of a Mining Town". It describes the influence Nordkalk's limestone quarry has had on the lives of the people of Pargas.

### Culture in Estonia

In June 2014, Nordkalk made a small contribution to the 145-year-long history of the famous Estonian Song Celebration. Prior to the main event on 5 July in Tallinn, a celebratory torch was relayed by cyclists from Tartu County towards Tallinn. It so happened that the convoy passed



## WATER AND WARMTH TO THE PEOPLE OF LOHJA

Nordkalk's Karinu quarry, where the dozens of participants stopped to learn about Estonia's national stone – limestone.

### Co-operation with schools and youth

Nordkalk co-operates with different educational institutions by offering internships to students and by enabling research work and organising excursions, competitions, lectures and family days. The goal is to educate younger generations about the mining and limestone industry and its opportunities.

In Finland, an educational board game on mining was released in the spring, and Nordkalk had it sent to all schools in its locations. A visit was paid to some of the schools, to discuss mining issues with the students.

In Estonia, both Rakke and Vasalemma welcomed several student groups, some of them as part of the national "Interesting School" programme. In Rakke, a series of lectures by Nordkalk's specialists at the local high school were given in the spring.

In Poland, Nordkalk supported the popularisation of science among children and youth in the Sławno region in September. Organised jointly with the Association of Friends of Earth Sciences PHACOPS and the

Municipality of Sławno, the workshops and the exhibition "Our place in the history of life on Earth" were both educational and interactive. Professional speakers and guides drew the public's attention to the uniqueness of the Sławno plant on the map of the paleontological world.

### Geopark to Gotland?

In partnership with Young Entrepreneurs on Gotland, Nordkalk held an Innovation Camp in May. It consisted of a workshop where youth groups dealt with the theme of geotourism, and involved planning initiatives to make geotourism as attractive as possible on Northern Gotland. In Europe, there are a large number of so-called Geoparks, meaning organised areas with a particular geological value which are open for visitors; the goal is to spread awareness of the geology. The creation of a Geopark on Northern Gotland has good potential, and it seems natural to highlight the central role of limestone on the island and unite tradition with today's hospitality industry.

### Commitment to BSAG

One of Nordkalk's major community involvements is the 5-year-long commitment to the Baltic Sea Action Group (BSAG) started in 2012. Nordkalk's objective is to reduce the phosphorus burden on the Baltic Sea with the help of Nordkalk Fostop® products (see page 4).

Companies provide society with needed products and services, and their surrounding communities with employment opportunities. In Nordkalk's case, some communities also benefit from by-products created in production. The best example is Tytyri in Lohja, where the town acquires both water and district heat from the plant.

More than one million cubic meters of groundwater is pumped up yearly from the underground mine. More than half of the water is delivered to the municipal waterworks, where it represents 23 per cent of all raw water received. The water comes from a part of the mine that is no longer in use, and at the waterworks it is filtered through a sand bed before being led to the water distribution system.

The Tytyri plant itself uses some 30,000 m<sup>3</sup> of water annually, also from the mine, but through a separate pumping station. The surplus water – about half a million cubic meters – is directed to the nearby lake Lohjanjärvi. Yearly quality measurements show that the water released into the lake corresponds to household water quality, and can thus even improve the lake water.

Waste heat is created in Nordkalk's lime burning process. It is directed to the district heating network in Lohja. The amount represents energy needed for warming 1,600 single family houses (see page 14). Further services to the community include a mining museum operated by the city and visited by more than 10,000 people annually. KONE Corporation's high-rise elevator test laboratory is located in the mine area. Currently KONE is expanding the laboratory by five new elevator shafts.

► In October 2014, Nordkalk's Sławno plant hosted an international scientific conference on research on the Jurassic era.





▶ Wall rock is processed in the Pargas quarry, while Mine Manager Robert Mannström and Sales Manager Erno Somervuori observe. (Photo: Terhi Anttila)

## RAW MATERIAL MUST BE SECURED

Access to raw materials is the foundation of Nordkalk's operations, and prospecting is continuous long-term work, as it can take up to a decade to open a new quarry. Mining is strictly regulated, e.g. by laws that have to do with mining, environmental and nature protection, water, land use, and building, completed by legislation concerning occupational safety, use of chemicals, and environmental impact assessments. Permit applications require extensive environmental studies to guarantee that negative impacts on the environment are kept to a minimum.

### Legal process continues on Gotland

In November 2014 a continuation permit was granted for Nordkalk's current Klinthagen quarry on Northern Gotland. The permit also covers an extension area of 32 hectares north-west of the quarry. The permit is valid for the time being. It includes execution, which allowed Nordkalk to continue operations at Klinthagen without interruption, while the earlier permit expired at the end of 2014. The verdict has been appealed, and a new hearing in the Land and Environment Court of Appeal is expected to take place during 2015.

The legal process for opening a new limestone quarry in Bunge on Northern Gotland continues. The permit application was filed in 2006, the quarry deemed permissible in 2009, and the following year that verdict became legally valid. The permit and its conditions were announced in 2012, but the verdict was followed by an appeal to the Supreme Court, and a new hearing

including Natura 2000 issues was ordered. That hearing took place in March 2014, and on 2 June 2014, the Land and Environment Court again granted Nordkalk a permit and conditions. Since this verdict was appealed, a hearing will take place in the next court instance in mid-April. The final outcome of the legal process is expected by 2016.

### Permit granted in Lappeenranta, Finland

Nordkalk's second largest open pit mine in Finland is located near the town centre in Lappeenranta. In summer 2012 an environmental impact assessment (EIA) was started in order to get a permit for the expansion of wall rock storage areas near the quarry. After various environmental studies, as well as meetings with neighbours and authorities, the EIA was completed in February 2014 and the permit granted on 3 October 2014. One appeal has been filed. The permit includes construction of a crushing

and screening line in the quarry area and guarantees Nordkalk's operations in Lappeenranta for decades to come.

### Sustainable mining

Nordkalk is active in lime and mining industry organisations that promote the operating conditions of the industry, such as shorter permit processes, as well as safety and environmental issues. In Finland, Nordkalk participates in the project "Mining 2030" through working groups controlled by the Network of Sustainable Mining. The main goal of the network is to define, together with stakeholders, the prerequisites for sustainable mining in Finland by strengthening co-operation between the extractive industry and its stakeholders as well as by developing concrete tools for responsible mining.

## MATERIAL EFFICIENCY IMPROVED

Nordkalk strives to use all of its extracted raw materials, aiming for 100% material efficiency, which is sound from both a financial and environmental point of view. This goal was reached by Ignaberga and Uddagården in Sweden, and by Slawno in Poland. In Kurevere, Estonia, Nordkalk even exceeded the goal of 100% material efficiency by supplying earlier stored fine material from a secondary deposit to agriculture.

The material-efficiency efforts include using all by-products: wall rock that is extracted, in addition to regular limestone, sand produced in the flotation process, filter dust, which builds up in all lime kilns and at grinding plants, and residues created in lime burning and slaking. Nordkalk also assists its customers by handling their process by-products in a sustainable way. For example, lime-based residue from pulp production is processed for utilisation.

In 2014, Nordkalk was able to raise the material efficiency rate from 87.9% to 90.9%, thanks to increased sales of lime kiln dust and especially of wall rock. This is typical of Finnish quarries for geological reasons. In the Lappeenranta and Pargas quarries in Finland, wall rock represents approximately one third of all quarried stone products.

Wall rock is used to build infrastructure, e.g. foundations for roads, airports and windmill parks. In addition to the domestic market of

Finland, stone products were shipped last year, e.g. to the Baltics and Russia for infrastructure projects.

All of Nordkalk's stone material is CE marked, which supports sales, as does growing environmental awareness in society. Paying a price for the transportation of stone is considered a smaller offense than starting to extract stone in greenfield areas near construction sites and at the same time dumping already quarried stone elsewhere.

### Changing landscape

One aspect of mining is its effect on the landscape: open pit mines are visible in nature. Nordkalk has an after-care plan for each of its mines. In some quarries, it is possible to landscape areas that are no longer in use simultaneously with extraction in other parts; for example, in the Karinu quarry in Estonia and Ignaberga and Uddagården in Sweden. Once extracting has ended, the quarry can completely disappear from the scenery after it has been evened out

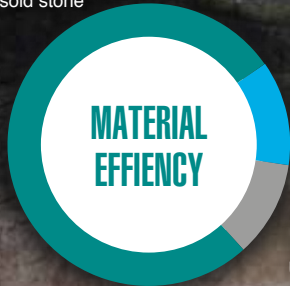
and vegetation takes over.

In deeper quarries, the aim of after-care is, besides safety, to contribute to the surrounding landscape and take the needs of the community into consideration. Old mine areas can serve as recreational or even nature conservation areas.

In summer 2014, the town of Pargas took part in a program called "new town" that included two-day design clinics to find ways to improve Finnish towns and cities. Two young architects from Jada, a Helsinki-based multidisciplinary design practice that focuses on architecture and design, were asked to plan what to do with the magnificent quarry once it is no longer in use – after some decades.

The photo below (by JADA Architects) shows one of the plans, an amphitheatre and wind park in the quarry area. A TV show was also done on the "new towns".

78%  
Processed and sold stone



9%  
To storage and disposal (2012: 15%, 2013: 12%)

13%  
Utilised by-products



► Klinthagen quarry in Storungs on Gotland. (Photo: Gunnar Britse)

## ENVIRONMENTAL IMPACTS MINIMISED IN MANY WAYS

Nordkalk has mines and production in 27 locations. Limestone is extracted and processed into crushed and ground limestone, quicklime and slaked lime, as well as special products. The operations can cause dust, noise and vibration, which Nordkalk minimises, e.g. by using best available technologies in investments and repairs. The surrounding environment and the employees' working environment are always taken into consideration in production planning.

Nordkalk's operations are regulated not only by legislation and the limit values defined by authorities in the permits, but also by the company's own environmental objectives, which are part of Nordkalk's continuous improvement process, according to ISO 14001 environmental management system. One of the targets is a regular risk assessment including activity plans for each location, which were started in 2013. By the end of 2014, 76 per cent of the locations were evaluated. No significant new risks were discovered in the assessments.

Dust emissions can be controlled effectively. The air emitted by the grinding plants and lime kilns is purified using filters, which are also used at loading areas. Enclosed conveyor solutions prevent dust dispersion. In 2014, loading equipment was replaced in Landskrona and improved in the slaking plant in Luleå, Sweden. Production areas and roads are paved in order to make cleaning

as efficient as possible. Roads and stored stone material are watered during dry periods; in Köping, Sweden, a water spray system was upgraded in 2014. At the Vimpeli plant in Finland, a new filter was installed in 2013, and measurements realised in 2014 showed that dust emissions had diminished to 1/20 part from what is allowed in the environmental permit.

Sound insulation is improved by constructing noise barriers, planting trees and using various noise-damping materials at crushing plants, conveyor belts and loading places. In Pargas, Finland, the crushing plant is situated underground; and in locations near residential areas, there are restrictions on night-time operations to avoid disturbances to the local residents.

One way to fight noise is to build noise barriers, as was done in Miedzianka, Poland. Old low fences were replaced by new, noise-reducing walls with a height

of 7 metres. First measurements show that noise emissions are decreasing as expected.

Several of Nordkalk's quarries are situated near residential areas, and this has to be taken into account when planning and carrying out blasting. Vibration caused by blasting is measured; at Tytyri in Lohja, Finland, e.g. continuous measuring is carried out at three locations near the mine and at several temporary measuring points. On the basis of the results, necessary changes are made to blasting methods in order to reduce the amount of vibration.



► Vibration meter.



**NORDKALK'S MISSION:**  
**MORE CLEAN WATER, FOOD, ENERGY AND PRODUCTS WITH LESS RESOURCES AND EMISSIONS.**

**Getting ready for IED**

The EU's Industrial Emissions Directive (IED) aims at reduction of emissions by means of, among others, specified definition of the regulation about Best Available Techniques (BAT). The BAT Reference Document for the Production of Cement, Lime and Magnesium Oxide was published in spring 2013, establishing the limit values that will be in force by 2017.

Part of Nordkalk's environmental work in 2014 focused on ensuring readiness of the production facilities for the new demands. Nordkalk evaluated 6 of its 8 kiln sites in 2014, and the work continues in the spring of 2015. In addition to lime kilns, filters at grinding plants were evaluated. Some of the filters require investments, which are planned for 2015 and 2016.

**Water issues**

The mining industry involves particular water issues because many processes require large quantities of water. The limestone industry, however, is not a big consumer. Water is used for washing stones at some plants. In Lappeenranta the flotation plant recycles its water.

The majority of Nordkalk's quarries are shallow and do not affect the groundwater level. If a quarry extends deeper than groundwater level, it can have an impact on groundwater levels in the surrounding environment. Due to precipitation, some water collects into all quarries, and in deeper ones, also through seepage. Thanks to the composition of limestone, this water is clean.

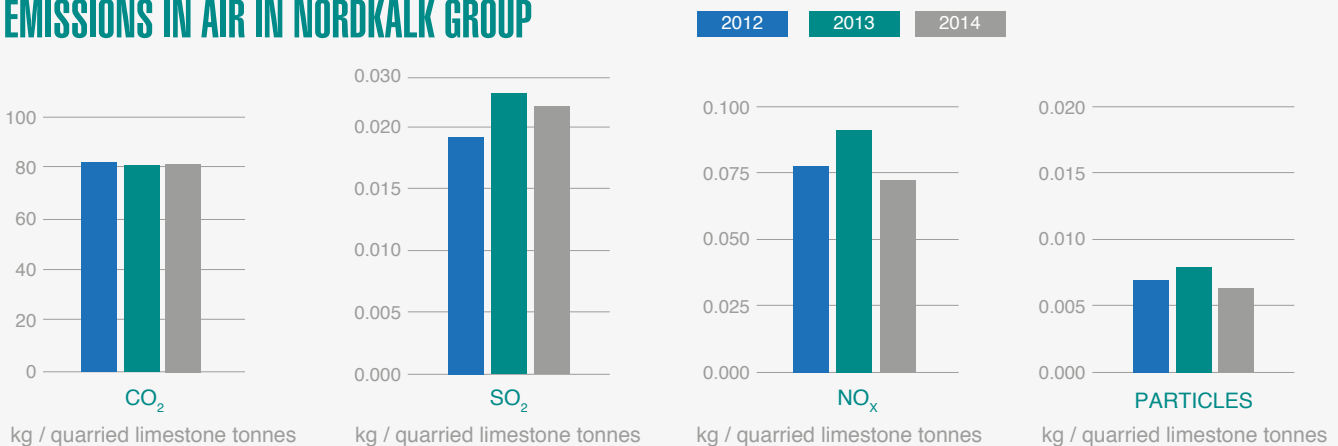
The guiding principle in each quarry is to carry out mining operations

with an absolute minimal negative impact on both the surface water and groundwater. This principle is well known and observed by Nordkalk, and each site is to have a Water Management Plan, of which 75 per cent were completed by the end of 2014.

**Biodiversity likes lime**

Old mining areas are also great preservers of biodiversity, as many rare plants and organisms thrive in lime-rich soil. This was again seen in Sipoo, Finland, where different mollusc species were identified during spring 2014. A total of 25 species were registered: 15 of them had been discovered already 120 years ago, in addition to which there were 9 new ones. Only one species was not found, and three of those discovered are endangered.

**EMISSIONS IN AIR IN NORDKALK GROUP**



► Nordkalk's production processes form particles or dust, 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 throughout the Group. 2013: Modified emission data for SO<sub>2</sub> ja NO<sub>x</sub>

## FOCUS ON ENERGY EFFICIENCY

The production processes of the mining and lime industry are energy intensive. Nordkalk strives for reduced energy consumption, which can be reached through optimised processes and capacity utilisation, and by making energy efficiency a priority in new investments and repairs.

Some examples of the work done in 2014: In the underground mine of Tytyri in Finland, a diesel- hydraulic face drilling rig replaced two old pneumatic drilling machines. A new truck was also acquired in Tytyri, and in Ignaberga, Sweden, a new wheel loader. In all cases, energy consumption and emissions will be considerably cut. New inverters were installed in grinding mills in Tytyri and in Wolica, Poland, and a crushing line was modernised in Kurevere, Estonia, which decreased energy use by 10 per cent. In Uddagården, Sweden, an office and workshop were insulated, and a heat pump and new windows were installed. In Rakke, the office heating system was also renewed and is now using residual heat from air compressors at the lime plant. In Kookkola, Finland, the energy efficiency of the grinding process was

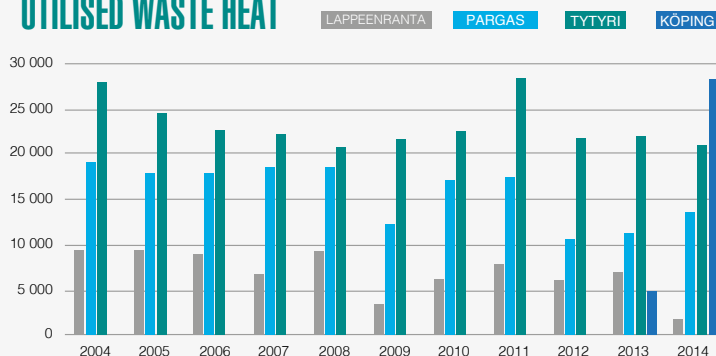
improved by thorough optimisation of the process parameters.

About a third of Nordkalk's energy consumed comes from coal, which is used in lime burning, as are oil, natural gas and coke oven gas. Electricity is used for crushing and grinding, and fuel oil, natural gas and liquid petroleum gas for the drying process. Nordkalk is exploring opportunities to replace coal and oil with alternative fuels, such as recycled fuels, waste-to-energy solutions and biofuels, which also help to reduce fossil CO<sub>2</sub> emissions. At the Ignaberga grinding plant, for example, Nordkalk has decided to test a new biofuel: fish oil, a by-product of fodder production. The test period in autumn 2015 will last 2 to 3 months.

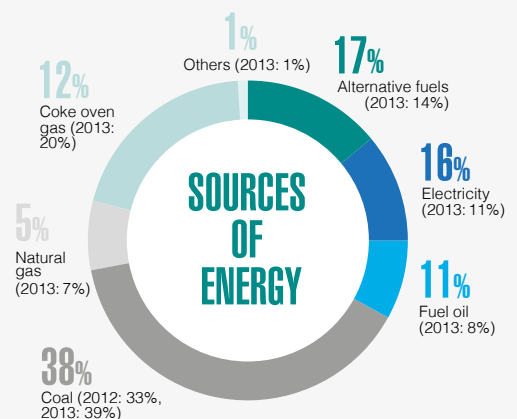
In Finland, an electricity tax increase for mining companies was imposed from the beginning of 2015. This will heavily burden the Finnish mining industry, and deteriorate the competitiveness of the entire Finnish export industry. Nordkalk has invested considerable amounts in improvement of energy efficiency – for example, as encouraged by Motiva Ltd's energy efficiency savings programme for industries – but now the tax change risks to make these investments difficult.

The EU Energy Efficiency Directive (EED) establishes a set of binding measures to help the EU to reach its 20% energy efficiency target by 2020. During 2014 several provisions of the directive entered into force in most EU member states. For large enterprises like Nordkalk, the

### UTILISED WASTE HEAT



Waste heat of lime kilns used in district heating networks (MWh)



EED requires that energy audits are carried out on a regular basis. Nordkalk has already earlier realised several energy audits and is heavily focusing on continuous improvement of energy efficiency at all production sites.

**District heat to communities**

At rotary lime kilns the flue gases must be cooled before they are led to the flue gas filter. The energy which is released during cooling can be utilised as district heat, as has been the case in Lappeenranta,

Pargas and Tytyri for many years. At the end of 2013, the plant in Köping initiated deliveries of recovered waste heat to the district heating network. In Lappeenranta the service was discontinued in May due to the closure of the lime kilns.

2014 was the first full year of use for the new heat recovery equipment at the lime kiln in Köping, and the total amount of recovered heat was almost 30 GWh. This equals the amount of energy found in 3 million litres of heating oil.

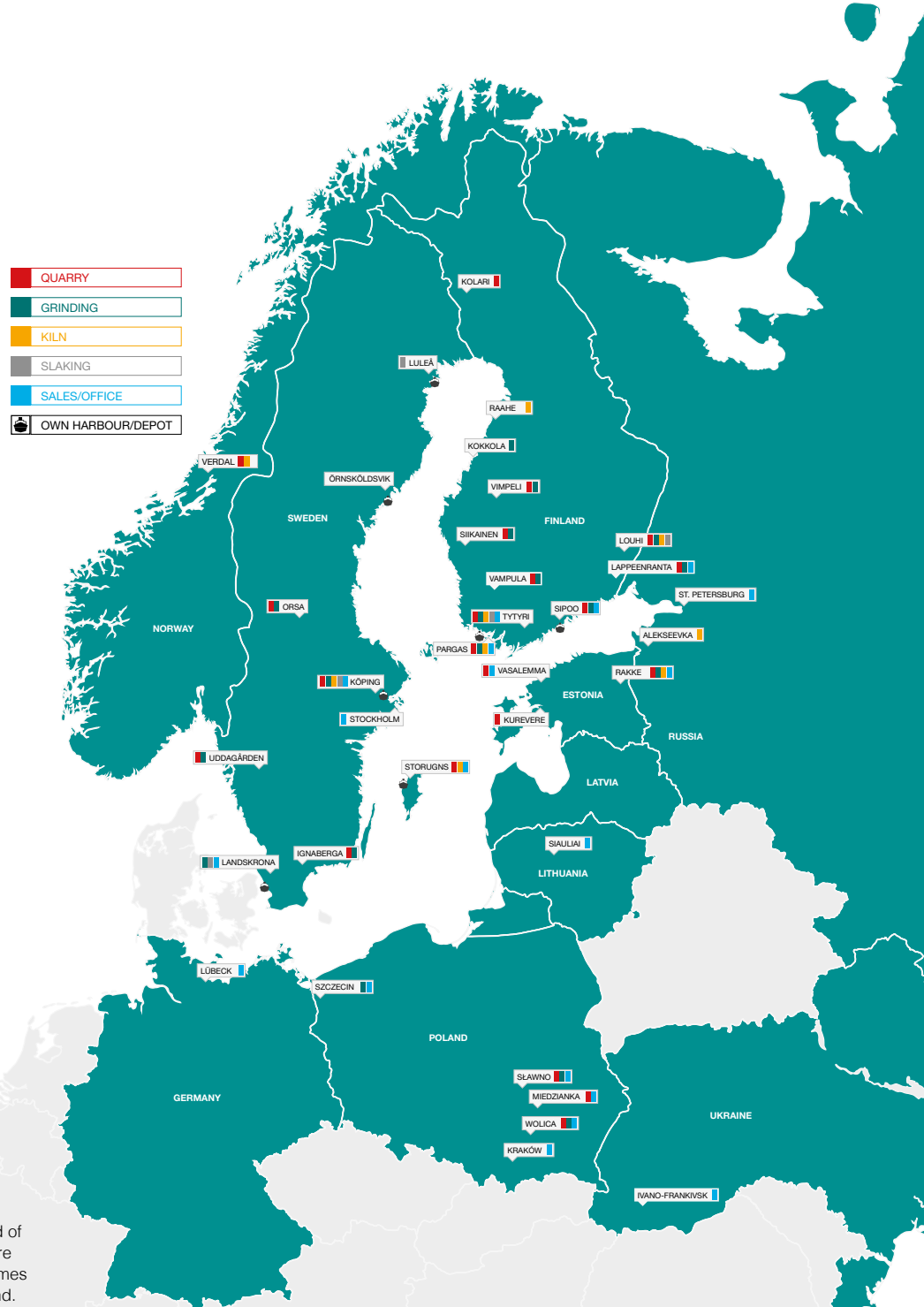
To enable heat recovery in Köping, Nordkalk invested more than EUR 3 million in the heat recovery facility, including a 14 MW warm water boiler installed directly in the flue gas channel, pipes, pumps and a heat exchanger. The town of Köping invested more than EUR 1 million in district heating piping and a pump installation. The inauguration took place in February 2014.

**WE ARE NEAR**

Nordkalk is Northern Europe's leading supplier of limestone-based products. We offer sustainable products for various fields of industry, such as pulp and paper, metals and mining, construction and chemical industry. Our products benefit the environment through flue-gas desulphurisation, water treatment and soil improvement. We strive for more customer value with less environmental impact.

Nordkalk is a local supplier with activities at more than 30 locations mainly around the Baltic Sea. The company employs some 1,020 people. Nordkalk is a member of the family-owned Finnish Rettig Group.

- QUARRY
- GRINDING
- KILN
- SLAKING
- SALES/OFFICE
- OWN HARBOUR/DEPOT



◀ Share of coke oven gas decreased because the lime kiln in Luleå, Sweden was divested in the end of 2013. Volumes of recycled oil includes joint venture NorFraKalk in Norway, and the electricity the volumes of the subsidiary Suomen Karbonaatti Oy in Finland.

Not just lime, but  
responsibility for a  
sustainable tomorrow.



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