



**Kährs**<sup>®</sup>  
QUALITY IN WOOD SINCE 1857

# KÄHRS ENVIRONMENTAL REPORT EMAS 2012

This is a translation of the controlled and approved Swedish report and it includes AB Gustaf Kährs' production facilities in Nybro and Blomstermåla.

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*Cover Photo: Martin Källqvist*

*Beautiful Crown Oak such as this is not suitable as material for flooring production. They provide the highest benefits when they are preserved and protected in the Swedish forest.*

# LETTER FROM OUR CEO

It is my pleasure, as president of AB Gustaf Kähr, to welcome you to read our Kährs 2012 EMAS environmental report.

Our business is now in its 156th year and we have our sights set on continued profitable and sustainable growth. Our aim is to be the customer's first choice and in an environmentally conscious way produce wood flooring with focus on quality, design and innovation.

In 2012, the merger between Kährs and the Finnish company Karelia-Upofloor was finalized. The expansion provides productivity and efficiency. It gives us new benefits and possibilities to strengthen our position within multiple, key areas. The integration and planning of our collective companies will comprise a big part of 2013.

At Kährs we are working towards long-term sustainability and it has been a key fundamental within our company. It leads to a decrease in environmental impact and shared with reduced costs and acts as an additional driving force as we develop new products. Our goal for the

near future is investing to increase our productivity and efficiency. Moreover, to develop our environmental efforts, we have decided on a new environmental goal: To reduce the scale of waste within production.

We are proud that a large percentage of our oak we use comes from Swedish forests because of the close proximity of our suppliers to Nybro. No matter where the raw materials are grown however, we have a responsibility to use the timber we have purchased in such a way that is it sustainable for both the planet and people. While global regulations on construction products and materials are



becoming tougher today. We welcome these challenges, as it is a positive development that environmental and human health considerations are so important today. These requirements are nothing new however to Kährs, we have been working for many years with our high quality and product design in conjunction with environmental and human welfare concerns as paramount.

We at Kährs Karelia-Upofloor see a bright and promising future ahead.

*Christer Persson  
CEO and President*



# ABOUT EMAS

EMAS is the European Union's voluntary environmental regulation. Its purpose is to promote environmental management, environmental improvements and environmental audits within the industry as well as to provide the public with information about the participating countries and their status.

Det Norske Veritas (DNV) is accredited as an environmental verifier by EMAS and by SWEDAC (accreditation number 1053).

DNV has reviewed Kährs production and has found that our environmental management system meets the requirements stated in the EMAS regulation (nr 1221/2009).

From 2006 and forward, Kährs' Swedish units are registered collectively as Kährs Nybro. SE-000055.



## Approved

DNV has reviewed the environmental statement in 2012 and has found it to be accurate, and detailed enough to meet the requirements in EMAS.

The report includes the production units in Nybro as well as Blomstermåla and AB Gustaf Kährs collective functions in Nybro. The next environmental audit for Kährs will take place during the first half of 2014.

Stockholm 2013-05-14

Ann-Louise Pätt

Management Representative

DNV Certification AB

## Om Kährs

### About Kährs:

AB Gustaf Kähr

### CEO:

Christer Persson

### Owner:

Triton & Hartvall Capital

### Global sales:

In more than 50 countries

### Production in Nybro:

Approx. 5 million m<sup>2</sup> wood floors.

**The EMAS-report :** Operations in Nybro and Blomstermåla (740 employees)

# ENVIRONMENTAL YEAR SUMMARY

Environmental efforts under 2012 have focused on two main points, the handling of increased external demands on certification of products and storm water issues related to irrigation

Kährs' comprehensive approach to responsible and sustainable businesses and stakeholder's expectations means that we consider principles of social, economic and environmental considerations into our planning and operations.

Our production facilities are located in the heart of urban areas, close to residences and other municipal operations that take up the issue of noise, dust and traffic. Tests show that we have met the required levels today but some noise will need to be diminished in order to meet future requirements.

Work on product certifications places demands on the entire operation at Kährs from product development and purchases via production and environment and safety features as well as marketing and communication departments.

Natural tannins come from the oak and that gives a dark color in run-off water. Researchers from Linnaeus University (Linnéuniversitetet) run pilot studies of various methods to reduce discoloration and tannins in storm water at Kährs. The presence of some chlorophenols in ground water enables controlled operations

which have expanded and that a plan for continued management and evaluation are presented to regulatory authorities.

Climate change and the reduction of our carbon emissions affect all planned activities and in particular transport and energy consumption. One of Kährs' strengths is a very high proportion of renewable raw materials in both production of flooring and biofuel.

Delivering our floors to over 50 countries leads to a high quantity of transportation, mainly shipping and trucking. Dependence on fossil fuels for transport is accordingly a part of the climate impact, and thus requires future improvements and research.

A carbon offset although is that Kährs has an excess of bioenergy from our continued operations and that our wood products store carbon dioxide decades under the floors use, furthermore we stored more carbon dioxide than we released during the entire year of 2012.

## Positive Results/ Actions

- Energy saving measures to reduce our energy use by 3 900 000 kWh per year in the future.
- Acquired equipment for purification of wastewater in collaboration with Linnaeus University.
- Through collaboration with our chemical suppliers, we have better conditions to meet customer demands and requirements within various product certifications.
- Nearly 5 million square feet of hardwood floors resulting in 65 000 tonnes of carbon dioxide being stored.

## Difficulties

- The presence of chlorophenols in groundwater indicates previous dipping operations, which affect the irrigation of timber in Nybro.
- Reducing the amount of tannins in our irrigation water is a challenge for the ongoing research
- Chemical management needs continuous improvement in accordance with the updated risk analysis.



# KÄHRS - WOOD AND ONLY WOOD

In 1857 Johan Kähr the elder moved from Mönsterås to the small, but thriving community of Nybro in Småland. He brought with him a lathe and a few other tools to setup a shop crafting wooden utility goods such as parts for spinning wheels. These simple beginnings became the foundation of the modern Kährs today.

## History

In 1919, Gustaf Kähr, grandson of Johan Kähr, set up the company AB Gustaf Kähr. Under his leadership the company developed and became an important and innovative producer of wooden doors, toys, furniture and flooring.

Gustaf was dedicated to find efficient ways to use the sustainable wood raw material and to improve the stability of wood when used in building materials. His perseverance paid off when in 1937 he received the patent for the invention of the modern multi-layer, laminated door.

Following upon this success he worked hard to find a solution for the problem of gapping, twisting and cupping of solid wood floors. After several years Kährs was awarded a patent, in 1941, for the invention of today's modern engineered hardwood floor, the multilayer floor.

## Kährs today

Kährs is still located in the town of Nybro, deep in the heart of a Swedish forest, where our company was born in 1857. The wood knowledge we have

accumulated over the years has been passed down from generation to generation.

We are constantly discussing new ideas as how to improve our floors. At work, we are trying, testing and eventually succeeding. But the goal is always the same: how to find ways to make our floors even better looking, stronger, easier to install and more sustainable.

We're proud that people all over the world appreciate the result. Today, our floors can be found in homes, offices, shops, hotels, concert halls, theaters and sports arenas from Europe and Asia to the Americas.

## World class Innovations

Kährs has always been at the forefront when it comes to innovations.

**1921** we begin using waste wood as biofuel for steam energy.

**1937** we were awarded the first patent for the multi layer wood door.

**1941** we get the first patent for multi layer wood flooring.

**1958** we introduce the first factory finished floor.

**1965** we develop the first sports floor system.

**1984** we introduce the first solvent-free, lacquer system,

**1995** our veneer wood floor, Linnea, is introduced.

**1999** first glueless joint, Woodloc® is introduced.

**2004** new generation Activity Floor,

**2010** we introduce Woodloc® 5S, the next generation wood joint.

**2010** we open the first LEED certified (green) warehouse.

**2011** we are certified according to DIBT, French VOC A.

**2011** we make the first wood floor made from dual labelled FSC®-Fairtrade certified wood.

**2012** merger with Karelia-Upofloor, provides even better conditions for the continued development of products and activities towards a sustainable business.



# KÄHRS RESPONSIBILITY

Our responsibility as a company is naturally to create a strong, efficient and profitable operation that is equipped for the future. Nevertheless, the path along the way is lined with choices and we can choose to take greater or lesser responsibility for people, society, and the environment. Our ethos at Kährs is that we have a responsibility to evaluate the long-term sustainability of those choices that we face.

Some examples of how Kährs works to make our world a little bit better for people, society, and the environment:

## People

- In our company, safety comes first. We continue working in a diligent and structured way to improve equipment and education, to minimize the risk of injuries on the job.
- Exercise and activity are important. Therefore, we want to make it easier for our employees to be able to stay fit, and exercise. We have our own gym, private tennis court, free admission to Nybro's municipal swimming pool, and every year hold a joint group activity for all of our employees.
- Kährs also has its own art society where the profits are financed by membership fees and contributions from the company itself.
- In our Code of Conduct we make demands on our business partners regarding responsible, ethical and sustainable business.

## Society

- Kährs has a responsibility to minimize the emission of substances that are harmful to humans and nature. As a company in the middle of a city, we must also show consideration to our neighbors by minimizing noise and disturbances.
- We also support local sports clubs.
- We are open to children as well as students that require contacts within the industry for special jobs, internships, and graduate jobs.
- We reward local suppliers of raw materials - wood suppliers in a regional proximity receive a higher price as well as certified wood. This benefits not only Kährs but the landowners and the environment as well.

- Since 2012, we manufacture and market the world's first floor with both FSC® and Fairtrade certified wood, originating from Chile.

## Environment

- Kährs has a comprehensive view on environment and quality and it has for a long time been of central importance. In 1993 we were the first flooring manufacturer in the world to receive ISO 9000 certification, and in 1997 we were certified according to ISO 14001.
- Long-term and responsible forest management is the foundation of our business. At Kährs we devote great care to ensure our raw material quality and origin. We have an ambitious environmental program in manufacturing, which includes both energy efficiency and optimum resource management.
- Kährs wood floor is, mainly made in a multilayer construction, where the raw material is used as efficiently as possible. Residual material becomes biofuel that heat Kährs factory as well as nearby communities. The remaining ashes are returned to the forest as fertilizer.
- We support various projects to benefit and preserve biological diversity. Kährs launched Project Oak disease that was run between 2000-2010.
- 2012, we received an award from the Regional Council in Kalmar County for "Climate Smart Work." Kährs was awarded for the world's first floor of double-certified wood and investment in a LEED-certified warehouse close to the production which decreased transports and reduced carbon emissions.



*We support the world's first dual project certified FSC® and Fairtrade labeled wood. Dual certification not only supports the restoration of biological diversity in the forest, but also alleviates poverty by providing local foresters an opportunity to have a sustainable income.*



*Sports is important in Nybro and the hockey team Nybro Vikings is supported by Kährs.*



*Recycling Society: A step to reduce the amount of unnatural chemicals to municipal sewage, and its process of its water treatment plant*

# KÄHRS ENVIRONMENTAL WORK

## 1. Environmental Aspects

The cornerstones of Kährs environmental work are knowledge about our company's impact, the laws we follow, and the requirements we face from our surroundings and our stakeholders.

Environmental aspects are updated and re-evaluated each year to ensure that our development is in the right direction and that real improvements are made. These different aspects support our long-term efforts to improve the organization's processes continuously.

## 2. Planning of the most important environmental aspects.

Kährs environmental policy sets the direction for environmental work.

All environmental factors are examined once a year at each of Kährs' units. The assessment we have made shows which are the most significant environmental aspects (with the greatest effect on the environment), and the environmental goals and program are set up against the background of at least one significant environmental aspect. Environmental impacts and risks in the significant environmental aspects at Kährs are examined in the next section.

## 3. Implementation

The people affected by the significant environmental aspects are key individuals in carrying out the environmental program at Kährs.

A large number of them work in the production organization, and receive training to cover the environmental issues that affect their work. We draw in a broad participation through improvement groups in TPM (total productive maintenance), which operates in all production lines.

Through the deviation handling system, which is easily accessible on the intranet, events and proposals for change are put forward. Environmental issues are communicated internally in the company and externally. All matters included

in the environment management system are documented as processes and are in our manuals. Most of the procedures and instructions that regulate efforts to protect the environment in the organization are accessible via the Kährs Intranet. There are specific precautions or routines to deal with identified environmental risks.

## 4. Monitoring

In order to monitor and measure the company's environmental impact, measurements are taken frequently.

A deviation handling system is in place to check that the internal processes function correctly and to ensure that incorrect actions are not repeated.

Internal audits are performed regularly throughout the year by specially trained personnel who monitor compliance with the environment management system. The inspections also aid the management in assessing whether the management system is effective and will lead to improvements. The environmental system is also a support to the legal demand of self-monitoring.

## 5. Action

The Kährs management group follows up on the environmental program and environmental management system.

Any significant new environmental aspects are presented at the review, and new environmental objectives are set, after which the company enters a new phase of Planning - Implementation - Monitoring and Action.

## 6. Transparency

EMAS audits and reports during the past 15 years show our history and transparency in our environmental work. This EMAS report is accessible at [www.kahrs.com](http://www.kahrs.com).

As an element in maintaining the company's ISO 14001 certification and EMAS registration, impartial external auditors from DNV verify compliance with EMAS standards and ISO 14001 standards annually. Information is available on our intranet. The material is used for internal training, but also as material for presentations to our customers and other external visitors.

*Model showing the Kährs environmental management system.*



## Our environmental principles

- Our commitment to the environment must be genuine and all issues handled with the upmost thought and respect.
- We will strengthen our environmental commitment further and create a long term sustainable business, for the benefit of current and future generations.
- We must contribute to and support responsible forestry.
- We must lessen our environmental impact through continuous improved management of chemicals, raw materials and energy.
- Our development and wood floor manufacturing processes must reflect the natural life-cycle, following the principles of sustainable development.
- We must fully understand and comply with legislation and environmental requirements, and apply this method throughout the whole supply chain.

# ENVIRONMENTAL ASPECTS

An environmental aspect is a part of an organization's activities, products or services that affect or could affect the environment.

The identified environmental aspects are evaluated one by one to decide whether they should be regarded as significant or not. In order to make the assessment, the following points must be evaluated:

**Legal:** Connection to legal requirements (regulations) and if any connection is found the environmental aspect is treated as significant.

**Risks:** How large is the risk of accidents are due to the activity, service or product.

**National** environmental goals.

**Scope:** Amount of emissions and resources used

**System conditions:**

1. The concentrations of substances from the crust of the earth must not be systematically increased in the natural surroundings.
2. The concentrations of substances produced by society must not be systematically increased in the natural surroundings.

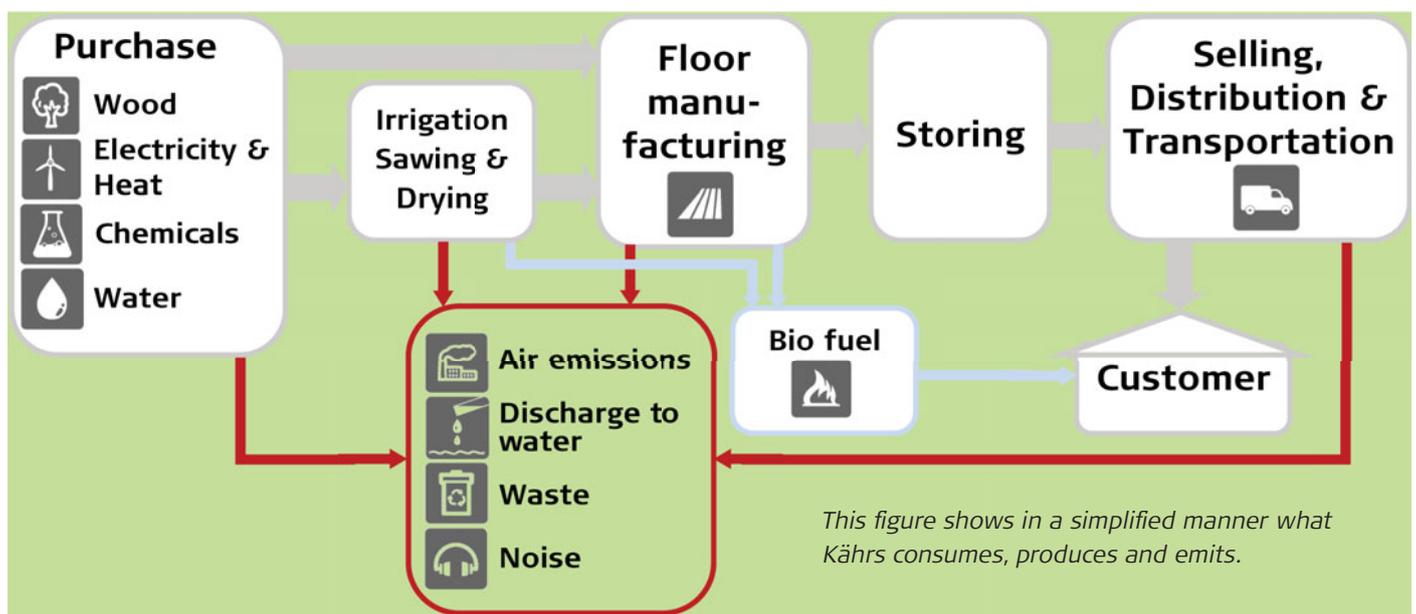
For more information see page 27 for contacts.

tematically increased in the natural surroundings.

3. The physical basis for natural productivity and diversity must not be systematically impoverished.

4. Effective and fair distribution of resources to satisfy human needs.

The environmental program is concentrated on the significant environmental aspects.



*This figure shows in a simplified manner what Kährs consumes, produces and emits.*

# SIGNIFICANT ENVIRONMENTAL ASPECTS

Some aspects will have no impact on the environment during normal operation, but only in connection too incidents or accidents. The ecological balance in the next chapter presents key trends and development for Kährs' significant environmental aspects.

Significant environmental aspect	Activity that affects the environment	Environmental impact	Risk	Symbol in the report
Risk from non-sustainable forestry	Purchase of wood	Felling that is not sustainable in the long term.	Wood material from felling operations that do not meet requirements could be delivered to Kährs.	
Climate impact	Transport of materials to, from, between and within Kährs' factories.	Emissions of carbon dioxide from fossil fuels to the atmosphere leads to increased levels of carbon dioxide and enhanced greenhouse effect.	Procurement of less efficient transport.	
Energy use	Drying materials is the process that uses the most energy in Kährs.	Acidification, emissions of carbon dioxide and consumption of resources in the conversion of energy.	Increased energy use	
Air emissions of dust	Extraction and transport of sawdust.	Spreading of particles that are harmful to breathe in creates a poorer air quality.	Major fire in the factory. Breakdown of filter with high emission in a short time. May result in nuisance to neighboring residents.	
Air emissions of nitrogen oxides and sulfur oxides	Transport of materials to, from, between and within Kährs' factories.	Acidification of soils, lakes and streams.	The use of vehicles with lower efficiency and purification.	
Air emissions of volatile organic compounds (VOC)	Surface treatment, filling, gluing and maintenance of machines and buildings.	Deterioration of air quality.	Emissions are diffuse and the use of smaller containers ensure a low risk of major discharges.	
Discharge of pollutants to the soil in the surface water or waste water drain net	Cleaning process equipment factor floors, saw blades and trucks. Events that result in discharge of chemicals. Irrigation and storing of wood chips of oak.	The industrial process waste water can disturb the biological processes in the municipal purification plant. Bio-accumulable wastes are absorbed in the sludge of the purification plant. During normal operations the environmental impact is insignificant.	Risk of leakage when chemicals are loaded or unloaded, if they can cause pollution to the recipients of surface water or to the soil. Extinguishing with water during a large fire.	  
Hazardous waste	Cleaning gluing machines, filling machines and surface treatment machines generates polluted water from washing, which is classified as hazardous waste.	Waste is not efficient use of materials. Hazardous waste represents a risk of violating system condition 2.	Handling and storing of hazardous waste means a risk for leakage to nearby soil and ground water.	
Noise	Transport, extraction fans and transport of sawdust.	Noise level causes a nuisance for neighbors.	Risk of nuisance resulting from inadequate maintenance or dimensioning and project planning.	

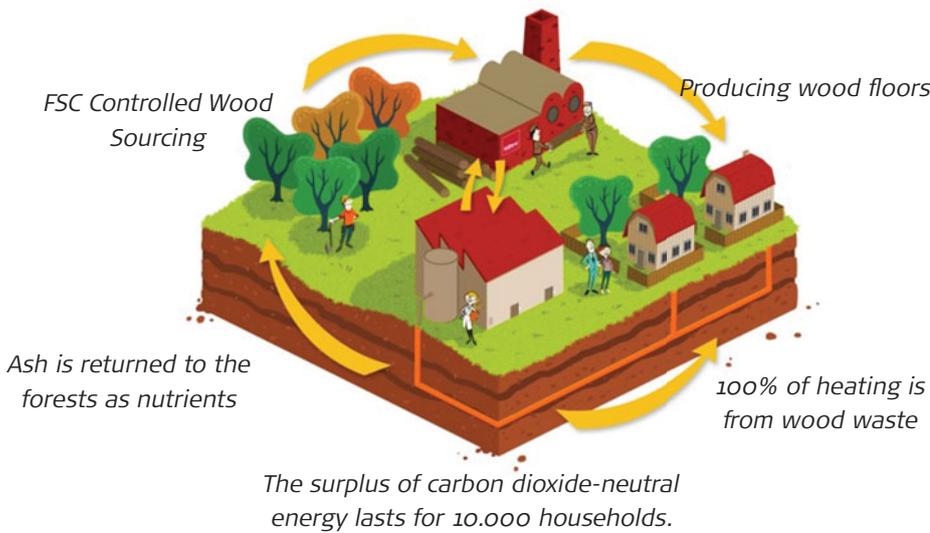
Green symbol = Positive development during 2012.

Yellow symbol = the situation is stable.

Red symbol = environmental impact is increasing, needs immediate attention.

# ECOLOGICAL BALANCE 2012 & TARGETS

Here we present the ecological balance of Kährs and the two production sites. A summary is only made for Kährs in total as the main facility in Nybro is the main site and Blomstermåla is part of the Kährs' sawmill operations.



**The basis used for calculating key performance indicators is the number of square meters (m<sup>2</sup>) of Nybro produced wood flooring.**

**All values in the ecological balance refers to full-year 2012.**



## Water Sources & Usage

<b>Municipal drinking water</b>	27 000 m <sup>3</sup>	6 l/m <sup>2</sup>
<b>Ground water for irrigation of logs</b>	10 000 m <sup>3</sup>	2 l/m <sup>2</sup>
<b>River water for irrigation of logs</b>	73 000 m <sup>3</sup>	16 l/m <sup>2</sup>
<b>Storm water for irrigation of logs</b>	95 000 m <sup>3</sup>	21 l/m <sup>2</sup>

The largest amount of water usage is for the irrigation of logs and to regulate humidity in the production process. Watering is done to keep about 21 000 m<sup>3</sup> of oak and ash logs wet at the lumberyard in Nybro and Blomstermåla. Most of the water used in Nybro is from storm water supported by ground water if necessary. The process for the watering of timber in Nybro is based on recirculation to conserve ground water.

Research cooperation with Linnaeus University is conducted to improve the management of process, storm water and leachate. "Integrated Wastewater Management for the Wood Industry - Process water, storm water and leacha-

te." In 2012, a pilot plant for the treatment of storm water has been operating by Linnaeus University researchers. Work will continue on a larger scale in 2013 in cooperation with LNU.

Leachate from wood biomass logs and uncut timber causes elevated levels of oxygen demanding substances. Treatment of this water in this pilot plant, consisting of wetland and aerated zones have show positive results.

Process wastewater occurs in the production mainly of water for cleaning machinery and equipment. The wastewater treatment plant discharge will be released to the drainage system and

municipal wastewater treatment plants. The risks to contaminate water or land associated with loading and unloading of chemicals, these risks are identified in the Kährs risk analysis. Procedures have been developed and followed to prevent incidents and minimize environmental impact in the event of an accident.



*Read more about the LNU-project*



## Material Efficiency

<b>Wood material</b>	136 815 t	30,8 kg/m <sup>2</sup>
Logs	83 932 t	
Sawn wood and semi manufactures	52 883 t	
<b>Chemicals for the prodcuts</b>	2 917 t	657 g/m <sup>2</sup>
Renewable	716 t	161 g/m <sup>2</sup>
Non-Renewable	2 174 t	496 g/m <sup>2</sup>
<b>Maintenance chemicals</b>	29,8 t	7 g/m <sup>2</sup>
Renewable	8,5 t	2 g/m <sup>2</sup>
Non-Renewable	21,3 t	5 g/m <sup>2</sup>
<b>Fuel</b>	111 t	25 g/m <sup>2</sup>

### Wood material

Wood raw materials consist of coniferous wood and broad-leaved deciduous wood or semi-manufactured in the form of sawn board materials. Oak, beech, ash och birch is first sawn in Nybro or Blomstermåla, and then dried, processed, assembled and surface treated.

To produce wooden flooring, other materials such as glue, filling and lacquer are also needed. The packaging is also an auxiliary material, and at Kährs it consists of recycled corrugated cardboard and plastic wrap.

Kährs' focus is to use primarily Swedish wood raw materials. About 70% of all

the wood used comes from Swedish forests, while only less than 2 % originates outside of Europe. The oak logs bought directly from forest owners come from forests in southern Sweden, which is primarily within a 160-kilometer radius to Kährs' sawmill.

Logs purchased from Denmark and Germany mainly go by train and ships.

Partial manufacturing for the veneer floor Linnéa comes from central Europe and consist of a HDF board with a veneer top layer.

### Other chemicals/materials

Before any new chemicals are introduced for use in any of our operations they are individually assessed for environmental and safety criteria aspects. Approved chemicals are then listed in our database, the chemical register, where information about each chemical also can be found, such as material safety data sheets. Currently, about 500 approved chemicals are listed.

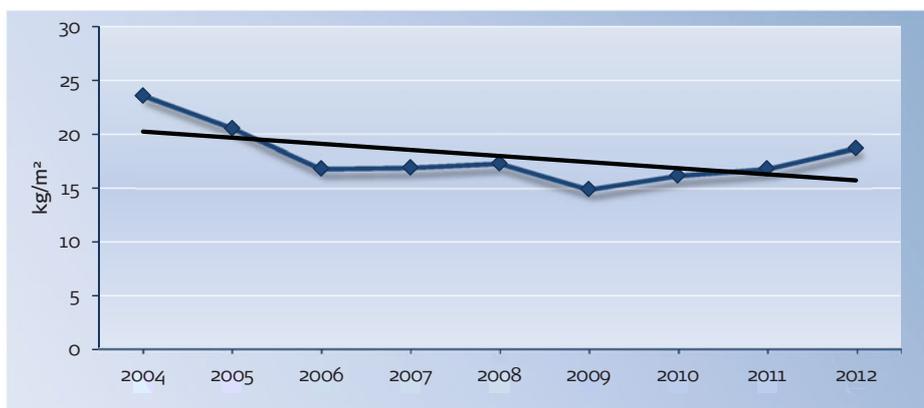
A water-based glue is used to join the multi-layers in our flooring. Since the surface (top) layer hardwood is not entirely smooth after sawing, wood filler can be applied to smooth out the surface if necessary. After sanding, the surface (top) layer is then prepared for a surface treatment.

Lacquers and or oils are used for the surfaces of the flooring to produce the desired appearance and performance.

The different finishes we can apply give the flooring a durable and longwearing surface. Kährs finish lacquers are waterborne and UV cured. The stains and oils contain small amounts of VOC's that are emitted during curing.

The final products meet indoor air certifications E1 and CARB (ATCM) Phase II.

The renewable auxiliary materials also consist of wax and cardboard for packaging. The supply of renewable auxiliary materials is limited and constitutes a



Amount of wood material to produce 1 m<sup>2</sup> wood flooring in floor factory (sawmill excluded). Logs converted to sawn timber.

challenge in product development and purchasing. Among non-renewable auxiliary materials are the plastic wrap, plastic banding and metal banding used in pallet packaging, the metal and plastic can be recycled. The paper in all of our carton packaging is from recycled paper while the paper used in printing of our product magazine is Forest Stewardship Council, FSC® Mix certified.

### **Maintenance Materials**

Maintenance materials such as lubricating oils and hydraulic oils for machinery are also listed in our chemical registry. A review of our range of lubricating and hydraulic oils has shown that we have reduced the number of products accepted.

### **Fuels**

At Kährens we use almost exclusively diesel and alkylate. Alkylation is the process that extracts the alkylate from the raw material. Diesel is used for our forklifts and loaders and alkylate petrol is mainly used in our chain saws at our production facilities.





## Responsible forestry

# Target- Certified wood

One of Kährs' main environmental targets is to increase the amount of certified wood.

- In 2012, our goal for certified wood purchased was 40%. Kährs achieved 42% certified wood.
- Two of our major suppliers have improved their ability to deliver certified or certified controlled wood, which is a very positive improvement.

The forest certifications Kährs accepts are FSC, FSC-Fairtrade, FSC Controlled Wood, PEFC and other certifications Kährs has deemed acceptable in conjunction with leading environmental NGO organizations.

All timber purchases follow our specifications that all wood must be in full compliance with the requirements of the Lacey Act and the 2013 EU Timber Regulation.

Our ambition is the purchasing of FSC controlled wood, as our minimum acceptable level is an important step to give support to responsible forestry. This also encourages the forest owners as they can take the "step approach"



and smaller investment increments on their way to achieving full FSC certification, typically in five years or less. The amount of sold FSC certified flooring is driven by demand of our customers and the market.

Any species classified as tropical must be FSC certified for Kährs to consider purchasing in 2012.

The proportion of FSC-certified oak logs in Sweden is dependent on the proportion of woodland that is certified. All the local Swedish raw material is classified as "from low risk area" by the FSC but due to costs considerations many of the small landowners choose not to become FSC certified today.



## A sustainable forest is the foundation of Kährs' business

One of Kährs' main environmental aspects is the risk of using wood from a non-sustainable forest. It is our belief that a future, sustainable supply of controlled wood is of outmost importance not only for Kährs but is a global concern as well.

**81,5 % of the floors we sell have a surface layer of oak.**

The Swedish oak tree is harvested and maintained according to the Swedish Broad Leaf Act (Ädellövsskogslagen). There is financial and technical support from the EU and Swedish government to replant and take care of the Swedish broadleaf forests.

Kährs' hardwood purchasers have contact with over 1000 forest owners. These contacts include discussions and education at Kährs to encourage and to protect high nature values in the forest.

Normally there is no conflict between nature conservation and floor production connected to old oaks. It is very important however that forest owners actively take care of their protected valuable broadleaved forest; otherwise they will be overtaken by spruce and other softwood species.

**Kährs carries out a number of activities to support a growing, active forest and to further strengthen the southern Swedish oak forestry:**

Special forest days for the education of local forest owners at Kährs in Nybro.

Production and distribution of the Kährs "Oak" (Ek) educational magazine to 7000 forest owners.

Special bonuses paid to local forest owners on delivery, of their timber to Kährs.

Bonus for certified wood.





## Waste & Recycling

<b>To energy recovery</b>	156 t	35 g/m <sup>2</sup>
<b>To material recycling</b>	215 t	48 g/m <sup>2</sup>
<b>To landfill</b>	6 t	1 g/m <sup>2</sup>
<b>Sent as hazardous waste</b>	160 t	36 g/m <sup>2</sup>

Material by-product that is collected for energy recovery consists of domestic refuse (for example) and anything from sand paper to seat cushions.

Under material recovery, recyclable waste is included, such as office paper, metal and plastic.

Anything that is unsuitable for material recovery or for burning is included under landfill disposal, which may be items such as concrete waste. The category of waste and recycling includes a significant environmental aspect, which is a hazardous waste.

The hazardous waste consists of items such as batteries, waste from the filling and surface treatment processes, and electronic waste such as capacitors containing PCB.

The waste is collected in approved containers, located throughout the facility for their particular purpose, and stored and managed under control at the production centers. Licensed vendors are used to handle the hazardous waste professionally and to ensure that it is

correctly and environmentally processed collect the containers.

- The amount of hazardous waste depends largely on changes in production processes and new product test runs.

- Intensive efforts to develop new products have led to many tests of chemical solutions that have increased the amount of hazardous waste.

Waste from renovations handled by construction companies is not reported here.

Overall, the total amount of waste has decreased compared to the previous year.

More efficient equipment to compact recyclable plastic does not increase recovery amounts, but they do reduce transportation and lower costs for recycling. In 2012, the number of collections and the number of shipments declined from 40 to 12.

- Improvement of the local collection stations and various containers makes

it easier to separate the different materials.

Even though all the waste is dealt with an environmentally acceptable manner, it still interrupts the natural cycle.

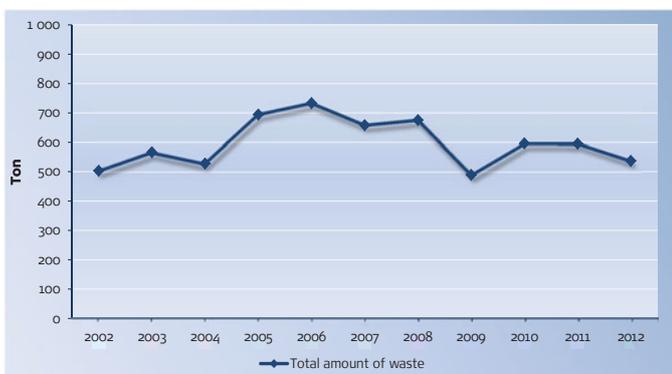
Waste, and especially hazardous waste, constitutes a risk of emissions with an environmental effect.

In order to take the next step and reduce the quantity of hazardous waste, new cleaning methods are required, and we must improve our methods and knowledge concerning environmental practices in the various manufacturing processes.

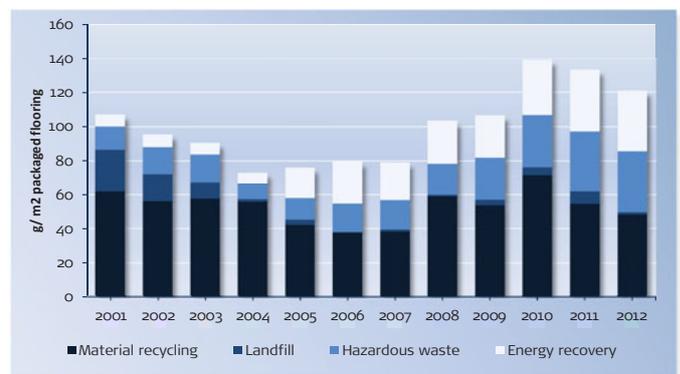
### Goal for 2013

- To reduce the amount of waste by 10 g/m<sup>2</sup> and the cost of management by 10% compared to 2012.

*This section does not deal with by-products such as wood chips and sawdust. (See instead Energy and Biofuel production on the next spread).*



Total amount of waste 2002-2012, expressed in tonnes.



Amount of waste per square meter manufactured floor 2001-2012. Total and broken down by waste fraction.



## Emissions

<b>VOC (Volatile Organic Compounds)</b>	3,1 t	0,7 g/m <sup>2</sup>
<b>Dust (estimated quantity)</b>	3 t	0,7 g/m <sup>2</sup>
<b>TOC in process water, to sewage plant, estimated</b>	< 0,2 t	

Emissions to the atmosphere from production processes are primarily diffuse emissions of VOC and dust from the filter installations.

### VOC

VOC's originate from dissolving agents in lacquer, stain and glue, and from various chemicals used in machine and building maintenance. The greater part of dissolving agents used for cleaning in the production processes, are handled as hazardous waste and sent for treatment by regulated waste service providers.

- The VOC emissions have decreased since 2006, which are partly due to reduced production and partly due to ongoing product development in gluing technology.

### Dust

Pipelines transport large quantities of wood shavings and wood dust through filters at Kährs' plant in Nybro. A preven-

tive maintenance program ensures that the filter equipment operates well. Our maintenance is designed to prevent accidents in the filter by measuring, examining and listening to the equipment and in proper time maintain or replace parts as needed.

- A measurement survey completed in 2012 shows that the terms of our permit are in compliance.

### Other emissions to the atmosphere

The heat energy for the production units is obtained, as mentioned above, from burning bio-fuel. The burning process releases carbon dioxide, nitrogen oxide, sulphur dioxide and dust. The carbon dioxide emissions contribute to the greenhouse effect, but bio-fuel does not cause a net increase of carbon dioxide in the atmosphere. However, nitrogen oxide and sulphur dioxide contribute to acidification.

The energy conversion does not occur on Kährs' premises, and no emission is therefore stated for this in the report.

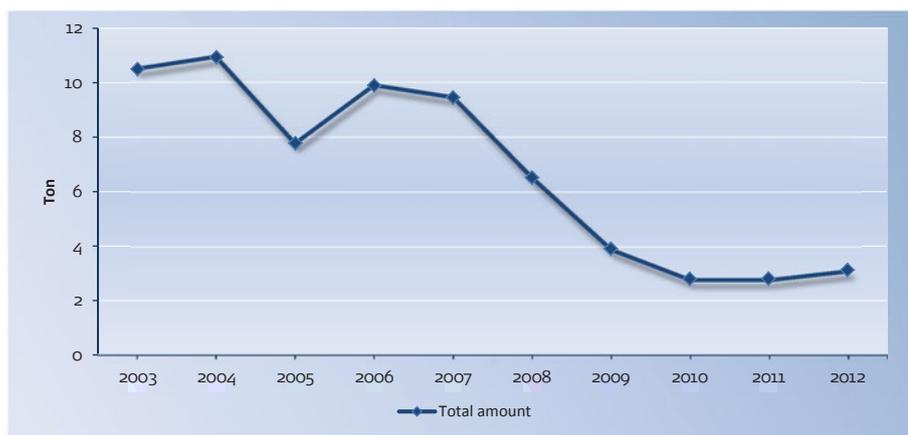
### TOC process wastewater

All process waste that's not treated as hazardous waste are treated in sedimentation/adsorption process to reduce organic material substances that are difficult to treat in the sewage plant in Nybro municipality. The improvements of this process are done together with Linnaeus University.

- In 2012, improvements for the treatment plant for wastewater have resulted in reduced amounts of organic matter (TOC) to the municipal treatment plant. As the industry's chemicals often do not break down, it is important to take care of it at the source.

### Irrigation water

- Storm water diverted from irrigation water contains tannins from the watering of oak logs. In 2012, low concentrations of chlorophenols were detected in the used groundwater. The amount of irrigation water that is diverted is limited by the retaining reservoir and recirculation. A pilot plant to purify the irrigation water is being conducted by researchers from Linnaeus University.



Emissions of VOC from Kährs 2003-2012.



## Energy Efficiency and Biofuel Production

<b>Electricity consumption</b>	38 000 MWh	8,5 kWh/m <sup>2</sup>
<b>Heat consumption</b>	44 000 MWh	10 kWh/m <sup>2</sup>
<b>Transportation energy (fossil)</b>	42 000 MWh	9,5 kWh/m <sup>2</sup>
<b>Production of biofuel</b>	265 000 MWh	60 kWh/m <sup>2</sup>
<b>Net-Energy Produced (Carbon Neutral)</b>	110 000 MWh	26 kWh/m <sup>2</sup>

- All electrical energy consumed at Kährs is contracted as 100% renewable hydro-power.
- All heat energy at the Nybro headquarters come from our own wet-waste (bio-fuel material) from the bark and branches generated from the sawmill.
- The total energy amount of fossil-based fuel which was used for Kährs' transportation in 2012 was approximately 42 000 MWh.
- The total amount of produced biofuel shipped from our facilities would generate, in an efficient power plant (90% efficiency), approximately 80 000 MWh of electricity and about 160 000 MWh of heat
- Kährs' activity in 2012 resulted in a surplus of carbon neutral fossil energy of about 110 000 MWh.
- Our dry residues (sawdust) is purchased by a local energy company to produce wood power or pellets for heat consumption. The ash from the combustion of biomass boilers is collected and then spread back in the local forests as a nutrient.



# Target - Energy use

Our environmental target is to carry out measures that will decrease energy use by 3 GWh per year.

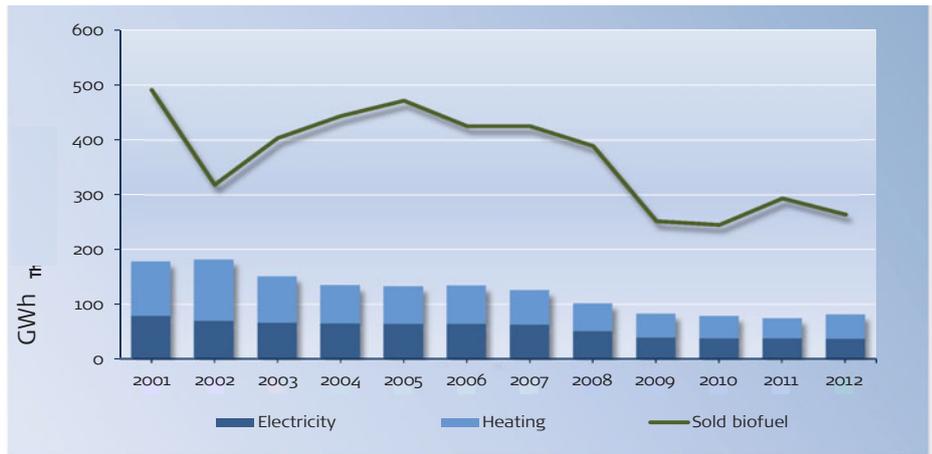
A broad range of activities to decrease energy use such as achieved the goals for 2012:

- Procedures are in place to turn off the filters when production is not running.
- Reworking extractor fans so they can run at the same time as production and turn off when production is halted.
- Examining and tagging each pneumatic mechanism for leaking compressed air. By this means we have identified the cost of each leakage.
- Automatic timers and automatic shut off for lights is important in a facility with 1 000 kW of installed lights

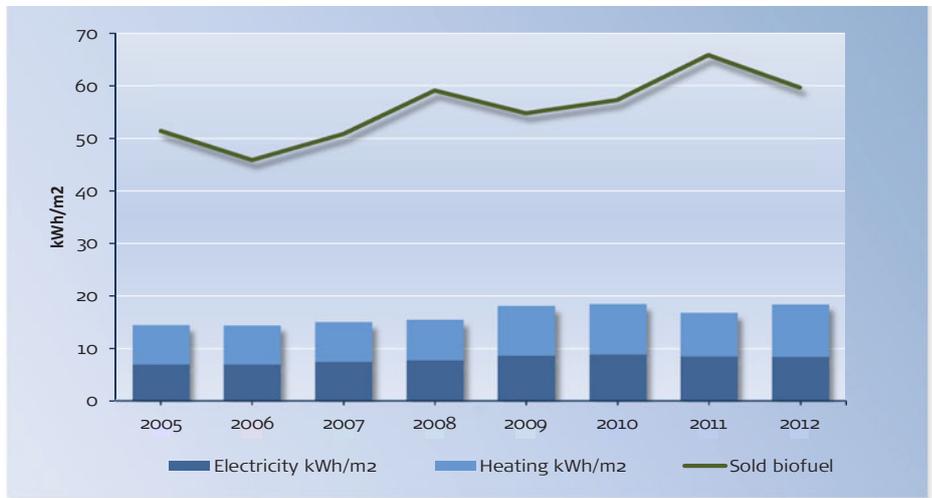
In 2013, the focus of our plan is on:

- Measuring energy use of our facilities and processes.
- With those results and measurements to identify and implement new possibilities for reduced energy use.
- Studying the feasibility of recovering energy (heat) from the exhaust air from our enormous filtration system.

*Note: The potential for reducing energy consumption is influenced by many factors, including weather, mild and severe winters and increases or decreases in production volumes.*



Kährs' energy use 2001-2012



Kährs' energy use per m² 2005-2012.

**Effective energy use reduces our environmental impact and makes renewable energy accessible to other consumers who currently use fossil fuels.**

All conversion of energy has some effect on the environment, primarily in the form of climate influence because of the fossil fuel consumption and the formation of acid gases.



## Transportation

	Transport work (tonkm)	Carbon dioxide CO <sub>2</sub> (ton)	Nitrogen oxide NO <sub>x</sub> (ton)	Sulphur dioxide SO <sub>2</sub> (ton)
<b>Transports in</b>	300	5 800	80	70
<b>Transports out</b>	120	3 700	40	20
<b>Intermediary transport</b>	2	120	1	~0
<b>Internal transports</b>	8*	350	7	~0

\*All internal use converted to truck transports

All calculations of transportation emissions are based on material from NTM and DB Schenker contractors. The distribution shows that the main types of transportation are by ship and trucking. Transportation by rail comprises the incoming transport of logs to the Bloms-termåla sawmill.

Cargo ships are used primarily to transport incoming wood material from Europe and other sources, and for outgoing transport of finished flooring to customers around the world. Truck transportation is used for short distance transportation between suppliers and the production sites and for transport needs that cannot be served by ship or train.

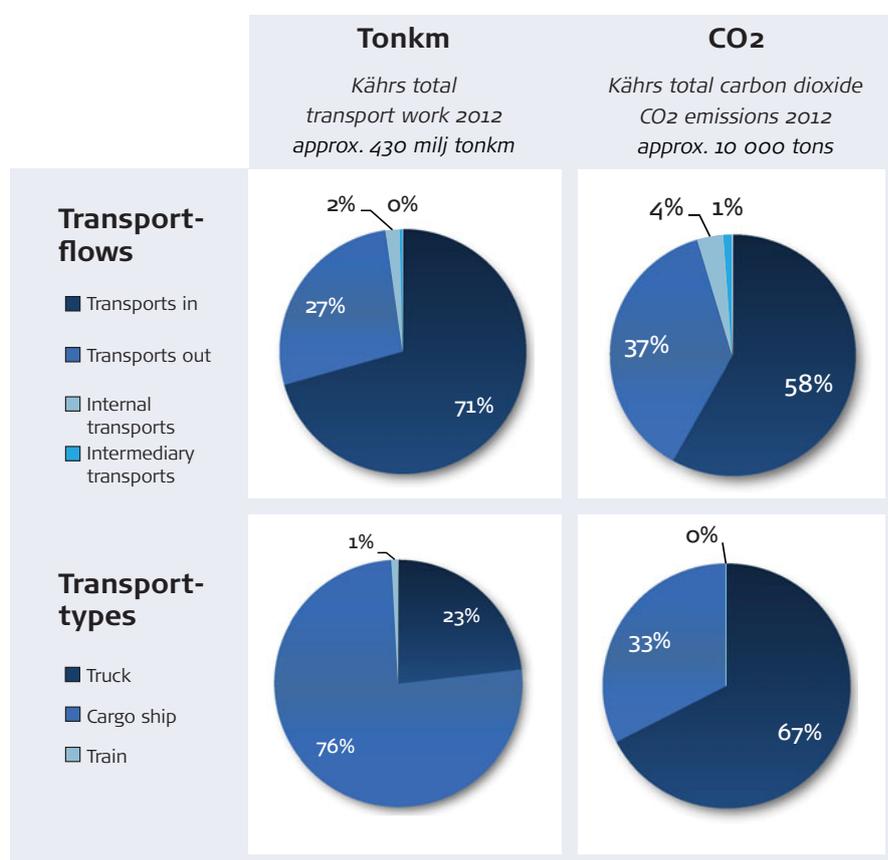
The category of intermediary transports includes externally manufactured products to our warehouse (KDCE). Most transportation work is via cargo ships, but the largest carbon dioxide emissions come from over the road transports.

### Carbon dioxide emissions

Kährs sells wood flooring all over the world, which involves long-distance transport. The resulting fossil carbon dioxide emissions contribute to our carbon footprint and thus an increase of climate change risk. The influence on our carbon footprint is measured in GWP<sub>100</sub>. Kährs' fossil carbon dioxide is

derived exclusively from transport, and amounts to approximately 10 000 tons or 10 000 000 GWP<sub>100</sub>. In this year's report we have changed to a new source of emission factors and included trans-

portation between different outsourced production sites and different Kährs storage. The result is a higher value of the emissions.



### Reduced carbon dioxide emissions

**Our main activities to reduce carbon dioxide are to increase the efficiency in the logistic planning and use transportation methods that give lower carbon dioxide emissions.**

When all internal use of energy and use for transports are subtracted from

the total amount of biofuel produced, there is still 110 000 MWhs left. This corresponds to an emission of approx. 30 000 ton CO<sub>2</sub>. or use of 11 000 m<sup>3</sup> heating oil.

Burning wood does not have a net increase of atmospheric carbon dioxide, when the forests are replanted. A Kährs

floor can have life cycle of fifty years, and it is then usable as biofuel or as another wood based product or use.

The greatest decrease of carbon dioxide is in the use of wood floor. Kährs sold quantity, during 2012, stored over 64 000 ton of CO<sub>2</sub> for 50 years in installations.



## Noise

Noise is caused primarily by our fans and filters in the manufacturing plant, but also can be in connection with transport (loading/unloading or road/motor noise). Excessive noise may be harmful or least cause a nuisance to people both inside and outside the company premises (employees, neighbors and nearby residents).

In order to avoid noise problems, preventive maintenance is continuously car-

ried out on fans and filters. The question of noise is taken into consideration in various decisions when planning investment projects and rebuilding. Noise management is also described in project routines. Noise is included specifically under the terms of the permits for each of our sites and the results for noise conditions are included in the statements for each facility.

- Measurements during 2012 showed that we fulfill demands in the neighborhoods near our production.

- Processing of wood, sawing, planing and sanding gives inevitable high noise levels. We are constantly working to reduce this noise by making demands on our equipment suppliers, to reduce noise at the source.



### **Kährs is situated right in the heart of Nybro**

Between the town hotel and the town hall is the sculpture by Vicke Lindstrand that has become a symbol of Nybro and the "Kingdom of Crystal" as the area is called.

# RISKS

Once a year, a Kährs' risk analysis is conducted from an environmental point of view, by a group responsible for environment, fire, recovery and safety.

Laws have evolved towards greater demands on risk assessment and measures to reduce the risks. At Kährs we have for several years coordinated our risk work in a group with representati-

ves from the environmental, health and safety departments.

The risk analysis is followed by an action plan established with measures of what should be corrected to reduce risks. Measures based on the previous risk analysis have been carried out, e.g. fire alarm systems in offices and the expansion of spark prevention in air filters. In 2012, a new risk assessment was carried out.

Implemented measures have been followed up and a new action plan for 2013

is developed, where the management of chemicals is one of the central points.

During the year, exercises have been carried out to deal with potential fires and chemical spills in Nybro. An audit of chemical risks is in progress and testing of emergency measures in specific locations has also been implemented. According to the risk analysis, the major environmental risks are associated with fire and filter failure and loading and unloading of chemicals.

# INTERNAL AND EXTERNAL AUDITS

Internal audits are a tool in the function follow-up of important processes, by ensuring compliance and endeavor of the requirements and targets set in the management system.

The standards for each management system (SS-EN ISO 9001:2008 and SS-EN ISO 14001:2004 together with the EMAS regulations) define the requirements for internal audits.

**Internal audits are carried out at planned intervals to ascertain whether the management system:**

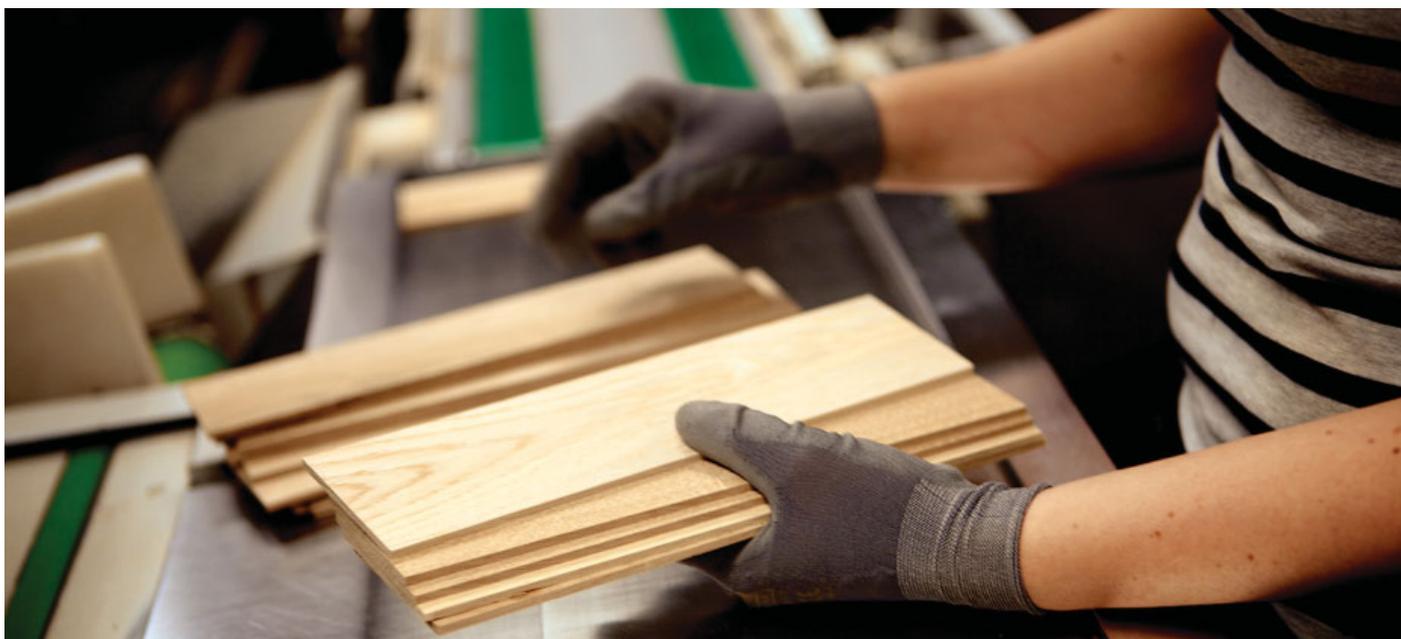
Ten internal auditors, with different roles in the company provides for a very competent group of auditors. Both planning, execution and reporting are designed to evaluate and support continuous improvements in Kährs according to the PDCA (plan, do, check, act) wheel.

The audits are carried out according to Kährs' shared management systems for environment and quality. Effectiveness verification of the system at the diffe-

rent production sites is included in the audit.

## External Audits

Periodic audits of the management system for environment and quality have been carried out during the year. For Kährs FSC certificate, we have had external audits. Audits are also conducted to verify that we meet requirements on our flooring products.



# LOCAL CONDITIONS

## KÄHRS NYBRO – Permitting Terms

in 2012, we have made applications of changes on heating of blocks and action plan for the handling of irrigation water. Measurements to improve the quality of released water are ongoing.

No noise complaints were received during the year. measures have been made to reduce noise from filters and saw dust pipes.

Activities to develop the handling of process waste water was carried out in 2012 and will go on during 2013.

Efforts to develop the self-control programs continue. Notes from inspections have been taken into action or are in progress and are reported in the environmental report.

No elevated levels that indicate any environmental impact from the landfill has been registered

Term (Date of issue)	Guideline	Status
<b>3. Discharge of VOC (2005-02-04)</b>	Max 0,75 tons of VOC per started million m <sup>2</sup> . As a limit value, however, 15 tons of VOC per year.	Met: 0,49 tons per started million m <sup>2</sup>
<b>4. Noise (2005-02-04)</b>	55 dB (A) Monday - Friday. 07:00 to 18:00 45 dB (A) at night 10:00 p.m. to 7:00 50 dB (A) at other times The maximum momentary noise level at night may be 55 dB (A).	Target for night met in the current operating times.
<b>5. Noise (2005-02-04)</b>	At a new establishment, measures shall be taken to reduce noise emissions to the Swedish Environmental Protection Agency's guidelines for newly established industry.	Requires measures according to an action plan reported to the regulatory authority.
<b>8. Decontamination and aftertreatment</b>	Examine the need for decontamination and aftertreatment measures	MIFO-FAS1 conducted in 2011. Detection of low content of chlorinated phenols in groundwater. MIFO-FAS2 planned 2013.
<b>9. Dust (2008-11-25)</b>	2 mg/Nm <sup>3</sup> dry air, measured as random sampling.	Measurement performed, < 0,5 mg/ Nm <sup>3</sup> . Maintenance and monitoring of the filters is made according to the regular maintenance system.
<b>10. Water (2010-09-09)</b>	Process wastewater shall undergo sedimentation and adsorption before it is released to the municipal sewage network.	Met through through the operation of a new process water treatment plant.
<b>11-14. Water (2010-09-09)</b>	The residues arising from the sedimentation and adsorption shall be disposed of as waste. Outgoing water must not damage the municipal sewage network, water treatment plant or the recipient. In the environmental report, Kährs shall annually present its work to reduce the amount of process waste water and pollutants into the municipal sewage treatment plant.	Glue and sawdust from treatment processes are disposed as waste for energy use. Low pH in some operating modes, changed operation modes and the choice of adsorption materials are tested. Evaluations and pilot studies with Linnaeus University is underway to improve processes and reduce environmental impact.

## KÄHRS BLOMSTERMÅLA

Transports and the risk of accidental discharge into the nearby Alsterån river are most important environmental aspects connected with the Blomstermåla sawmill. Kährs is included in the Alsterån Water Council and follows the program for recipient monitoring. No complaints concerning external environmental findings were received during the year.

### Irrigation

The watering system has operated the entire season. Tests of the runoff from the irrigation have been, conducted,

and reported to the Environmental Office (Mönsterås). Analyses of water from irrigation were made in 2012 in collaboration with Linnaeus University. Assessments of the results reveal no negative impact on Alsterån.

### Transports

Train and ships transported over 75% of the logs delivered to Blomstermåla during 2012.

### Supervision

The last supervised visit was conducted in November 2011. The handling of sawdust is one of the problems that we have worked with to prevent the spread to adjacent areas. The sawmill in Blomstermåla produced 22 000 m<sup>3</sup> of sawn timber in 2012. 6 500 m<sup>3</sup> logs were watered with 74 000 m<sup>3</sup> of water from the Alsterån.

# CERTIFICATES

All Kährs' production units are covered by the Kährs' certified quality and environmental management system in accordance to ISO 14001 and EMAS registration and ISO 9001. The certificates are available for download at [www.kahrs.com](http://www.kahrs.com)



Location	EMAS	FSC	ISO 9001	ISO 14001	FSC® and Fairtrade
Blomstermåla	2000	2006	2005	2000	
Nybro	1997	2005	1999	1997	2011

**EMAS'** purpose is to promote environmental improvements. It is a voluntary EU program that requires public reporting of environmental conditions.

**FSC** is an international organization working for global responsible forest management that takes into account both the environment and the people living in and from the forest. Kährs "chain of custody" certification means that we may buy FSC material, manufacture and sell flooring products as "FSC Mix" products.

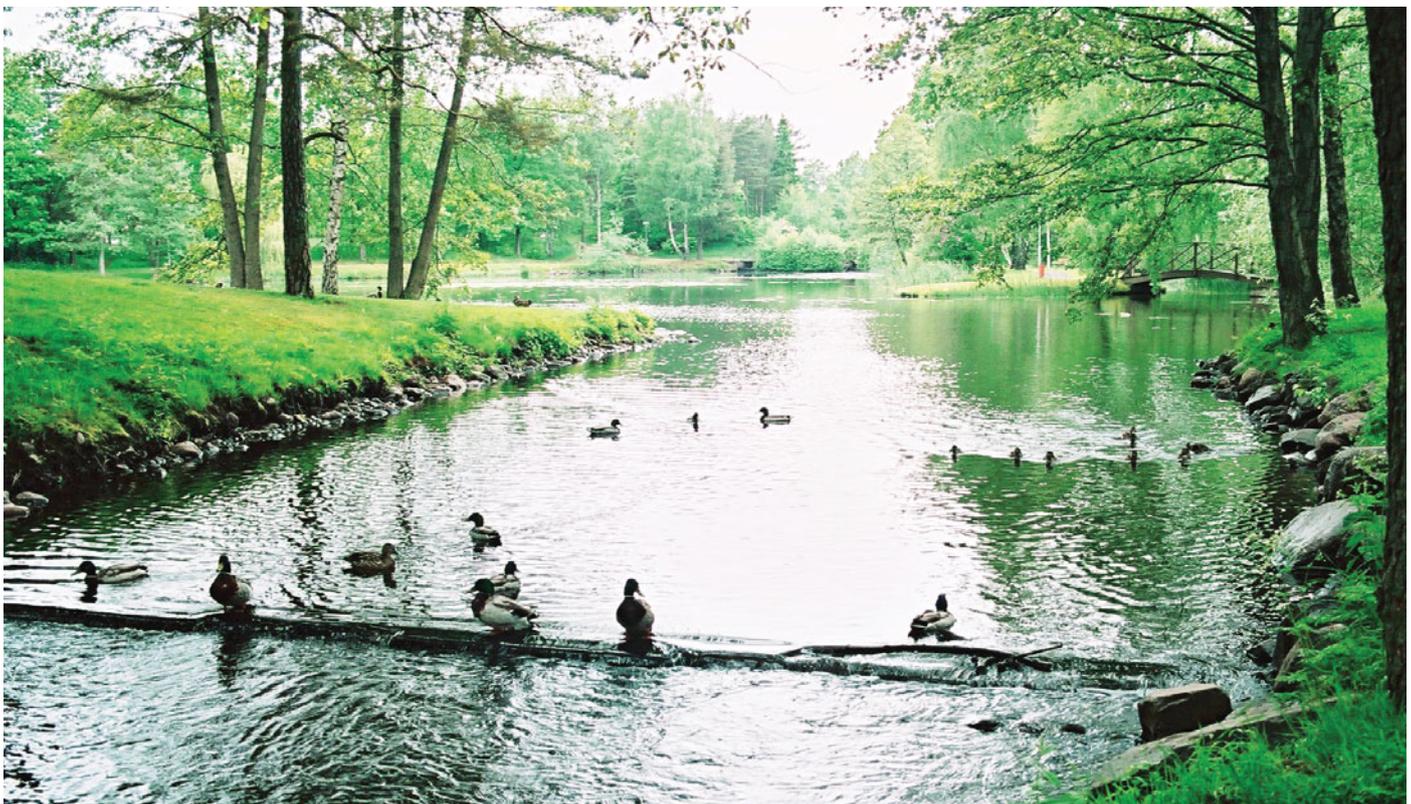
**ISO 9000** is a set of internationally agreed standards that provide guidelines for a Quality Management System.

**ISO 9001** is the international quality management system.

**ISO 14000** Family of related, auditable, international standards and supplementary guidelines that apply to an organization's environmental management system. Administered by the International Organization for Standardization.

**ISO 14001** is the international standard for environmental management, designed to protect the environment, prevent pollution and achieve constant environmental improvements.

**Fairtrade** (FLO Cert) is an independent product labeling standard and organization tackling poverty and injustice through Fairtrade. Aiming at better prices, decent working conditions, local sustainability in disadvantaged regions of the world.



# CERTIFICATIONS & REGISTRATIONS

Definitions and certification systems that we meet or are working towards:



**BASTA** is the industry's environmental assessment system for construction products. The purpose of BASTA is to phase out substances with hazardous chemical properties in building and construction products and contribute to Sweden's national environmental goal - a Toxic-free environment. BASTA's product database lists the products and construction products that meet BASTA's requirement for chemical content



**California Air Resources Board (CARB)**, Airborne Toxic Control Measure (ATCM) 92120 Phase 1 and Phase 2 for formaldehyde. In April 2007 CARB approved a measuring method, the airborne toxic control measurement (ATCM) to reduce formaldehyde emissions from composite wood products.

## Formaldehyde Standards Act (FSA)

**Formaldehyde Standards Act (FSA)** On July 7, 2010, President Obama signed the Formaldehyde Standards for Composite Wood Products Act into law ("FSA" or "Act"). The FSA sets formaldehyde emission limits for HWPW, PB and MDF that are identical to the Phase II CARB limits. Kährs complies with the FSA.

E1

**E1** European standard EN 14342:2005 (Wood), Class E1 is <math>0.124 \text{ mg/m}^3</math> is a limit on emissions of formaldehyde originally developed for composite wood material but also used for flooring, furniture and building materials. Products that meet E1 has low emission of formaldehyde.

## Lacey Act Compliant 16 U.S.C 3371 et seq.)

**The Lacey Act** of the Government of the USA makes it an illegal act to import, export, transport, sell, receive, take possession of or buy plants or products that have been traded in any way that contravenes domestic or international law.



**European Timber Regulations (EUTR)** EU regulation on illegal timber to prevent illegally harvested wood being used in the EU.



**The Blue Angel (Der Blaue Engel)** is a German label, which shows that the product is among the best within its product category, from an environmental point of view. Blue Angel demands include low power consumption, noise, emissions and the minimization of hazardous substances and recycling.



Kährs became the first wood floor manufacturer in the world to produce wood flooring with **FSC® and Fairtrade certified wood**.



From September 2012, construction products, decoration and furnishing products to be traded in France for the first time are to be labeled with an **emissions classification on the basis of VOC emissions tests**. This obligatory emissions' classification and labeling regulation will also apply to products which are already on the French market.



**LEED Leadership in Energy and Environmental Design** is an international environmental certification of buildings that take a holistic approach to a building's environmental presentation. Kährs products can contribute to LEED points.



**BRE Environmental Assessment Method (BREEAM)** is an environmental classification system originally from the UK and is used to certify commercial office and retail properties.



**Ü-mark** is a marketing brand in the German market. Equivalent to the CE marking is the international label to show that the product complies with the essential requirements such as health, safety, function and environment.

# DEFINITIONS

## Auxiliary material

Material other than wood that is included in finished wood flooring

## Carbon dioxide (CO<sub>2</sub>)

Is included in the natural cycle and contributes to the greenhouse effect. Burning fossil fuels results in a net increase in carbon dioxide, which may affect the climate.

## Chlorophenols

Chlorophenols is a generic name for chemical compounds that are both chlorinated organic compounds and phenols. Chlorophenols used until the late 1970's to include dipping (rot protection) of sawn softwood.

## DNV

Det Norske Veritas Certification AB - the certification body for Kährs environment and quality management system.

## Dust

Particles that can cause contamination if discharged.

## E1

A requirement for formaldehyde emissions according to European Standard EN 14342:2005 (Wood Flooring), class E1 is < 0.124 mg/m<sup>3</sup>.

## EMAS

Eco-Management and Audit Scheme - the EU's environment management and environmental auditing program.

## Environmental aspect

Part of an organization's activities, products or services that affect or could affect the environment. Kährs' significant environmental aspects are identified, evaluated and prioritized. Expression of Kährs significant environmental aspects, outcome and how we work with them are described in this environmental report.

## Examination of permit applications.

Process of decision making on permits for activity that can be dangerous to the environment. Committees, the ECD and the application are involved. The decision is taken by the Environment Inspection Committee of the County Administrative Board.

## Formaldehyde

A toxic compound that is found naturally in green plants (including trees) and fruit. Also found in many glues. The glues used by Kährs are within the E1-norm.

## Fossil fuel

Oil, coal and natural gas which are not

classified as renewable.

## FSC

Forest Stewardship Council - an organization that works internationally for environmental certification of ecologically, economically and socially sustainable forestry.

## GWh

Gigawatt hour - an energy unit = million kWh (kilowatt hours).

## GWP<sub>100</sub>

The GWP factor indicates how much effect a gas has on the climate compared with carbon dioxide. One kg of carbon dioxide corresponds to 1 GWP. This is calculated on a 100-year perspective, which means for instance that biofuel does not add any carbon dioxide. The hydrocarbons subject to restriction under the Kyoto protocol (various forms of HFC) have GWP values between 120 and 12 000, depending on their absorption of radiation and atmospheric lifetime.

## HDF

High Density Fiberboard - layers used as the cores of Linnea floors.

## LNU

Linnaeus University, Sweden

## MWh

Megawatt hour - an energy unit = thousand kWh (kilowatt hours).

## Nitrogen oxides (NO<sub>x</sub>)

A group of gaseous compounds of nitrogen and oxygen, which are formed in combustion. In humid air nitrogen oxides are converted to nitric acid, which falls in the form of acid rain. Emissions of nitrogen oxides also have a fertilizing effect.

## NTM

Nätverket för Transporter och Miljön (the Network for Transport and the Environment)

## PDCA

Is short for Plan, Do, Check, Act and is a scheme in quality management for systematic improvement.

## PEFC

The Programme for the Endorsement of Forest Certification. An international non-profit, non-governmental organization promoting sustainable forest management

## Renewable

When a resource is used up more slowly than it is regenerated. Examples are wa-

ter, wood and various biomass products. Non-renewable means something that is depleted faster than it is regenerated, e.g. products based on fossil oil, such as diesel or plastics.

## Responsible forestry

Wood material that comes from suppliers who can show verification that the forest of origin is managed in a sustainable manner. Examples of verification are FSC, PEFC, documented origin, underwater sawing

## Sulphur dioxide (SO<sub>2</sub>)

A gas that is formed when fossil fuel is burned, and the sulphur in the fuel is oxidized by atmospheric oxygen. In contact with humid air sulphur dioxide is gradually converted into sulphuric acid, which contributes to acidification.

## System conditions

Four system conditions for a sustainable society:

- The concentrations of substances from the crust of the earth must not be increased in the natural surroundings.
- The concentrations of substances produced by society must not be increased in the natural surroundings.
- Conservation of space for the natural cycle and diversity
- Efficient and fair housekeeping with natural resources

Read more: [www.thenaturalstep.org](http://www.thenaturalstep.org)

## Tannins

Also known as tannins and polyphenols which is found in oak wood and red grapes.

## Tonkm

Tons per kilometer - unit of transport work performed. It is calculated as the number of tons transported times the number of kilometres.

## UV-lacquer

Lacquer that is hardened by exposure to ultraviolet (UV) light.

## VOC

Volatile Organic Compounds - A collective designation for organic compounds (solvents) primarily consisting of carbon, hydrogen and oxygen. VOCs contribute to the formation of ozone close to the soil.

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