

Sydsvenska Kemi AB (publ) Environmental Report 2004



Contents

| | |
|----|--|
| 4 | Perstorp in brief |
| 5 | Statement by the CEO |
| 5 | Statement by the head of environment, health and safety |
| 6 | Specialty Chemicals |
| 7 | Materials Technology |
| 8 | Perstorp's environmental, health and safety policy |
| 9 | Objectives |
| 10 | Research and development |
| 12 | Product stewardship |
| 13 | Transfer of technology |
| 14 | Management system, Training |
| 15 | Environment |
| 15 | Resource management |
| 16 | Energy |
| 17 | Air |
| 21 | Waste |
| 22 | Water |
| 23 | Land |
| 24 | Transports, Noise, Environmental accidents |
| 25 | Working environment and health |
| 26 | Stakeholders |
| 26 | General public |
| 27 | Authorities |
| 28 | Customers |
| 29 | Suppliers/Contractors, Industrial organizations, Competitors |
| 30 | Environment-related financial data |
| 32 | Organization, Presentation principles |
| 33 | Contact with Perstorp |
| 34 | Glossary |



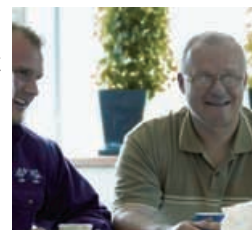
Product stewardship

12



Environment

15



Stakeholders

26

Photography: Rickard Hansson, Lars-Olof Henriksson, among others

Introduction

The main purpose of the Environmental Report 2004 is to present the Environment, Health and Safety (EHS) work of the Perstorp Group during 2004. The Environmental Report is a complement to the Group's Annual Report, which contains a short summary of EHS work. The EHS section in the Annual Report is primarily for readers with financial interests, while the Environmental Report 2004 addresses a large group of stakeholders, including employees, local residents, customers, suppliers, contractors, environmental authorities, students and other organizations. The Group considers it to be of great value to inform all stakeholders about the ongoing EHS work.

The structure of the Environmental Report is based on a number of main headings and starts with a presentation of the Perstorp Group. This is followed by a presentation of how the company views and leads EHS issues from the management point of view. A more comprehensive presentation of the Group's work on the environment, health and safety is shown under the detailed headings. A separate section describes the Group's communication with the different stakeholders. The environmental report ends with environment-related financial figures and accounting principles.

The environmental impact of the Perstorp Group's operations consists mainly of emissions to the air and water. The operations also generate waste and noise. Each production unit contributes to the overall impact in varying degrees and therefore has its own EHS objectives, adapted to the prevailing conditions.

For several years, Perstorp has been using a computer-based system (EHS Frango) to collect and store environmental figures to the EHS issues. In addition, a separate database is used to gather annual text information related to the EHS. The Environmental Report 2004 is based on the information from both of these systems.

An annual HR Report is issued by the Group's Human Resources department. The report provides a description of Perstorp's work in personnel-related matters. The topics covered include among other things recruitment, competence development, working environment and health. Read more in the "HR Report 2004".



Perstorp in brief

Perstorp's vision is to be a world leader that creates solutions for customers based on efficient and environmentally sustainable applications in selected niches of organic and polymer industrial chemistry. In 2004 the Group's sales reached around SEK 6.5 billion from production units in eight countries in Europe, North America and Asia. In Sweden, production takes place at Perstorp, Stenungsund and Nol. During the year the Group had an average of 2,091 employees who are distributed around the world as follows: Sweden (51%), other EU countries (21%), USA (15%) and Asia (13%).

Sydsvenska Kemi AB (publ), which is controlled by Industri Kapital 2000 Fund, is the parent company of the Perstorp Group. Industri Kapital is one of Europe's leading private equity companies. When acquiring Perstorp in 2001, Industri Kapital's payment included a subordinated debenture loan that is registered with the Stockholm Stock Exchange.

Two business sectors

Perstorp has two business sectors - Specialty Chemicals and Materials Technology - and the company is one of the leading suppliers in the world within several of its selected market segments.

Perstorp is also a leading producer of advanced composite materials for the electricity, building, aerospace and aviation industries.

The *Specialty Chemicals* business sector works with specialty chemical products on markets throughout the world. The Group is the world's largest supplier of various types of polyols (polyalcohols), organic acids and plants and catalysts for the production of formalin.

Perstorp's customers are mainly to be found in the paint and plastic processing industries, and also within the building, automotive and engineering industries.

The business is based on extensive knowledge primarily of aldehyde chemicals and associated areas as well as advanced competence within specific process technologies and applications.

The *Materials Technology* business sector focuses on fiber

reinforced polymer materials for demanding applications within the electricity, building, aerospace and aviation industries. These materials combine light weight with high performance, which means that they are increasingly replacing metals in many areas.

Other Operations include group management and the property services.

Specialty Chemicals is the largest business sector, accounting for 84% of turnover in 2004. Simplification of the company's structure began during the year and the internal service companies are being integrated into the chemicals business as a result. Following the end of the financial year a significant part of the business within Materials Technology has been divested.

Environmentally-adapted products

Perstorp was formed in 1881 in the Swedish town of the same name. Chemicals have been the base for the activities and continuous development has always characterized the business.

Demand is growing for environmentally-adapted and cost-efficient specialty chemicals that have new technological properties. Against this background the company is striving to increase sales through continuing globalization and the development of both new and existing products. Through these efforts Perstorp aims to increase its portion of specialty products and achieve sustainable growth and profitability.



Chemistry is a solution, not a problem

Many people today associate the words chemistry and chemicals with something negative. Meanwhile, our society and to a very great extent life itself are built around, and completely dependent upon, chemical processes and products. The solutions to the great challenges facing us on our planet will be based upon our knowledge and application of chemistry. Those of us who are educated in chemistry or in some way knowledgeable about the chemicals business share a common responsibility to communicate the significance of chemistry and the opportunities it offers. An insight that not everyone has. At the same time we have a great responsibility to use chemistry in ways that are sustainable and safe for both people and the environment.

In recent years the Perstorp Group has been restructured into a business that focuses exclusively on selected niches within specialty chemicals. Our success is dependent on a number of factors, and our ability to handle environment, health and safety (EHS) issues is among the most important. We have therefore identified "the development of environmentally sustainable products and concepts" as one of four main goals for the Perstorp Group. Managing increasing demands connected with EHS issues in a broad sense, is a key factor for our growth and development, not only from a pure emissions and impact perspective, but also for obvious business reasons. Environmental awareness is an opportunity, not a threat!

We have major ambitions on the environmental front, but we face global competition and we must always consider the financial implications and secure our competitive strength. We can never afford to endanger the environment, but progress must be made by balancing the various factors; environmental concepts, customer demands and economic realities. As a business and as individuals we are far from perfect, but I consider Perstorp to have moved a long way in the right direction.

This year's environmental report aims to give an overview of the Group's activities and its impact in the environmental field. I encourage our employees and other interested parties to read it and hopefully suggest improvements, not just concerning the report itself but also in view of the way in which we work.



Lennart Holm,
President and CEO



Jan Petersson,
Head of environment, health and
safety

Active environmental work to achieve sustainable solutions over the long term

Environmental work is a natural part of Perstorp's business. Despite implementing many environmental measures over the years, many challenges still remain. Key areas for the future include energy utilization and reducing waste. Perstorp also has considerable ambitions concerning improving the working environment and thus reducing incidents and work-related injuries.

Specialty Chemicals

Due to production increases, VOC emissions to air increased slightly in 2004 compared with 2003. Meanwhile, emissions of sulfur dioxide have been cut significantly due to successful process changes at the Vapi unit in India. Leaks of HCFCs increased, however. Preventive maintenance and further investment will correct this situation. Energy consumption has followed the increase in production. The same applies to waste. The Perstorp productivity project, *nEverest*, will now focus on energy and waste issues. The number of accidents that caused one day or more of sick leave fell from 26 in 2003 to 15 in 2004. The aim is to reduce this further significantly.

Materials Technology

Production increases in 2004 led to marginal increases in emissions to air. Leaks of HCFCs have been cut in half compared with 2003 due to focused maintenance measures. Energy consumption is virtually unchanged. The amount of hazardous waste has been virtually halved and non-hazardous waste remains at the same level as in 2003. The number of environmental accidents was reduced from 13 in 2003 to 5 in 2004. The same positive picture applies for working environment accidents that caused one day or more of sick leave, which fell from 32 in 2003 to 16 in 2004.



Specialty Chemicals

Specialty Chemicals is one of the world's leading suppliers within several market segments. Most products are sold throughout the world, with the largest markets in Europe and USA and an expanding market share in Asia.

The business sector has sales of around SEK 5.5 billion and 1,447 employees. The largest product groups are basic and specialty polyols, organic acids, oxo alcohols and plasticizers, which together make up around 75% of the business sector's turnover.

Perstorp produces specialty chemicals at ten units in eight countries. The largest units are at Perstorp and Stenungsund, Sweden, at Bruchhausen, Germany, and at Toledo (OH), USA. Each unit usually includes several specialist plants, which is why the total number of production plants within the Group exceeds 40.

Most of the products are intermediates in other products produced by customers mainly within the chemical, coating and plastic-processing industries, but also within the building, automotive and engineering industries. Around two-thirds of sales are within the chemicals industry, with the paint industry, via the resin industry, as the single largest user. Applications are also to be found within the farming, food and other industries.

Around two-thirds of raw materials are crude oil or natural gas, with propylene and methanol as the main materials. Most of production is carried out using efficient, environmentally-adapted processes based on unique technologies developed by the company. Many raw materials that are essential for production, including various aldehydes such as formaldehyde, butyraldehyde and propionaldehyde, are produced internally, which makes a strong contribution to the company's competitiveness and its capability to develop new products.

The main product and application areas are:

Basic polyols

Perstorp's range of basic polyols focuses primarily Penta (pentaerythritol), TMP (trimethylolpropane), Neo (neopentyl glycol) and film-formation chemicals. These products are used mainly to produce resins for the paint industry, but are also used in the production of glue, plastic additives, lubricants and other chemical products.

Specialty polyols

Specialty polyols are developed for more specific applications such as water-based or UV-tempered paints for electronic

products such as mobile phones and screens and also for the furniture and automotive industries to achieve a high gloss finish. A large and expanding application for specialty polyols is synthetic lubricants such as those used for compressors in freon-free refrigeration systems.

Formalin technology (plants and catalysts for production of formalin)

Perstorp is a world-leading supplier of plants and catalysts for the production of formalin. Customers include the world's largest chemical, resins and board producers in over 40 countries.

Organic acids

The range of specialty chemicals includes a number of organic acids for various applications, primarily 2-ethylhexanoic acid, propionic acid and formic acid.

2-ethylhexanoic acid is used as an additive in safety glass and in corrosion inhibitors, i.e. it is added to glycol, for example, to protect against rust. Propionic acid and formic acid are used as raw materials in the production of products mainly for the farming and leather industries.

Oxo-alcohols and plasticizers

Perstorp is one of Europe's largest and most differentiated producers of oxo-alcohols, which are synthetically produced alcohols. Oxo-alcohols are used for, among other products, waterborne coatings, biologically degradable lubricants and as a fuel additive to increase combustion efficiency in diesel engines. Plasticizers are also made for PVC plastics, medical DEHP (diethyl hexyl phthalate) products, plastic carpets in wet areas and electric cable insulation.

Food & Feed products

The agricultural and food industry are growing application areas for several of Perstorp's products such as formic acid, propionic acid, calcium formate, sodium formate and sodium propionate. The range includes antibacterial feed additives, silage agents used to conserve animal feed and various acid mixtures used to conserve grain.



Materials Technology

Within Materials Technology, the Perstorp Group focuses on advanced materials for industrial customers. These materials include fiber-reinforced polymers for demanding applications primarily within the electronics, building, aerospace and aviation industries. The special features of these materials are that they combine low weight with high performance, which means that they are increasingly replacing metals in many applications.

Products are based on the Group's core technologies within thermoset chemistry and fiber-reinforced resins. These products are developed continually for new applications and to meet growing demands for productivity, quality and environmental adaptation.

The customers of Materials Technology are based primarily in Europe and USA, but are also in Asia. Activities are run by the Engineering Materials business area and in the past financial year they were organized within three business units: Moldable Composites, Advanced Composites and Compounds. In 2004 the business area had sales of SEK 1,032 million and 549 employees.

Following the end of the financial year, activities within Moldable Composites were divested. Advanced Composites and Compounds remain within Materials Technology.

Advanced Composites

Advanced Composites comprise the subsidiaries, YLA and CCS, both in USA and both focusing mainly on the aerospace and aviation industries. The business units are leading suppliers within narrow niches on these markets, which are mainly in USA. The companies have especially strong positions within satellite structures based on carbon-fiber reinforced composite materials.

The aerospace and aviation industries want new materials that combine low weight with high performance, and this is driving demand on Advanced Composites' markets. YLA has had significant success in the development of new products for high-temperature systems for the aerospace and aviation industries. In 2004, cooperation with the R&D staff at Specialty Chemicals was extended in order to further develop material properties and improve the efficiency of production processes.

Compounds

Within Compounds, Perstorp is a leading supplier on markets for amino-based thermosets in North America and Europe. These products, which are characterized by high durability, heat tolerance and electrical isolation capability, are mainly used for electrical products and interior fittings. Materials with antibacterial properties are also produced for sanitary goods and interior fittings in environments with strict hygiene requirements such as hospitals, hotels, restaurants and other public environments. The production units are based in Sweden, Italy and USA.



Perstorp's environmental, health and safety policy

Perstorp runs and develops its business to become a global leader in selected niches within Specialty Chemicals and Materials Technology. Perstorp focuses on continuous improvements to the environment, health and safety of its processes and products to achieve sustainable development. Perstorp has joined the Responsible Care and UN Global Compact schemes.

The business

Working environment

A safe and sound working environment where employee health is first priority. Stimulation of personal development through interesting duties, cooperation and consideration. Clear-cut division of responsibility, goal-oriented training and open communication.

Environment

Continuous improvements in processes and products to minimize their impact on people and the environment. Caution, a closed-cycle approach and economization of natural resources will characterize the business.

Safety

Top priority for preventing serious accidents through risk analyses, preventive actions, emergency preparedness and long-term technical planning.

Contractors

Suppliers, contractors, consultants and transporters are expected to follow Perstorp's demands concerning environmental work, health and safety, where observance of these demands determines continued involvement.

Customer focus

Product safety

Development of products with improved environmental properties and reduced use of resources for safe use by the customer throughout the entire lifecycle of the product. Up-to-date information to customers about the product's health and environmental properties.

Customers

Long-term customer relations and active collaboration to find environmentally improving and resource-effective solutions for customers' products and processes.

Global contact

Communication

Open communication with the general public, authorities, customers, media and other interested parties.

Authorities

Good cooperation with authorities and good margins concerning applicable legislation.

This revised environmental policy applies to the entire Perstorp Group. Group Management and the line organization are responsible for ensuring compliance with the policy. The management system is available at most of the production sites to ensure a structured work method. Perstorp's work in the environment, health and safety area is published annually in the Group's environmental report.

EHS objectives of the Perstorp Group

In connection with the restructuring of the Perstorp Group in 2004, new objectives were set for Specialty Chemicals and Materials Technology.



The overall objectives for Specialty Chemicals

Working environment and environmental accidents

Specialty Chemicals has a vision of zero accidents. Each unit shall halve the number of work and environmental accidents by the end of 2007 compared with 2004.

Each unit shall also reduce its LTAR figure by >2 to achieve a LTAR <4 in 2005 and a LTAR <2 by the end of 2007.

Comments

LTAR has developed positively for Specialty Chemicals and fell from 10.9 in 2003 to 6.3 in 2004.

Reduced environmental impact

Specialty Chemicals shall establish a detailed program for each production unit in order to reduce consumption of raw materials and energy. This is a central part of the business sector's *nEverest* productivity program.

The overall objectives for Materials Technology

Working environment and environmental accidents

Materials Technology has a vision of zero accidents. In 2005 the business sector shall halve the number of work and environmental accidents compared with 2004. Each production unit also has the goal of halving its LTA figure. The goal is to reduce LTAR in 2005 to <16 in total for the business sector.

The goal for 2005 is zero environmental accidents.

Comments

The LTA figure was 16 in 2003 and 10 in 2004 for the entire business sector, excluding the parts of the operation which were divested during 2005. The LTAR was 44.8 in 2003 and 28.5 in 2004.

LTA = Lost Time Accident, accident at work resulting in sick leave of one day or more

LTAR = Lost Time Accident Rate, number of LTAs per million working hours



Research and development

Perstorp's work on new products is currently focused on supporting the development of more environmental-adapted chemical products on the market. Key market segments in which Perstorp is active include environmentally and technologically attractive concepts for the paint and thermoplastics industries, attractive solutions for agricultural chemicals, including animal feed concepts, and the plasticizers' segment for, among other applications, safety glass for the car industry. Development towards more environmentally-adapted systems moves very fast and requires significant research and development resources in order to produce new products that both retain the technical characteristics of older systems while meeting ambitious environmental requirements.

The following are examples of areas where Perstorp is developing new products:

New raw material for binding agents in paint systems containing little or no organic solvents

Organic liquid solvents that have been used for decades in paints are now understood to cause serious injuries to people and damage to the environment. The paint industry is therefore working very hard to develop new systems that minimize the use of such solvents. The main role of a solvent in paint has been to reduce viscosity (thickness) so that the paint can be applied easily on a surface. Once the layer of paints is applied the solvent must evaporate so that the paint can dry. The high level of viscosity is due to the binding agent in the paint that gives the paint its hardness and resistance. When solvents cannot be used any more it means that the system must be radically altered. There are several ways to do this, including diluting the paint with water, changing the binding agent so that much smaller amounts of solvent are required to achieve sufficient low viscosity, diluting the paint with low-viscosity components that react chemically with the binding agent rather

than evaporating, or by applying the paint as a powder. New paint systems are currently being developed for all these methods and Perstorp, as a manufacturer of the components used in the binding agents, is investing significant innovation, research and development resources. By developing new chemical products and proposing new paint systems Perstorp can contribute to faster phasing out of traditional solvent-based paints. One example is Perstorp's project aimed at significantly reducing the amount of solvents in alkyd paints. Perstorp has achieved excellent results that more than match the future environmental demands set by the EU concerning VOC emissions.

Additives to the plastic polyvinyl chloride (PVC)

The use of PVC has been debated extensively because it contains two separate additives that have been criticized for their impact on health and the environment. Lead-based stabilizers were used for a long time to counteract thermal breakdown of the plastic during processing. These stabilizers remained in the plastic until it was deposited as

landfill or burnt, whereupon there was a risk of the lead entering the environment. New stabilizer systems have now been developed that contain no lead and are based on relatively harmless materials such as calcium and zinc. However, these systems cannot fully replace lead-based stabilizers. However, combined with the polyalcohol developed by Perstorp, these

new stabilizers are acceptable alternatives. To achieve the same technical performance as lead-based products, the right organic acids must be chosen, including the 2-ethylhexanoic acid, which reacts with metals, along with the right combination of polyalcohols. Different PVC applications require different mixes of stabilizers and Perstorp continues to develop competitive products for these applications. The new stabilizers are used today throughout the Western world and are also swiftly replacing lead-based products in Eastern Asia.

The other criticized additive is phthalate-based plasticizers, which are used to shape and bend PVC as a finished product. The amount used can be significant. The most important traditional plasticizers have been based on phthalate acid esters with various alcohols, so-called phthalates. These substances have been criticized as potentially hazardous for humans and the environment. As a manufacturer of phthalates, Perstorp is now working hard to develop new types of plasticizers.

Because the harmful characteristics of Perstorp's products are very small, a large amount of development is focused on improving the products that include components from Perstorp. This work includes chemical synthesis and an assessment of the chemical systems from both environmental and technological point of view. This work is often done in collaboration with the customer that produces the chemical system and has the environmental knowledge about the product that Perstorp lacks. The result of this work includes proposals for new components from Perstorp that contribute to improved environmental properties, or just

as frequently, proposals for a variation to the composition of the customer's system.

The development of new products is characterized by a gradual expansion from lab work to factory-scale production. In the early stages of innovation and development especially, very thorough checks are made to ensure that the proposed product does not have any negative health or environmental aspects. In addition to the internal properties, the proposed application is tested to ensure that the environmental effects are as planned. By eliminating doubtful substances at an early stage there is less risk that dangerous products will reach the market and resources will not be wasted on the wrong products. Development work follows established procedures for the assessment of new products in accordance with Perstorp's environmental management system.

The innovation process within Perstorp is coordinated by R&D, while ideas for new products, applications and manufacturing processes also enter the system from other parts of the organization. In 2003 around 130 new ideas were registered, of which 15% resulted in new R&D activities. In 2004 around 200 new ideas were registered, of which 10% went further to R&D activities. The aim in 2005 is to achieve the same number of new ideas as 2004. The number of new ideas already received in 2005 suggests that the target will be reached.

As regards new patent applications, Perstorp is now bearing the fruit of its intensified R&D activities. In the first quarter of 2005 six new applications for patents were made, compared with five in total in 2004. The aim for 2005 is ten new applications.



Steel components covered with paint containing Charmor in the binding agent mean that, in the event of fire, people have more time to evacuate a building. See the section Product Stewardship on page 12.

Plastic film made from 2-ethylhexanoic acid can be used in safety glass for cars, for example.



Product Stewardship

Product Stewardship is a concept within Responsible Care program that covers all the knowledge the company should have about the environment, health and safety aspects with which the company's products can be associated. Product Stewardship also means that the customers should be supplied with advice and instructions regarding safe transport, storage and use of the products as well as - if applicable - dealing with the products and their packaging after consumption.

Product safety

In order to carry out risk assessments, knowledge is required about the product's inherent properties. In order to ascertain the properties of products, searches are initially carried out in the literature, in databases and other sources. The company supplements missing information by conducting its own toxicology or ecotoxicology studies at test laboratories. Regular searches for new information are also made for well-known products so that Perstorp has access to the latest research.

However, the risk is also dependent on how the user is exposed to a chemical product. When the risk has been evaluated, it is then possible to specify how the product should ideally be handled in order to minimize the risk as far as possible.

Several of Perstorp's products contribute to increasing safety for humans and the environment

Charmor products are included in binding agents for paints that expand when exposed to heat. This means that painted steel components can be insulated during a fire, contributing to slower rises in temperature and thus more time for people to escape from a burning building.

Plastic film made from **2-ethylhexanoic acid** can be used in safety glass for cars, thus preventing sharp edges that can cause cuts during a collision.

Prosid products, salts of formic acid and propionic acid are used in animal feed and improve animal health. Reduced consumption of antibiotics is beneficial for both human health and the environment.

Polyol products are used to make binding agents for waterborne coatings, thus lowering risks to human health and the environment.

Approval from FDA for BEPD contact with food

In 2004, after several years of applying work, Perstorp received FDA (Food and Drug Administration) approval for BEPD (butyl ethyl propanediol) to be used in contact with food.

EU program for existing substances

Together with other businesses in Europe, Perstorp participates in producing risk assessment for mass-volume chemicals. Work on risk assessments for diethyl hexyl phthalate (DEHP) continued in 2004 and will be completed in 2005. The EU Commission has started developing risk-reducing measures for DEHP and it is expected that usage will be restricted.

IARC reclassifies formaldehyde

During the year the International Institute for Research on Cancer (IARC) reclassified formaldehyde, which now belongs to Group 1 carcinogens. This will have consequences for EU legislation. Perstorp works with these issues in CEFICs sector group FormaCare.

Preparations for REACH - future legislation within the chemicals field

Perstorp continues to monitor development of the forthcoming REACH regulations system. The affected parts of the organization have been informed about the contents of the proposals and the consequences for the company. Perstorp's customers have shown increasing interest.

Life-cycle perspective

Many of Perstorp's products are used by customers to make new chemical substances. Following a chemical reaction, the product made by Perstorp ceases to exist as a substance and it cannot be re-used, recycled or recirculated.



Transfer of technology

Perstorp is world-leading supplier of equipment and catalysts for production of formalin. This position is based on a highly efficient formalin process developed by the company and marketed under the Perstorp Formox brand.

Environmental safety is an integrated part of Perstorp's activities and is based on the belief that a good environment can be created by making it financially profitable. This results in reducing the environmental effects for Perstorp's customers in countries where environmental legislation is not so strict. For example, for the past decade all the formalin plants designed and supplied by Perstorp Formox have included a highly effective Emission Control System, ECS. In addition to the fact that an ECS almost eliminates emissions of volatile organic compounds (VOCs), it also generates valuable steam that makes a strong contribution to reducing energy requirements from other sources.

Perstorp also makes recommendations to customers about how they can optimize production of formalin and thus reduce consumption of non-renewable raw materials while maximizing steam production. The company also advises customers throughout the world on the safe handling of methanol and formalin. This is carried out through a magazine entitled "*Informally Speaking*" and at regular technology meetings and seminars that represent a key part of Perstorp's long-term commitment to the customers.

Perstorp produces catalysts for treatment of VOCs that are specially designed for treating VOC emissions from formalin factories. Catalyst VOC treatment results in reduced emissions of carbon dioxide (CO₂) and nitric oxides (NOx) compared with thermal combustion. Energy consumption is also reduced by around two thirds.

Perstorp also produces formalin catalysts. All catalyst customers are given a unique re-purchase offer, whereby Perstorp buys back used catalysts. Perstorp can thus ensure maximum recycling of raw materials and safe handling of residual products from all its customers.

Management systems

Since 1994, the Perstorp Group has been working to introduce a management system for environment, health and safety. The management system is based on the international ISO 14001 standard, but covers also safety and the working environment.

The following companies within the Perstorp Group have ISO 14001 certificates:



Specialty Chemicals

- Perstorp Specialty Chemicals AB, Perstorp, Sweden
- Perstorp SpA, Castellanza, Italy
- Perstorp Polyols Inc., Toledo (OH), USA
- Perstorp Aegis Chemicals Pvt. Ltd., Vapi, India
- Perstorp Chemicals GmbH, Bruchhausen, Germany
- Hansol-Perstorp Co., Ulsan, Korea
- Perstorp Oxo AB, Stenungsund and Nol, Sweden
- Perstorp Oxo Belgium AB at Gent, Belgium, does not have ISO 14001 certificate.*

Materials Technology

- Perstorp Compounds AB, Perstorp, Sweden
- Perstorp Chemitec SpA, Castellanza, Italy
- Vyncolit N.V., Gent, Belgium
- Perstorp Compounds Inc. at Florence (MA), USA, and Vyncolit North America at Manchester (CT), USA, do not have ISO 14001 certificate*

At the units with certificates, annual internal audits of the management systems are carried out. External audits are also performed by independent assessors twice a year. Since being introduced in 1994 the management system has changed and been developed continuously. Experience from one part of the Group is passed on to other parts.

Within Specialty Chemicals a system called Perform was introduced in the spring of 2004. Perform is an integrated management system for quality, the environment, health and safety. Via a graphical interface, Perform presents an overview of work processes and their mutual relationships, while associated procedures and instructions are accessible via links to the actual processes. Perform will be developed continuously and will be introduced throughout the Group in the near future.

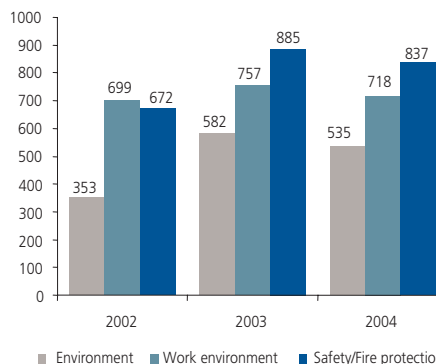
Training

For many years, Perstorp has offered the employees comprehensive training in environment, health and safety. In 2004 the training continued with courses at most of the units in the Perstorp Group. The most common form of training is fire protection and emergency situations. In addition the company provides training in environment, chemical health risks, waste management, etc.

Personnel are also informed about environment, health and safety through the Group's intranet, environmental meetings, environment brochures and environmental reports. All computers in production at Manchester (CT), USA, are equipped with "Rolling Newspaper", where environmental, health and safety issues are mentioned regularly.

During the year, proposals regarding the environment, health and safety have been rewarded within the Perstorp Group, including the units in Perstorp, Stenungsund, Gent, Belgium and Vapi, India. Perstorp Pharma gave a reward for an idea for reducing packaging material and Gent gave a reward for energy savings.

Training - Environment, Health & Safety (number of employees) Perstorp Group





Environment

Resource management

Raw materials and auxiliary chemicals

The Perstorp Group uses a wide variety of raw materials in its processes, particularly formalin, methanol, natural gas, propylene, ethene, butyraldehydes and acetaldehyde. Other key chemicals include sulfuric acid, sodium hydroxide and formic acid. Many projects are underway at the plants to reduce the use of raw materials. Certain plants register all disruptions that cause increased use of raw materials and perform remedial measures to reduce the number of disruptions. Other plants perform different process improvements and optimization to reduce the amount of raw material per ton of finished product. An example of this is the unit in Castellanza, Italy. The plant in Vapi, India has increased its penta plant capacity to save raw materials and steam. The same is true of the formalin plant, which has been made more efficient in order to improve results.

Purified water

A number of projects are underway within the Group to reduce waterborne emissions. At the site in Perstorp, Sweden, a major project is underway that affects the entire industrial park. This project aims to reduce the hydraulic load on the wastewater treatment plant. In connection with this, work is also being undertaken to reduce the consumption of purified water. Several units are working to replace purified water with various types of recycled process flows. Others are taking measures to directly reduce the consumption of purified water.

Packaging material

The Perstorp Group accounts for substantial bulk shipments, but also uses various types of packaging materials for smaller shipments. These materials include paper and plastic sacks, plastic big-bags (partly reusable), metal and plastic drums, cartons etc. The aim is to increase the share of reusable packaging materials, and several units are working with this. One example is Perstorp Compounds at the site in Perstorp which has introduced a big-bag recycling project with its biggest customers. Perstorp Compounds has transferred parts of its deliveries to big-bags and this share is expected to increase over the coming years. Other units are working towards reducing waste from packaging. An example of this is the unit in Toledo (OH), USA. Another example is Bruchhausen, Germany, which works to cut the amount of material used in packaging material. In some cases, however, customers place demands on certain types of packaging, which may limit opportunities for reuse.



Energy

During 2004, the consumption of energy rose at the Perstorp Group compared with 2003, mainly due to increased production at some units. Consumption of fossil fuels declined, while the share of peat and renewable fuels increased.

Several projects aimed at increasing the efficiency of energy consumption and saving energy are being carried out throughout the Group. Targets for saving energy have been set and a survey of energy consumption has started that will eventually cover the entire Group. Energy saving measures introduced within the Group during the year included a project in Toledo (OH), USA. Another example is the plant at Vapi, India, where several measures were carried out during the year. The Vapi plant is also looking at opportunities to use alternative fuels (biofuels). Perstorp Oxo in Gent, Belgium, has made adjustments to its process and this has had a positive effect on energy consumption. The plant in Castellanza, Italy, has implemented measures aimed at saving energy, while similar measures have been performed at the plant in Manchester (CT), USA.

The use of fossil fuels in the Perstorp Group amounted to 611 GWh in 2004, divided into natural gas, oils, methane/propane and coal.

Specialty Chemicals at the Perstorp plant intends to participate in the PFE program for increasing energy efficiency in energy-intensive industries. The aim is to implement an energy management system, which will bring the following benefits:

- the company will gain better control and a better structure for its energy consumption
- better planning, operations and maintenance procedures and purchasing routines
- reduced energy consumption and lower energy costs

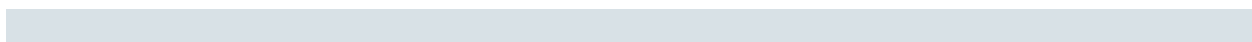
The program has started and will run for five years. During the first two years the aim is to survey energy consumption and introduce and certify a standardized energy management system. During the remaining three years measures will be implemented aimed at improving the efficiency of energy consumption. An energy survey is being performed at the Specialty Chemicals plants. The results will be used to set targets for energy optimization. Meetings are held regularly to discuss ideas for reducing energy consumption. Extensive

energy balances are made as necessary. The cost analysis of energy aspects is always addressed when investment is made in new equipment.

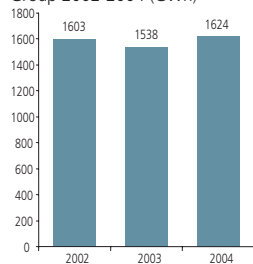
The steam power plant at the Group's largest plant in Perstorp supplies steam and electricity to the entire Perstorp Industrial Park. The switch was made from coal to biofuel as early as 1991. The main fuels are wood chips, demolition wood and peat. The steam power plant at Perstorp is a major supplier of heating to Perstorp Fjärrvärme AB, a district heating company that supplies the Perstorp urban area with heating for homes and other buildings. Heating for the network is extracted using a flue gas scrubber located in the steam power plant. Condensate is sprayed on the hot gas and hot condensate is collected at the bottom of the scrubber, from where it circulates to a plate heat exchanger for onward delivery to the district. The steam power plant is capable of generating all the district heating requirements of Perstorp municipality, and the project is a good example of co-operation between industry and local government.

Perstorp Oxo supplies surplus heating to Stenungsund. Surplus heating is extracted from two places, the Oxo reactor tower's tempered water system and the isomer column's cooling system. The transfer of surplus heating from the plant to the municipality's district heating company, SEMAB, began when state finance was granted for the project in 2000. Around 600 additional homes, industrial buildings and shops could be connected to the system. Around 65 GWh of energy are consumed, which covers the heating requirements of the district except on very cold winter days when liquified petroleum gas boilers must be used.

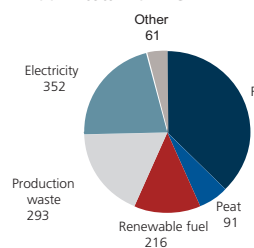
A similar operation is conducted at the Group's plant in Nol, where surplus heating is supplied to Ale Fjärrvärme and neighboring industrial buildings. Ale Fjärrvärme distributes heating to its customers within the municipality. The energy that Nols supplies corresponds to around 3,500 cubic meters of heating oil, that is the amount that 1,200 homes consume each year. Deliveries of surplus heating reduce negative environmental impact through lower emissions of carbon dioxide, nitrogen oxides and sulfur. The plant at Nol is a production unit within Perstorp Oxo AB and has been producing phthalic anhydride since the mid 1940s.



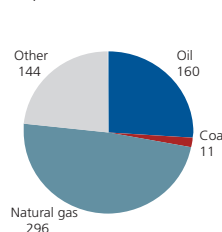
Energy consumption in the Perstorp Group 2002-2004 (GWh)



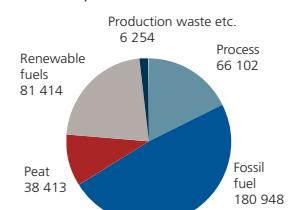
Energy use in the Perstorp Group 2004 - total 1624 GWh



Use of fossil fuel in the Perstorp Group 2004 - total 611 GWh



Carbon dioxide - Perstorp Group in 2004, total 373 131 tons





The flue gas scrubber at the steam power plant.



The steam power plant at the largest company site in Perstorp, Sweden, supplies steam and electricity to the entire Perstorp Industrial Park. The switch from coal to biofuel took place in 1991. The main fuels are wood chips, demolition wood and peat.

Greenhouse effect - influence on climate

The greenhouse effect is considered to be due to the fact while that the earth's atmosphere lets in short-wavelength solar radiation, the so-called greenhouse gases prevent long-wavelength thermal radiation from leaving. The risk is that greenhouse gases will disturb the earth's climate system by raising the temperature.

The main greenhouse gases are carbon dioxide, methane, dinitrogen oxide, sulfurhexafluoride, fluorocarbons and the coolants CFC/HCFC/HFC. Carbon dioxide is the chief contributor to the greenhouse effect due to the volume of emissions. Carbon dioxide is formed on the combustion or decomposition of organic material. Fossil fuels such as oil, coal and natural gas add "new" carbon dioxide to the atmosphere, i.e. carbon dioxide that was previously trapped in the earth's crust for millions of years. Biofuel, on the other hand, releases carbon dioxide that is already part of the natural cycle, and is thus not regarded as a net contributor.

The Perstorp Group began working to reduce its contribution to the greenhouse effect many years ago. One important measure has been the reduction in the use of fossil fuels. Back in 1991, a biofuel-fired steam boiler was built at

the Group's largest unit in Perstorp, Sweden, replacing the use of coal. Together with oil-fired back-up steam boilers, the biofuel-fired steam boiler supplies steam to some 20 plants in Perstorp and is the plant in the Group with the greatest total emission of carbon dioxide.

During 2004, Perstorp's total emissions of carbon dioxide decreased to 373,131 tons, compared to 388,300 in 2003, mainly thanks to less carbon dioxide emissions at the largest company site in Perstorp, Sweden.

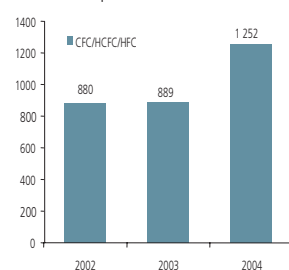
The work to improve energy efficiency continues at several sites in the Group. See the section Energy, page 16.

Carbon dioxide from transportation is not included in this report. In addition to carbon dioxide, other greenhouse gases emitted by the Perstorp Group include the cooling media (CFC/HCFC/HFC). See also section headed The Ozone Layer, page 18.

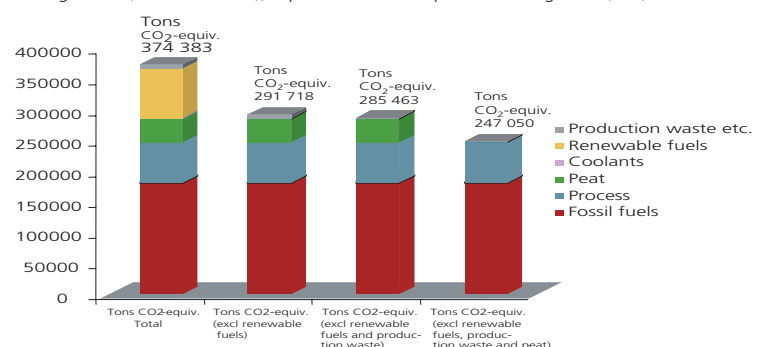
Greenhouse gas emissions allowances

The company has been granted greenhouse gas emissions allowances for carbon dioxide for 2005-2007. It is considered that the allowances allocated will match the company's requirements.

Contribution to the greenhouse effect (GWP/Global Warming Potential) - tons CO₂-equivalents CFC/HCFC/HFC



Contribution to the greenhouse effect from the Perstorp Group 2004 from carbon dioxide and cooling media (CFC/HCFC/HFC), expressed as CO₂-equivalents using GWP (100) factors





The Ozone Layer

Stratospheric ozone (O₃) is formed when ultraviolet radiation from the sun breaks down free oxygen (O₂). The stratospheric ozone layer protects the earth from harmful levels of the sun's ultraviolet radiation.

Chlorofluorocarbons (CFC) and hydrated chlorofluorocarbons (HCFC) are assumed to operate as catalysts for the degradation of ozone. It is believed that a stratospheric CFC molecule is split under the influence of UV radiation and emits a free chlorine atom that in turn attacks ozone molecules. As a result, the ozone layer is degraded. Moreover, CFCs are stable compounds that can continue to do damage for a long time.

A thinner ozone layer can influence the conditions of life on Earth. For humans, this may lead to higher frequencies of skin cancer and cataracts. For animals, plant life and microorganisms, the balance between species may be shifted, favouring the ones more resistant to UV-radiation.

Within the Perstorp Group, CFCs and HCFCs are used, for example, in air-conditioning and cooling equipment. In recent years, efforts have been made to find substitutes for CFCs and HCFCs. Today, most Group units, including units in Sweden are totally CFC-free. Conversion to safer cooling media (e.g. HFC) is underway. At the same time, leak testing, maintenance and training efforts continue to be improved.

Within the Perstorp Group at the end of 2004, about 0.01

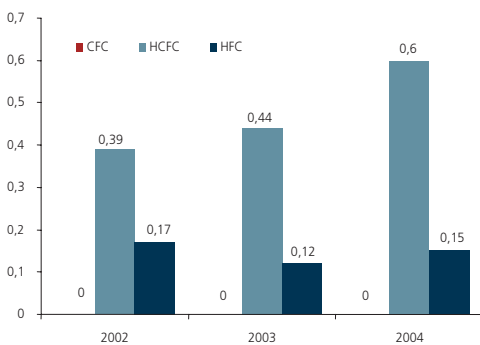
tons of CFCs were installed at Group facilities in USA. During 2004, there was no leakage of CFCs.

The installed amount of HCFC in the Perstorp Group in 2004 was about 4.3 tons and leakage amounted to 0.6 tons, i.e. about 14% of the installed volume. This represents an increase since 2003 when the corresponding leakage was about 10%. Significant emissions occurred during the year at the units in Castellanza, Italy, Vyncolit N.V. in Gent, Belgium, Manchester (CT), USA and Ulsan, Korea. The emissions were primarily due to leakage and technical breakdown of old cooling equipment that has since been replaced or repaired.

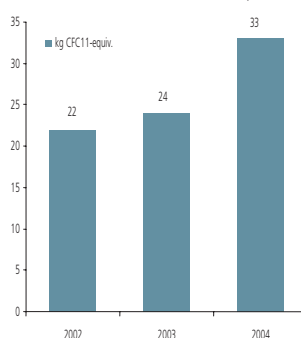
Perstorp considers that coolant leakage should not exceed 4% of any installed amount. The company continues towards this goal by improving maintenance and leakage detection, replacing old equipment, etc.

The installed amount of HFC within the Perstorp Group during 2004 was about 2.1 tons, with leakage of about 0.15 tons, i.e. around 7% of the installed amount, which is an increase compared to 2003 when leakage was 6% of the installed amount. HFC is not considered to contribute to the depletion of the ozone layer.

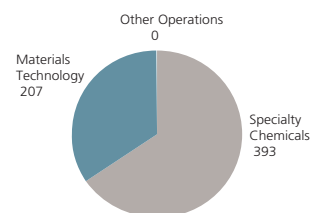
Leakage of CFC/HCFC/HFC to the air from the Perstorp Group (tons/year) the past three years



Contribution to ozone depletion from the Perstorp Group expressed in kg CFC11-equivalents, according to the Best Estimate ODP (WMO/World Meteorological Organization). CFC 11 and 12 = 1. HCFC 22 = 0,055



Distribution of HCFC leakage to the atmosphere from the Perstorp Group 2004 (kg/year). Total 600 kg.





Volatile Organic Compounds (VOC)

In certain weather conditions including sunlight, Volatile Organic Compounds (VOC) and nitrogen oxides from vehicular traffic, electricity and heat production plants and other industrial activities can contribute to the formation of photochemical oxidants, of which ozone is the most dominant. High levels of ozone in the troposphere can damage plant and animal life while acting at the regional and local level.

For emissions of nitrogen oxides from Perstorp, see the section entitled Acidification, page 20.

Emissions of volatile organic compounds from Perstorp originate primarily at the production plants. At the start of the 1970s Perstorp began installing treatment facilities for emissions to air. The first generation of treatment technology consisted of wet scrubbers, in which pollutants were treated in washing columns. Around 1975 the second generation of treatment technology was introduced, which involved thermal combustion using oil or other fuel. Demand for technology that consumed less fuel led to the introduction of the third generation of technology in 1985. This technology featured catalytic combustion. This is the most common treatment technology currently used by Perstorp, although wet scrubbers and thermal combustion

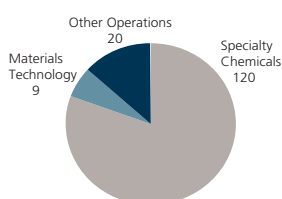
are still used by several plants.

In 2004 VOC emissions to air from Perstorp increased slightly compared with 2003 both within Specialty Chemicals and Materials Technology. The increase was mainly for methanol at the units in Perstorp and Castellanza, Italy and dimethyl ether at the plants in Sweden, Toledo (OH), USA and Castellanza, Italy.

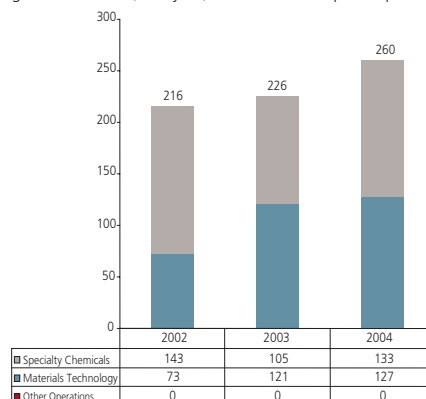
Methanol is the source of Perstorp's single largest emissions of VOC (60 tons in 2004). Methanol is found in small amounts at most of the Group's plants, with the largest amounts in 2004 at the plants in Perstorp, Sweden, Vapi, India, Castellanza, Italy and Höganäs, Sweden (methanol storage).

Isopropanol also accounts for a large share of Perstorp's emissions of VOC (52 tons in 2004). Vyncolit N.V. in Gent, Belgium, has reduced its emissions of isopropanol considerably in recent years by replacing it with a non-volatile substance. However, the unit at Gent still accounts for around 34 tons of the Group's emissions of isopropanol. In addition, Vyncolit North America, Manchester (CT), USA, accounts for emissions of around 18 tons of isopropanol.

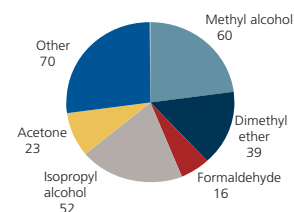
Distribution of HFC leakage to the atmosphere from the Perstorp Group 2004 (kg/year). Total 149 kg.



Organic emissions (tons/year) from the Perstorp Group



Organic emissions to the atmosphere from the Perstorp Group 2004. Total 260 tons.





There are 15 catalytic incineration facilities at different production plants at the site in Perstorp, Sweden. The largest facility comprises three lines - each with a capacity of 25 000 Nm³/hour.



One of the three boilers at Perstorp Aegis Chemicals in Vapi, India, was converted to use a bio-fuel system with excellent results. Emissions of sulfur dioxide have been drastically cut because the plant now burns briquettes made from bagasse, which is a waste product from the sugar-cane industry.

Acidification

Acidification is believed to result from emissions of sulfur dioxide and nitrogen compounds (nitrogen oxides and ammonia), which have a tendency to form acid rain. When fuels containing sulfur (coal, oil etc.) are burnt, the sulfur is released and it can react with oxygen in the air to form sulfur dioxide. This in turn reacts to become sulfuric acid, which is dissolved and falls to the ground as rain. Nitrogen oxides are emitted by traffic and combustion plants through a reaction between nitrogen and oxygen. They react further to become nitric acid, which has a fertilizing effect when it reaches soil, rivers and lakes.

Emissions of sulfur dioxide from the Perstorp Group come mainly from burning of fuel containing sulfur at the Group's plants. In 2004 the Group's emissions of sulfur dioxide were reduced considerably due to major efforts at the plant in Vapi, India. A large proportion of oil was replaced with biofuel by using pre-oven ahead of a combustion unit. The biofuel consists of sugar-cane waste. The Vapi plant is investigating the use of other types of biofuel in order to further reduce oil consumption.

Another unit emitting sulfur dioxide is the unit at Perstorp, Sweden. Measures to combat the emissions started in 1991 when the coal-fueled boiler was replaced with renewable biofuel through the investment in a new and modern biofuel-fired

steam boiler. Oil-based heating is still performed in the company's reserve boilers. The Perstorp plant reduced its sulfur dioxide emissions in 2004 by reducing oil consumption, while sulfur dioxide emissions at the plant in Bruchhausen, Germany, increased marginally in 2004.

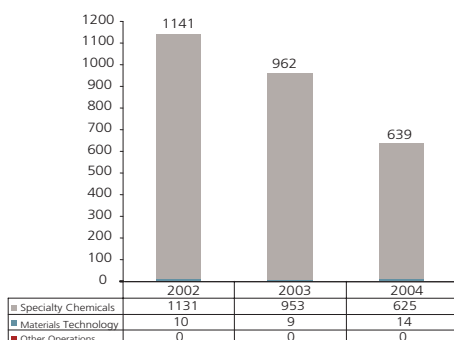
Emissions of carbon dioxide come mainly from combustion facilities within the Group. In 2004 emissions of nitrogen oxides fell slightly, partly due to an optimized fuel mix, smoother operation and, to a certain extent, reductions/changes in production.

The overall amount of ammonia emissions from the Perstorp Group fell marginally in 2004 to around 10 tons.

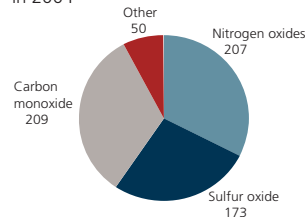
The main measures for tackling acidification are using the best possible treatment and combustion technology, using energy from renewable sources and managing resources sensibly. Work aimed at improving the efficiency of energy consumption is underway at most units within the Group. See also the section entitled Energy, page 16.

Natural gas replaced heavy oil as the raw material in the production of syngas at the Group's plant in Stenungsund, Sweden, in 2004. The change gives many environmental benefits, principally that emissions to air and water are drastically reduced. Because the gases are in principle free from sulfur, nitrogen and heavy metals, the sulfur cleansing and nitrogen reduction facilities could be shut down.

Inorganic emissions from the Perstorp Group (tons/year) for example sulfur dioxide and nitrogen oxides, etc.



Total emission of inorganic substances amounted to 639 tons in 2004



Contributions to acidification from the Perstorp Group regarding SO₂, NO_x, HCl and NH₃ expressed in SO₂-equivalents using acidification factors (Nordic Guidelines, Best estimate)

