



# Products from the forest – a natural choice

The Swedish Forest Industry's sustainability publication 2008–2009



The Swedish Forest Industries Federation is the trade and employers' organisation for the Swedish pulp, paper and sawmill industries. The Federation is involved, in association with its member companies, in Swedish and European industrial policy, employer issues and in market issues on wood engineering products.

The Federation represents around 50 pulp and paper mills owned by 25 groups/companies and around 140 sawmills owned by some 70 groups/companies, as well as some companies that have close ties to the production of pulp, paper and sawn timber.

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[www.forestindustries.se](http://www.forestindustries.se)

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# ABOUT THIS SUSTAINABILITY PUBLICATION

The Swedish Forest Industries Federation's sustainability publication describes the industry's work for responsible and sustainable business.

This is the Swedish Forest Industries Federation's third sustainability publication, which describes the work of the industry from an environmental, social and economic perspective. Swedish Forest Industries Federation intends to issue a sustainability publication every second year. The last was published in spring 2008.

A working group of representatives from member companies and the Swedish Forest Industries Federation has been central to the process of producing the publication.

## STAKEHOLDERS AND TARGET GROUPS

The publication is primarily aimed at politicians, authorities, non governmental organisations and union organisations and seeks to paint a comprehensive and fair picture of the sustainability work in the industry.

In defining the focus areas and content for this publication, representatives from different stakeholder groups were contacted. Around 15–20 separate meetings were held with representatives from authorities, unions, non governmental organisations, political parties and research institutes. In addition, some 30 people from member companies and stakeholder groups were asked to give their views on the previous publication by completing a questionnaire. The Swedish Forest Industries Federation has taken those views on board and is constantly working to improve its sustainability efforts.

## DATA AND INFORMATION DOCUMENTATION

The facts and figures quoted in the publication refers to company operations in Sweden and is comprised of information reported to authorities for 2008, along

with material produced specifically for this publication (for 2008 or 2009). Unless otherwise stated, environmental data refers to companies that are subject to reporting requirements. In principle, this includes all pulp and paper mills, but only the larger sawmills. During 2010, the industry aims to also collect environmental data for at least 60 percent of sawmill annual production. Unless otherwise stated, social and economic indicators relate to all member companies.

The economic recession has resulted in cutbacks being made in the industry, which has had a certain effect on raw materials consumption and emissions. Otherwise, no significant changes have occurred compared to the period covered by the previous sustainability publication.

In the report, Global Reporting Initiative's (GRI) C level guidelines have been applied.



## FURTHER INFORMATION

Our website ([www.forestindustries.se](http://www.forestindustries.se)) contains additional information about the sustainability work in the industry. The site also hosts the pulp and paper mill environmental database. For more information about an individual company's operations, please refer to the company's website.

350 million plants are set in Sweden every year. Forest growth exceeds what is harvested.

10,9 million tons of paper, 3.7 million tons of pulp and 16 million m<sup>3</sup> of sawn timber were produced by the Swedish forest industry in 2009.

200 000 people are employed by the forest industry, directly and indirectly. In many counties, the forest industry accounts for 20 % or more of the industrial jobs.

123 billion SEK amounts the export to during 2009, which means that the forest industry makes a sizable contribution to Sweden's trade balance.

0,9 TWh amounted the industry's energy savings to during the first phase of the Swedish energy authority's voluntary programme (PFE).

10 billion SEK amounts the Swedish forest industry's investments to on an annual average. This is equivalent to more than 15 percent of Sweden's total industrial investments.

# THIS IS THE SWEDISH FOREST INDUSTRY

The forest industry is a cornerstone of the Swedish economy. It is a technologically advanced business that is based on the natural and renewable raw materials of the forest. The industry provides employment throughout Sweden, not least in regions where the labour market is weak.

The forest industry is one of the oldest in Sweden and, together with the iron and ore industries, turned Sweden into an industrial nation in the 19th century. The forest industry continues to be one of Sweden's most important business sectors, and has a true desire to contribute towards sustainable development – economic, environmental and social – now and in the future.

The forest resource lies at the heart of the business, and the industry assumes significant responsibility for

creating conditions for allowing the forest to continue to grow and produce raw materials of the highest quality in balance with the environment.

The forest industry produces newsprint, packaging, cardboard, hygiene products, sawn products, energy, bio-energy products and manages forests. It also conducts research in a variety of different areas, including biofuels, new chemicals and cellulose-based plastics.

# THE FOREST INDUSTRY IN TIMES OF CHANGE

2008 and 2009 were years of both challenges and opportunities. Challenges in the form of global warming and financial recession. But also opportunities, by the forest industry's role in climate change and its major importance to the Swedish economy.

## THE FOREST INDUSTRY AND CLIMATE CHANGE

Following the Copenhagen Summit held in December 2009, climate change has never been discussed as much as it is at the moment. The forest industry, which uses renewable raw materials and manufactures recyclable products, plays a key role for the climate. In addition, we are also one of the few industries that has its own ambitious targets to reduce environmental impact. Trends also show that we can. The industry has significantly reduced its impact on the climate and the environment by making major energy savings, reducing fossil fuels in favour of bioenergy and increasing the proportion of railway freight.

The forest industry has, in a number of different contexts, been held up as a sustainability role model. For example, in their annual inspection, auditing firm Deloitte highlighted the pulp and paper industry as having good and comprehensive sustainability reporting. In addition, many companies are listed on international indices that facilitate for investors to identify companies that work with sustainability in a good way.

## EMERGING STRONGLY FROM THE DOWNTURN

The economic downturn has forced many of our member companies into making difficult decisions, including making employees redundant and closing parts of their operations. They have done this in order to remain competitive in spite of the adverse conditions.

Nevertheless, the forest industry continues to be very important to the Swedish economy. In order to maintain this position, the industry must continue to focus on attracting young, well-educated people, bringing gender balance to the workplace and working more on health and safety issues. In addition, we also need to conduct research on new materials, biofuels and chemicals in order to identify new business opportunities. If we become better in these areas, we will have even more attractive, dynamic and secure companies and be better equipped to meet the outside world's demands for competitiveness.

## THE FUTURE FOREST INDUSTRY

The forest industry can look to the future with confidence. We are one of the few industries that are based on a renewable raw material. Our products are an important part of people's day to day lives, and demand in the majority of areas will increase in the long term. The UN's Intergovernmental Panel on Climate Change (IPCC) has stated that active forestry and use of wood and timber products constitute important measures for counteracting the effects of global warming. Reports and bills put forward by the Swedish government also state that forestry plays a decisive role in reducing the effects of greenhouse gas emissions. Wood-based products can replace energy intensive and climate affecting materials, whilst bio-energy from the forest can replace fossil fuels. In other words, the forest industry can be seen as a future industry that is needed more than ever.



The Swedish forest industry is therefore set to continue to play an important role. We are in a leading position in the European forest research collaboration. We are the second biggest exporter of pulp, paper and timber products taken together. We can, through high forest growth with consideration to biodiversity, provide many countries with climate adapted forest products – and at the same time allow the forest to grow.

And, last but not least, the far-reaching objectives set out in this publication enable us to continue to challenge both ourselves and others.

Leif Brodén  
Chairman of the Board

Marie S Arwidson  
CEO

## VISION 2030

The European forest industry:

- Plays a key role in a sustainable society.
- Comprises a competitive, knowledge-based industry that fosters the extended use of renewable forest resources.
- Strives to ensure its societal contribution in the context of a bio-based, customer driven and globally competitive European economy.

The Swedish forest industries has leading role to play in realising this vision.

SOURCE: THE EUROPEAN FOREST BASED SECTOR TECHNOLOGY PLATFORM, FTP

# THE FOREST INDUSTRY'S TARGETS FOR SUSTAINABLE DEVELOPMENT

The forest industry has agreed on measurable, industry-wide targets in order to move the business in a sustainable direction and to progress forward.

The forest industry has adopted 14 objectives and two visions in order to become even stronger in respect of sustainability. Establishing industry-wide objectives ensures that all companies in the industry work in the same sustainable direction. Many member companies also have their own sustainability objectives that complement those of the industry.

## ELABORATED BY MEMBER COMPANIES

The objectives and visions have been elaborated by Swedish Forest Industries Federation's various committees, which consist of representatives from member companies. They have since been adopted by the Board of the Swedish Forest Industries Federation. Expectations from the industry's stakeholders, coupled with an assessment of which issues that are important for the long-term competitiveness of the industry, have played a decisive role in formulating these objectives.

Most objectives were adopted during autumn 2007, but discussions continued in the committees and a further

two objectives were adopted and two revised during autumn 2009. For the financial area, a vision has been formulated.

The base year for the objectives is 2007. Progress will be followed up annually on the Federation's website, where more information about the objectives is available.

## POSITIVE SIDE EFFECTS

The objectives apply to the operations of the Federation's member companies in Sweden. In many instances, the objectives have effects outside Sweden as they can affect companies' overall sustainability strategies for their entire business – including those parts located in other countries.

The industry's efforts to meet the objectives have led to the development of various tools, including a guide for calculating the emissions from transports. This type of tools facilitates for companies to map their sustainability impact and increase their responsibility.

## OUR SUSTAINABLE PRODUCTS

- Sawmills shall produce Carbon Footprints for at least 80 percent of their products by year 2010.
- The Swedish paper industry will contribute to the European Industry achieving its target for paper recycling (66 percent by year 2010).
- The industry's R&D investments at universities, technical colleges and research institutes shall increase by 50 percent by year 2012.\*
- R&D investments shall double in the long run (year 2030).\*

### \*PRE-REQUISITES FOR TARGETS:

- Public funding should match, or exceed, industry funding.
- In addition, public funding should be made available for risky and demanding demonstration projects on a larger scale than today.

## OUR AGENDA FOR FOREST MANAGEMENT

- The annual growth in Swedish forests shall increase by 20 million cubic metres by year 2020.
- The extraction of bio-energy from the forest shall increase by 20 TWh by year 2020.

## OUR CONCERN FOR THE ENVIRONMENT

- Energy efficiency in the forest industry shall be improved by at least 15 percent by year 2020.
- The forest industry's own electricity production shall increase by 2 TWh by year 2020.
- By 2020 the forest industry shall have reduced its emissions of fossil carbon dioxide from transports by 20 percent.
- The forest industry shall develop common sustainability criteria for the procurement transportation services by year 2010.

## OUR WORK WITH SOCIAL ISSUES

- A maximum of 1.0 work-related accident with absence per 100 employees by year 2015.
- Health-related absenteeism below 3.5 percent by year 2015. Particular attention on measures to reduce absence among women. (Applies to the pulp and paper industry.)
- At least 30 percent of managers appointed during year 2012 shall be women. In this context, "managers" refers to everyone with staff management responsibilities.
- At least 60 percent of employees recruited during year 2012 shall have a higher education qualification.

# OUR APPROACH FOR ECONOMIC RESPONSIBILITY

## MARKETS AND VALUE CREATION

The recession affected almost all industries in Sweden during 2008 and 2009, and the forest industry was no exception. The industry was hit by the failing world economy and a downturn in demand. The forest industry is one of the industry sectors that has the greatest significance for the Swedish economy and welfare.

As early as autumn 2007, it was noticed that parts of the forest industry were suffering an economic downturn. By the second half of 2008, this downturn had become a recession. This, coupled with overcapacity in certain product areas, resulted in a number of entities in the pulp, paper and sawmill industries being forced to close. The overcapacity is also a result of increased competition from electronic media. However, there are still significant opportunities for the industry.

### UPTURN IN THE EXPORT PRICE OF SAWN PRODUCTS

The sawmill industry is one example where you can see both challenges and opportunities. Global demand for sawn products has fallen, but raw materials shortages, production cutbacks and closures have led to the supply contracting even more. This has in turn affected the prices. Export prices rose during second quarter of 2009, to the benefit of Swedish sawmills.

### STRONG ON THE MARKET

Swedish forest industry is highly export oriented and exports during the recession have benefited from the weak krona. Sweden is the second biggest exporter of pulp, paper and sawn products in all. Only Canada is bigger. Swedish forest product exports amounted to SEK 123 billion during 2009.

Sweden's position on the market is therefore strong. But the growth rate in other countries has been faster. Paper production is growing fastest in China, whilst pulp production is growing fast in China, Indonesia and Brazil.

In terms of paper consumption, India, China, Russia, Eastern Europe, the Middle East and Africa are showing the highest growth rate. In countries with mature markets, growth in demand is generally lower, sometimes even contracting.

### THE IMPORTANT INVESTMENTS

The forest industry invests on average around SEK 10 billion a year, equivalent to more than 15 percent of Sweden's total industrial investments. In recent years, the investments have fallen. If the industry is to keep its leading position on the international market, this

trend must be broken. The paper machines used in Sweden are of a high technical standard but, in order for them not to be superseded by new machines in other parts of the world, it is vital that we continue to invest in Sweden. A large proportion of the investments relate to environmental measures and energy efficiency. Investments are also being made in new, large sawmills.

### RETURNS MUST BE SECURED

Due to the proximity to raw materials, the capital intensity and a long historical tradition, the industry is strongly bound to Sweden.

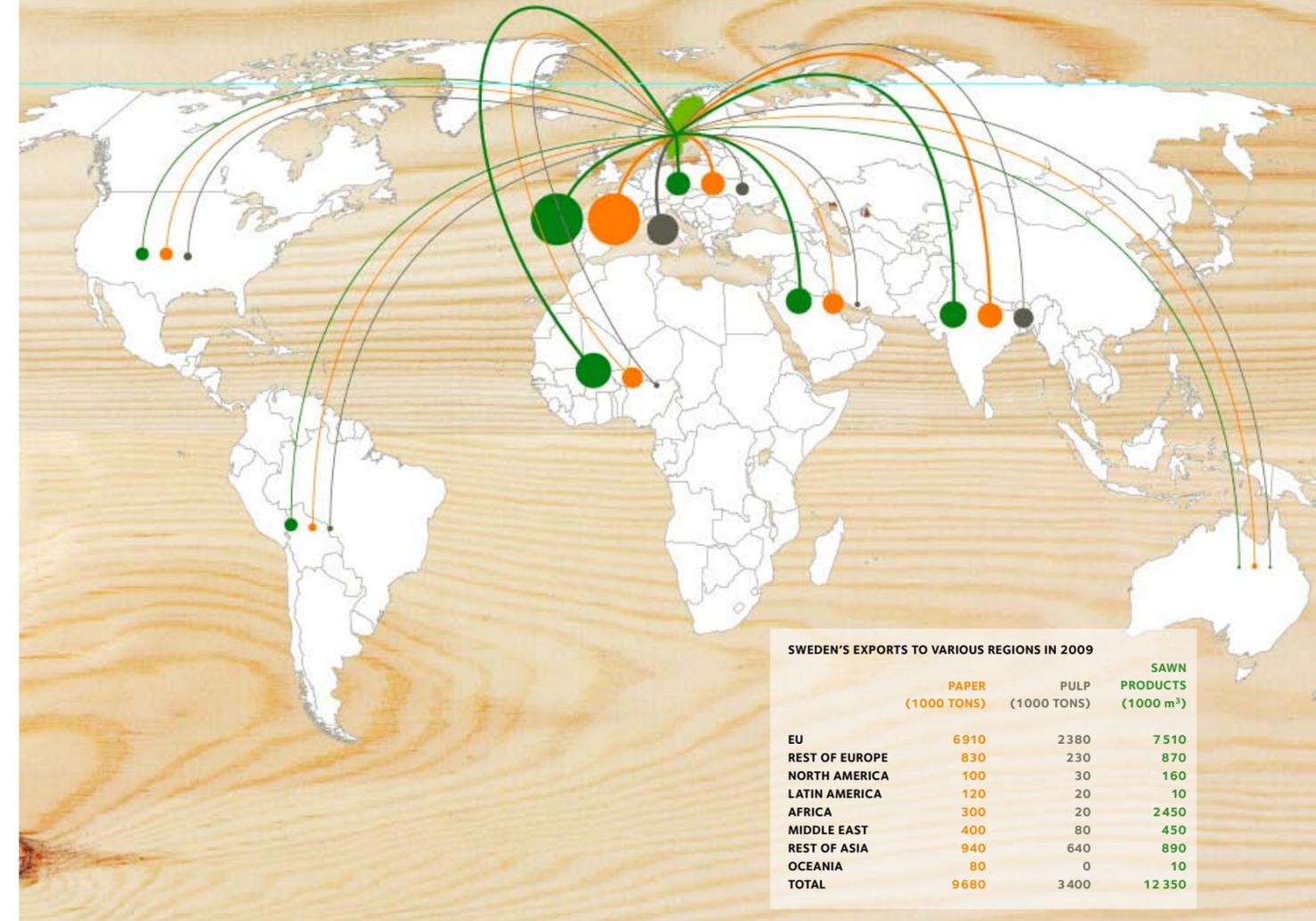
Many Swedish plants are part of international corporations. The competition between investments in different countries is large and investments are made where companies consider the conditions for a high return are the best. These conditions include energy and raw materials costs, good research and development opportunities and a highly skilled workforce. For example, production costs in Asia and Latin America are lower and the market growth higher than in markets in Europe.

### FOREST INDUSTRY'S VISION

The forest industry, together with other players in the cluster, want to emphasise its belief in a favourable development for the forest industry cluster, based on efficiency, expertise and skills, research, development and innovation.

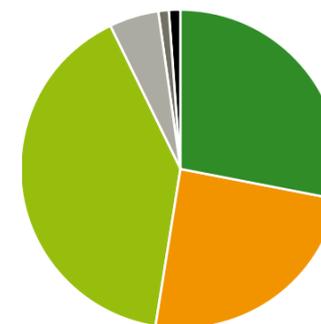
To this end, the forest industry has formulated a vision stating that production (measured as added value) in the Swedish forest industry cluster shall double by 2035. Half of that growth shall come from new products.

The majority of Swedish pulp, paper and sawmill production is exported. The imports of these products to Sweden are low.



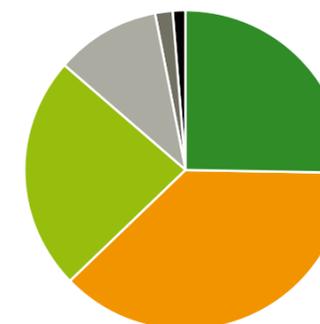
### PRODUCTION IN THE WORLD OF:

PAPER, 2008  
Total 391 million tons



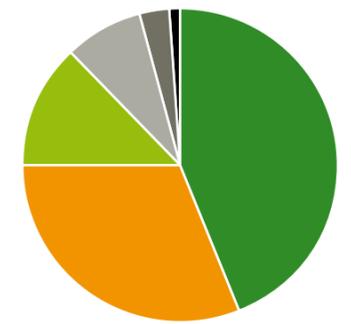
EUROPE	28 %
NORTH AMERICA	25 %
ASIA	40 %
LATIN AMERICA	5 %
OCEANIA	1 %
AFRICA	1 %

PULP, 2008  
Total 192 million tons



EUROPE	26 %
NORTH AMERICA	37 %
ASIA	24 %
LATIN AMERICA	11 %
OCEANIA	2 %
AFRICA	1 %

TIMBER PRODUCTS MADE FROM SOFTWOOD, 2008  
Total 288 million m<sup>3</sup>



EUROPE	44 %
NORTH AMERICA	31 %
ASIA	13 %
LATIN AMERICA	8 %
OCEANIA	3 %
AFRICA	1 %

# OUR APPROACH FOR ECO-NOMIC RESPONSIBILITY

## EMPLOYMENT AND LOCAL IMPORTANCE

The forest industry is very important to employment in many Swedish counties. The recession has resulted in several mills and sawmills reducing their workforce and some have also been forced to close down. Hopefully, these savings will contribute to increased competitiveness in the future.

### THE FOREST INDUSTRY – A STRONG LIFELINE

In some counties in Sweden, the forest industry provides 20-30 percent of the industrial employment and 25-50 percent of the industrial production value. The forest industry is therefore a very important employer, particularly in the forest-rich and sparsely populated counties of northern and central Sweden.

In smaller towns and villages, the paper mill or sawmill may be the main employer. Tax payments from the employees contribute to the municipal budget, their purchasing power benefits local businesses and their families form the population basis required to run schools and childcare. Other companies in the town are usually dependent on the paper mill or sawmill in question.

### MANY INDIRECT JOB OPPORTUNITIES

The forest industry does not just generate direct employment. For each direct job opportunity, the forest industry creates around two indirect jobs, be they in forestry, transport, chemicals or the consultancy industry. According to the employers' organisation Almega and Unionen trade union, the forest industry provides the highest number of indirect work opportunities compared to all other industries in Sweden, on a relative basis.

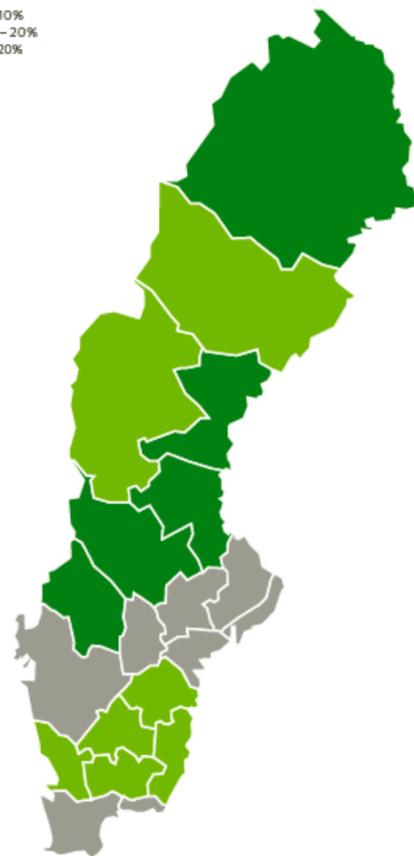
### TOUGH BUT NECESSARY DECISIONS

Many smaller communities have been hit hard by cutbacks in the forest industry. Cutback decisions were difficult for companies to make, but deemed essential in order to reduce costs and remain competitive. It is estimated that around 1 000 people lost their jobs in the pulp and paper industry during 2008 –2009, along

### PROPORTION OF COUNTIES' INDUSTRIAL WORKERS EMPLOYED IN THE FOREST INDUSTRY

Source: Statistics Sweden

- < 10%
- 10–20%
- > 20%



The forest industry employs many people. It is estimated that for each forest industry job, two jobs are also created in the supply chain. Source: Statistics Sweden

with some 500 people in the sawmill industry. Since 2007, a total of about 4 000 people have been affected by cutbacks or closures in the forest industry.

The industry strives to implement staff lay-offs in a responsible way. Redeployments and early retirements can reduce the number of redundancies. To support those who lose their jobs, many companies offer training grants and access to a personal coach as support in their search for future employment. Employees are covered by collective bargaining agreements and the closure processes are implemented in consultation with trade union organisations.

### POSITIVE LONG-TERM DEVELOPMENT

The industry believes that the tough savings and structural changes will contribute to long-term competitiveness. In the future, products based on renewable raw materials will be more attractive than many fossil-based, energy intensive and climate affecting materials, which will benefit the development of the industry.



### WOOD BRIDGES GAIN GROUND

Timber construction in Sweden is on the increase, and the technology for the industrial building of timber bridges has developed quickly. Since the 1990s, almost 1000 new timber bridges have been built in Sweden. They deliver the same performance and last as long as bridges made from steel and concrete, but are usually significantly cheaper and quicker to build. In addition, today's modern timber bridges require minimal maintenance.

Martinsons Träbroar AB built Sävarbron in Umeå. It is a combined road, pedestrian and bicycle wooden bridge, spanning 34 metres and with a dual carriageway.

Another significant wood bridge built by Martinsons Träbroar is the pedestrian and cycle bridge in Hästepallarna, which was awarded the Swedish National Road Administration's Beautiful Bridges Award for 2009. The bridge is 450 metres long and forms part of a longer beach walk outside Uddevalla.



Peter Strunk with what is set to be viscose.  
Photo: Domsjö Fabriker

### CLOTHES FROM THE FOREST

Relatively few people are aware that viscose, which is used as a fibre in fabrics and textiles, is based on cellulose derived primarily from forest. It is a product that has experienced strong growth. After a break of 30 years, research into viscose has now re-started in a project run by Domsjö Fabriker, Umeå University, Akzo Nobel, Processum and research company MoRe Research. By analysing viscose, Domsjö Fabriker hopes to improve and further adapt cellulose for use in the textile industry.

The market for textile fibres is currently dominated by oil-based materials such as polyester, followed by cotton. The idea is that clothes made from viscose could increasingly replace textiles that are based on oil, thereby further reducing our oil dependency.



### STRETCHABLE FIBREFORM® – AN INNOVATION IN PAPER

Billerud has launched a packaging paper that has a high level of elasticity – up to 20 percent, compared to the 2-4 percent of standard paper. The paper, which is called FibreForm, is, like all paper products, based on wooden raw materials and is therefore both compostable and recyclable. It is used as packaging for foods and consumer goods, as well as for highly embossed packaging.

During 2009, FibreForm packaging was awarded the Guldägget prize and received a silver medal at the prestigious Pentawards.

# OUR SUSTAINABLE PRODUCTS

## A SELECTION OF FOREST INDUSTRY PRODUCTS

Forest industry products play an important role in society. They are made from renewable raw materials and can be recycled, both as material and as energy. As technology and research advances, they are also becoming increasingly sophisticated.

### SAWN PRODUCTS

More than half of the timber from Swedish forests goes to the sawmill industry, primarily for the manufacture of sawn products.

After Canada and Russia, Sweden is the biggest exporter of sawn products and, despite the recession, those exports increased by two percent during 2009.

The industry is constantly working to improve the characteristics of timber products. For example, research is

being conducted in construction timber, and major advances have been made in eliminating defects such as cracks or deformations that occur when timber products are dried. The forest industry is also investing significant resources into standardising wood and timber products in order to create efficient construction systems.

Wood is one of our most important building materials, and consumption in Sweden is at a constantly high level. It is now possible to use wood in several different

types of constructions, including multi-storey buildings, halls and bridges.

### PULP AND PAPER

The fibre raw materials used in pulp and paper manufacture are either fresh fibre from the forest or recovered paper. Fresh fibre is used to manufacture mechanical pulp and chemical pulp. These two processes give different qualities of pulp and paper products.

*Mechanical pulp* is primarily used for newsprint, telephone directories and brochures.

*Chemical pulp* is used in printing and writing paper and various forms of packaging.

Used paper is collected and mixed with fresh fibre to produce newsprint, tissue paper and cardboard.

### BIOENERGY PRODUCTS

The forest industry is producing an increasing amount of bioenergy products. This includes branches and tree tops, pellets, surplus heat used for district heating and electricity from back-pressure power production. In addition to these bio-based products, many companies have recently invested in expanding wind power – both in industrial plants and for more efficient use of forest land.

# OUR SUSTAINABLE PRODUCTS

## RAW MATERIALS IN AN ECOCYCLE

The forest is part of a natural cycle with a renewable raw material. The entire tree is used in an efficient industrial system. Efficient use of raw materials is essential for sustainable development. In addition, the forest and the forest industry also have a key role to play in respect of the climate, as renewable products can replace their fossil-based counterparts.

Resource use in the forest industry is efficient. Forestry, pulp and paper mills, sawmills and bioenergy production form an industrial system in which forest raw materials are utilized in a very high degree.

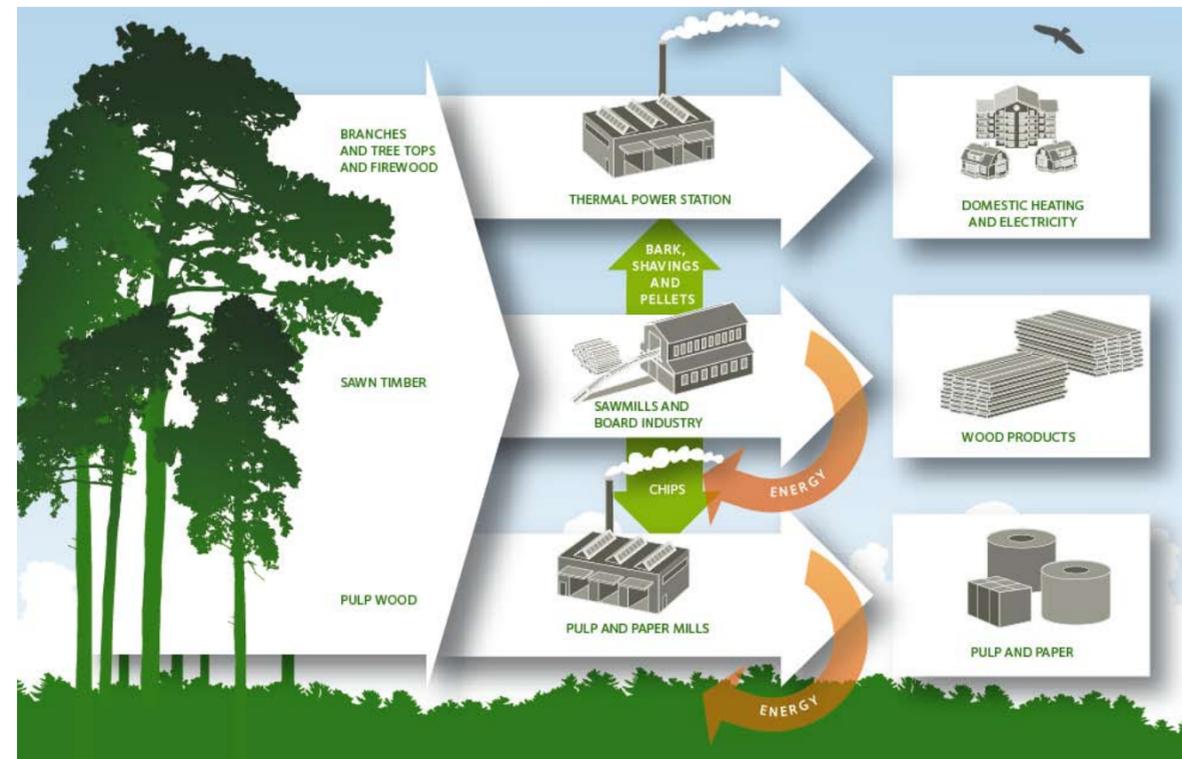
Different parts of the tree are used to manufacture different products. Even by-products are used to their maximum effect, primarily in energy production.

During 2008, 74.9 million m<sup>3</sup> solid volume under bark of forest raw material was used in the Swedish forest industry.

### AN ETERNAL CYCLE

The forest needs the sun to grow. Through photosynthesis, trees convert sunlight, carbon dioxide in the atmosphere and water in the ground to wood. Carbon dioxide is stored in the trees in the form of carbon compounds. Of course, trees and soil release some carbon dioxide, but they absorb considerably more. This is why the forest plays a key role in limiting the greenhouse effect.

Forest products such as sawn products and paper also contain carbon compounds that were once absorbed by



Forest raw materials are utilized to a very high degree. Different parts of felled mature trees, as well as small-dimensional and thinning trees, are used to manufacture different products.



Forest industry products form part of the carbon cycle.

trees in the form of carbon dioxide. These compounds are stored for the entire life time of the products.

When forest products have served their time and are used as bio-energy or are composted, the carbon dioxide is released. But, in contrast to climate affecting emissions from fossil fuels, incineration of forest products does not release additional amounts of carbon dioxide into the atmosphere.

The carbon dioxide released is instead absorbed through photosynthesis by replanted and growing trees. This closes the circle and a new carbon cycle can begin.

Swedish forests and forest products absorb and store more carbon dioxide than all fossil carbon dioxide emissions produced in Sweden. This has been demonstrated in the Lustra research programme, where researchers from SLU (Swedish University of Agricultural Sciences) and Mid Sweden University have mapped how the Swedish forest influences the amount of carbon dioxide and other greenhouse gases in the atmosphere.

### TWO TYPES OF CARBON DIOXIDE

**BIOGENIC CARBON DIOXIDE** is released when trees and wood based products rot or are incinerated. The carbon dioxide given off is already part of the atmospheric carbon cycle.

**FOSSIL CARBON DIOXIDE** is released when oil or coal is incinerated. This process releases new carbon dioxide into the atmosphere, contributing to the greenhouse effect.

### THE FOREST INDUSTRY'S OBJECTIVES:

- Sawmills shall produce Carbon Footprints for at least 80 percent of their products by year 2010.

### THE FOREST INDUSTRY'S OBJECTIVES:

- The Swedish paper industry will contribute to the European Industry achieving its target for paper recycling (66 percent by year 2010).

# OUR SUSTAINABLE PRODUCTS

## WOOD AND ITS ADVANTAGES

Carbon Footprint is a measure of the amount of greenhouse gases a business or product causes. It is becoming more common for organisations and companies to evaluate their carbon footprints in order to determine how they can reduce their climate impact.

More and more organisations, companies and authorities strive to reduce their carbon dioxide emissions. A first step in this process can be to do a carbon footprint assessment, i.e. to calculate how much carbon dioxide the operations generate during all phases of manufacture.

### CARBON FOOTPRINT OF WOOD PRODUCTS

The term "carbon neutral" is used for something that has a zero carbon footprint. Wood products from sustainable forestry have a negative carbon footprint during their life time, which means that they absorb more carbon dioxide than they release.

In order to determine the carbon footprint of building materials and other wood products, the industry has taken an initiative to develop tools called "Carbon Cal-

culators". Using these tools, companies can, in a uniform, transparent and credible way, report the carbon footprint from a product or design and, to a certain extent, compare it with other materials.

### WOOD BUILDING SYSTEMS INCREASE

The climate benefits of timber becoming manifest in areas such as building constructions, and timber construction is increasing in Sweden. Sixteen municipalities have invested considerable resources in building with wood by joining the project Trästad (Timber City) 2012. The project aims to develop Swedish expertise and technology, and in the long term create a European and global market for modern industrial timber construction technology.

### THAT IS WHY TIMBER CONSTRUCTION IS SUSTAINABLE

The production of sawn timber products requires only small amounts of fossil energy, and the by-products are used for bioenergy production.

Modern timber constructions are energy efficient. Building regulation requirements for low energy use are therefore easy to satisfy with wood building systems. In addition, wooden houses and wood products store carbon dioxide as carbon compounds during their entire life time.

At the end of its life time, waste wood can be used for energy recovery and replace fossil fuels.

### BETTER QUALITY ASSURANCE WITH X-RAY SCANNING

X-ray and 3D technologies will greatly benefit today's forest industry. Forest machines equipment measures timber length and diameter precisely.

Logs can then be X-rayed in the lab to measure timber quality, log type, density, durability, proportion of heartwood and diameter under bark. Complete 3D images can also be generated of the log's interior using multi-sensor technology. In this way, you can ensure that the timber fits for the purpose.

## RECOVERY

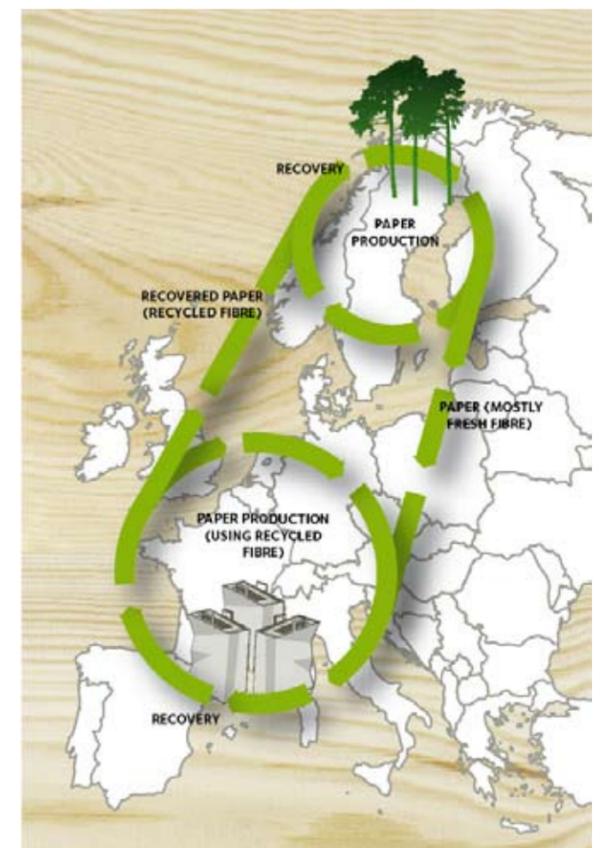
Sustainable cycles are based on recovered products, either through materials recycling or energy recovery. Paper recycling ensures that forest raw materials are used in an efficient way and reduces the amount of waste in society.

Compared to most other countries, Sweden has a high level of collection of recovered paper. In 2008, total paper collection in Sweden amounted to more than 1.6 million tons. Some recovered paper is also imported. 77 percent of all packaging and newspapers were recycled, which is the highest level since the producer's responsibility for packaging and newspaper was introduced in 1994. In 2008, the Swedish paper industry used around 2 million tons of recovered paper in the production, equivalent to 14 percent of the fibre. In addition to this, most untreated wood products in Sweden are either re-used or recovered, primarily as energy.

In Europe, 2008 the target of 66 percent recycling of paper was achieved – two years ahead of schedule. In Sweden, this level was achieved some time ago, but the Swedish forest industry continues to contribute to increasing collection levels in Europe through a variety of initiatives.

### SWEDISH FORESTS SUPPLY EUROPE WITH FRESH FIBRE

A recycling level of 100 percent is not achievable, as the quality of paper degrades each time it is recycled. That is why new, fresh fibre must continually be added. In Sweden, there is plenty of forest. Therefore, it is natural that the Swedish pulp and paper industry for the most part uses new, fresh fibre in its production. The Swedish forest industry supplies Europe with pulp and paper from fresh fibre. This paper is largely recycled in Europe, where paper manufacture is based to a great extent on recovered paper.



In Sweden, most paper is made from fresh fiber and is then recycled in Europe. In this way, Swedish paper manufacturers supply European producers with fresh fibre. Picture source: Holmen.

### THE FOREST INDUSTRY'S OBJECTIVES:

- The industry's R&D investments at universities, technical colleges and research institutes shall increase by 50 percent by year 2012.\*
- R&D investments shall double in the long run (year 2030).\*

### \*PRE-REQUISITES FOR TARGETS:

- Public funding should match, or exceed, industry funding.
- In addition, public funding should be made available for risky and demanding demonstration projects on a larger scale than today.

# OUR SUSTAINABLE PRODUCTS

## RESEARCH

Sweden is a strong country in respect of forest and forest products research, and competing forest companies collaborate within research and development. The research is about improving economic and ecological sustainability, developing efficient paper and packaging solutions and working for a beneficial research strategy.

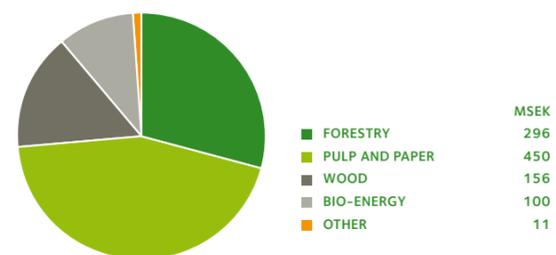
### LARGE RESEARCH VOLUME IN SWEDEN

Forestry industry research in Sweden is held in high regard on the international stage, and the resources invested are comparatively large. Annually reported forestry and forest industry research in universities, technical colleges and research institutes have increased with SEK 200 million since 2005, and is now around SEK 1 billion per year.

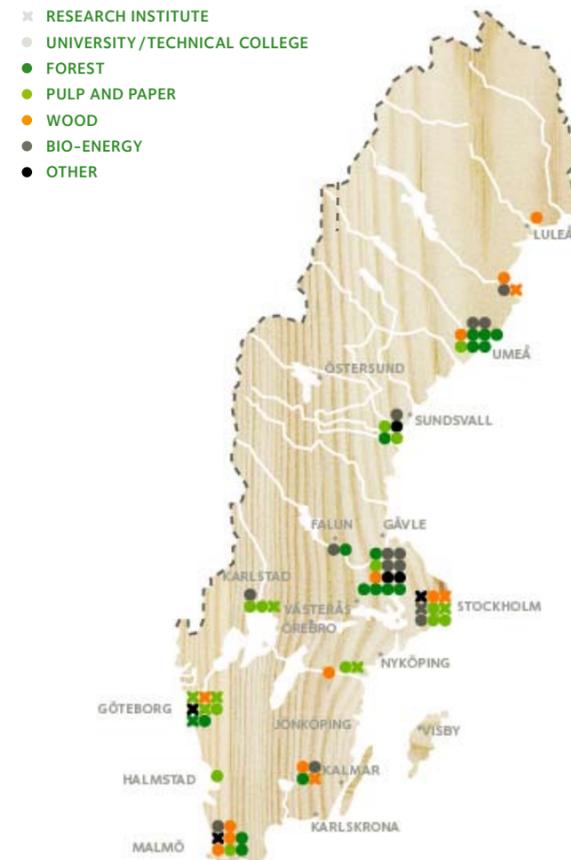
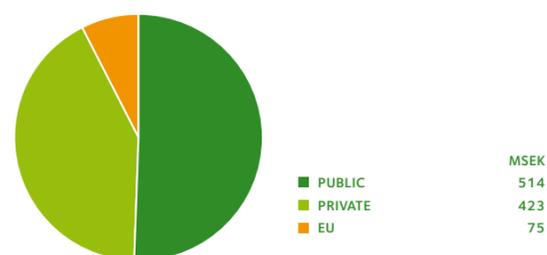
### NRA – A NATIONAL RESEARCH AGENDA

NRA sector is the national research agenda for the forest industry. It has been developed jointly by the forest industry, forest owners, government financing agencies and Swedish research parties. NRA is an important tool for developing products with a higher added value and for identifying new business opportunities for the forest industry. Through NRA, research resources

### SWEDISH FORESTRY AND FOREST INDUSTRY R&D AT UNIVERSITIES, TECHNICAL COLLEGES AND INSTITUTES, 2008



### FINANCING OF SWEDISH FORESTRY AND FOREST INDUSTRY RESEARCH AT UNIVERSITIES, TECHNICAL COLLEGES AND INSTITUTES, 2008



Swedish forestry and forest industry R&D at universities, technical colleges and institutes, 2008

can be coordinated and focused on strategically important areas where there is potential to become world class.

### SWEDEN AT THE FOREFRONT

Four major EU research programmes have been coordinated by Swedish research institutes. SustainPack and EcoTarget were coordinated by Innventia (formerly STFI-Packforsk). SustainPack dealt with sustainable packaging technology, whilst EcoTarget's objective was to streamline the pulp and paper industry so that "more can be produced with less raw materials".

Skogforsk managed Eforwood, which sought to evaluate and develop the forest industry's contribution to sustainable development. SP Träteck coordinated Indisputable Key, with the purpose to improve the traceability of forestry and the sawmill industry.

All four projects came to an end during 2009 and the results were presented at FTP's (Forest-Based Sector Technology Platform) conference "From Research to Business", held in November 2009 in Stockholm. The results are now being applied by the industry.

### TODAY'S RESEARCH BECOMES TOMORROW'S BUSINESS

The climate issue presents the forest industry with many opportunities. Research is underway with opening up entirely new business areas for more climate adapted products. With the help of cutting-edge re-

### WHAT IS STAR-COLIBRI?

Star-COLIBRI is a major strategic initiative to support European collaboration within the biorefinery sphere. It will also support breakthrough innovations by speeding up and facilitating industrial use of research results.

The short term aim of Star-COLIBRI is a "clustering of stars" – i.e. identifying and collecting important research projects, supporting them to become successful and acting as role models for other projects.

Star-COLIBRI is coordinated by the forest sector technology platform FTP (Forest-Based Sector Technology Platform). FTP is a European partnership for research and development. In addition to FTP, four other technology platforms are also represented in Star-COLIBRI. In total, Star-COLIBRI's consortium consists of 11 partners.

search, pulp mills can contribute to the production of future automotive fuels and cellulose-based chemicals. In addition, packaging and hygiene products can be produced from highly processed fibers, wood polymers and composite materials.

In order to fully succeed in terms of research, collaboration with other industries and research areas such as IT, biotechnology, nanotechnology and materials technology, is necessary. Research funds also need to be ploughed into collaboration between public and private sector players. The objective of increasing forest industry research and development investments at universities, technical colleges and institutes by 50 percent by 2012 is based on public funds being invested into joint research projects involving both business and public sector players.

### READ MORE ABOUT THE RESEARCH PROGRAMMES AND THE RESULTS:

- NRA: [www.nra-sweden.se](http://www.nra-sweden.se)
- SustainPack: [www.sustainpack.com](http://www.sustainpack.com)
- Indisputable Key: [www.indisputablekey.com](http://www.indisputablekey.com)
- Ecotarget: [www.ecotarget.com](http://www.ecotarget.com)
- Eforwood: [www.eforwood.com](http://www.eforwood.com)

**THE FOREST INDUSTRY'S OBJECTIVES:**

- The annual growth in Swedish forests shall increase by 20 million cubic metres by year 2020.
- The amount of bio-energy extracted from the forest shall increase by 20 TWh by year 2020.

# OUR AGENDA FOR FOREST MANAGEMENT

## YIELD AND GROWTH

Swedish forests are managed with focus on long-term sustainability and the volume of growing forests has gradually increased over the past century. The forest provides renewable raw material for products that can be recycled and used as bio-energy at the end of their life time.

**HIGH FOREST GROWTH IS GOOD FOR THE CLIMATE**  
 The Swedish government states in the 2006 forestry report "Mervärdeskog" (Forest Added Value) that:

"The forestry has a decisive role to play in terms of reducing Swedish dependency on oil and thus emissions of greenhouse gases."

In its findings, the report addresses many methods to increase the growth and the uptake of carbon dioxide in the forest, including:

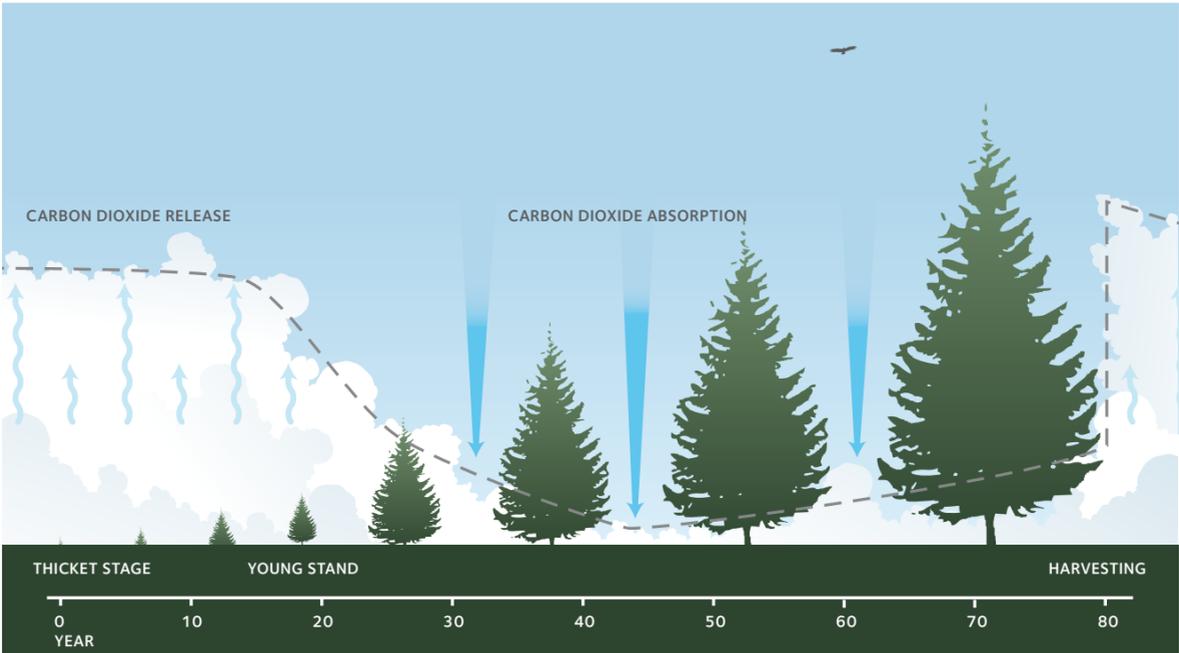
- afforestation on abandoned arable land
- extend forest fertilisation
- clean old ditch systems
- use the best possible plants and regeneration methods
- increase the cultivation of new, highly productive tree species

The government bill "En skogspolitik i takt med tiden" [A forest policy in line with the times] (2007/08:108) also addresses the climate benefits of high forest growth.

"The government believes that high and stable growth is a fundamental starting point in making use of the forest's role in combating global warming. High growth counteracts climate change by increasing carbon uptake in growing forests and land and in various forest products, as well as through increased biofuel production."

A high growth in the forest is favourable from a climate perspective. Felled trees produce renewable raw material for timber and paper products or a raw material that can replace finite or more energy intensive materials and fossil fuels.

Raw materials from the forest are part of the carbon dioxide cycle. Immediately after harvesting, carbon dioxide leak as residual branches and needles start to break down. However, after about 20 years, the new tree generation has grown sufficiently to absorb more carbon dioxide than the soil releases. Trees grow fastest between the ages of 20 and 90, absorbing significantly more carbon dioxide than released during the clear-cut phase. As trees get older, they grow more slowly and their ability to absorb carbon dioxide diminishes. For-



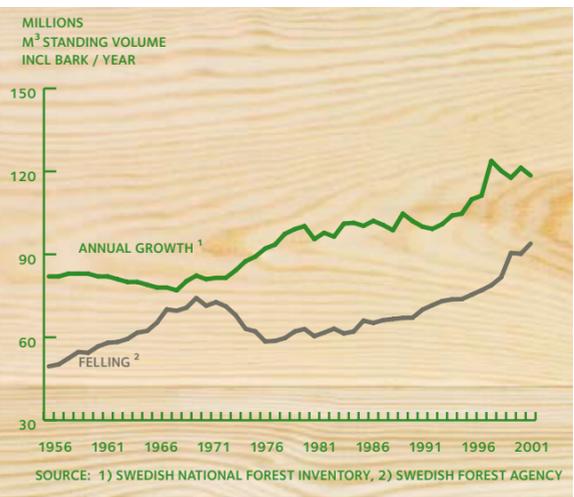
Immediately after felling, carbon dioxide starts to leak as harvest residues such as branches and needles start to decompose. Once the new trees reach the age of around 20, they are able to absorb more carbon dioxide than the amount that leaks from the ground. Trees are felled when their growth decrease and they are then used as raw material for products that can replace more climate affecting materials and types of energy. Using the forest is therefore good for the climate. Picture source: Holmen.

ests should therefore be harvested when trees are 80-120 years old. When trees die and rot in the forest, the bound carbon dioxide is released into the atmosphere.

**THE CLIMATE AFFECTS THE FOREST**  
 According to the Swedish Commission on Climate and Vulnerability (SOU 2007:60), the greenhouse effect will have a major impact on the Swedish forestry. The growth of pine, spruce and birch may increase markedly, but with the warmer climate the risk of damages from storms, fires, fungi and insect attacks increases as well. It is still too early to estimate the magnitude of potential climate changes.

**MORE AND MORE BIO-ENERGY**  
 By using bio-energy instead of fossil energy, we reduce the climate change effect. The amount of bio-energy extracted from the forest, in the form of branches and tree tops, has substantially increased and is now around 7 TWh per year. In addition, there is unused potential of about 8 TWh. Due to increased demand for bio-energy, it may in the future be possible to use stumps and smaller trees that previously have been left in the forest. Doing so, an additional 12 TWh could be produced. In the long term, it is estimated that bio-energy extraction from the forest could increase by 20 TWh.

When more bio-energy is extracted from the forest, more nutrients are also extracted from the forest soil. One way of counteracting this is to re-circulate ash from the incineration of bio-energy. The ash contains all the important nutrients, apart from nitrogen, and may also prevent the acidification of the soil.



**THE SWEDISH WOOD EFFECT, SWE**  
 The total amount of forest in the world is reducing year on year, but in Sweden the situation is the reverse. The growth of Swedish forests is larger than the cutting yield, resulting in an increasing timber volumes in the forest with around 1 % every year. Estimates show that if all forests globally were managed in the same way, with greater growth than harvest, emissions of fossil carbon dioxide equivalent to the current global emissions level could be taken up and stored in forests and wood products by 2050.

# OUR AGENDA FOR FOREST MANAGEMENT

## BIOLOGICAL DIVERSITY

The forest industry is investing major resources in preserving the biodiversity of the forests. For example, after felling, all dead trees are left in the forest and groups of deciduous trees are preserved in order to benefit the flora and fauna that are dependent on these habitats.



During felling, buffer zones are preserved, where trees and bushes meet lakes, brooks and wetlands **(1)** in order to reduce the risk of erosion and nutrient leakage. Buffer zones are also left around flat rocks and cliff edges **(2)**. Groups of deciduous trees **(3)** are saved as they are valuable for preserving biodiversity. Similarly, big or old trees are preserved **(4)**. If there are no big or old trees, trees that may develop into big,

storm-resistant trees in the future are left instead. Standing dead wood, "dry wood" and "high stumps" **(5)** are also left during felling, as fungi and insects thrive in them. Birds, in turn, feed on these insects. If natural access to high stumps is poor, new stumps must be created by cutting trees at a height of 3–4 metres.



## SÖDRA AND GREEN FOREST MANAGEMENT PLAN

Managing the forest is a big responsibility and commitment. It must be managed in a sustainable way and the raw materials produced must be of good quality. In addition, consideration must be given to the forest's other values for environment and recreation. It is not always obvious how this should be accomplished in practice, but as early as 1996 Södra developed a method and product that is now an intrinsic part of forest ownership.

The product is called Green Forest Management Plan and is drawn up exclusively for each property. It gives the forest owner a comprehensive picture of the production and nature values of the property. The management direction for each individual forest department is determined using four target codes. This allows the forest owner to know in advance where to invest in timber production and where the highest nature values are and how they should be managed. The plan also forms a base document of forest certification and, in this respect, is the forest owner's most important tool for conducting sustainable forestry where production and environment exist in harmony. In 2008, CEPI (Confederation of European Pulp Industries) chose Södra's Green Forest Management Plans as one of the best planning tools for responsible forestry in Europe.

Today, trees and groups of trees are always left in the harvesting area after felling in order to protect the biodiversity. The trees saved are mainly those with atypical characteristics, such as dead and old trees, deciduous trees and bushes and lying trees. In the long term, this will increase the amount of deciduous trees, dead and big trees in the forest, which will benefit insects, fungi and other organisms.

### CERTIFICATION

In order to facilitate for consumers, companies and authorities to get information about the origin of timber and to guarantee that it has been produced in a responsible manner, there is certification systems for forestry. All of The Swedish Forest Industries Federation's member companies that own forests are certified in accordance with FSC (Forest Stewardship Council) and / or PEFC (Programme for the Endorsement of Forest Certification schemes). FSC certification is common amongst larger forest companies, whilst PEFC is more common within small scale forestry. Many companies are certified against both.

Both these systems are tougher than the Swedish Forestry Act, featuring requirement such as:

- areas with rare plants and animal species must be preserved in order to protect local biodiversity
- the forest owners set aside 5 percent of their forests voluntarily to preserve and create natural values for the future
- requirements for education, safety and job security for those who work in the forest
- forests are managed with consideration to other interests using the forests
- considerations are given to ancient remains and cultural sites.

Forest products may be marked with the FSC or PEFC logo. In order to do this, a certificate is required that guarantees that the origin of the raw material has been established and that it satisfies certain requirements. These so called traceability certificates are issued by an independent inspector.

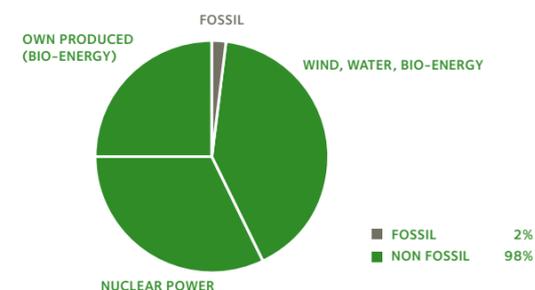
# OUR CONCERN FOR THE ENVIRONMENT

## ENERGY

The forest industry's processes are energy intensive, both in terms of electricity and heat, but considerable efforts are being made to achieve efficiencies. The industry has adopted a zero vision for the use of fossil fuels in manufacturing processes and 90 percent of the heat requirements are already met by bio-energy. The forest industry also produces bio-based back-pressure power and renewable wind power.

In total, the forest industry used approximately 21 TWh of electricity in 2009, corresponding to 15 percent of the total electricity use in Sweden. For an electricity intensive industry like the forest industry, electricity costs constitute a major part of the production costs. Because of this, considerable efforts have been made to streamline the energy use and increase the production of self-generated electricity. Today, more than a quarter of the electricity used by the industry is self-generated and based on bio-energy.

### ELECTRICITY USE, PULP AND PAPER INDUSTRY 2009



### ZERO VISION FOR FOSSIL FUELS

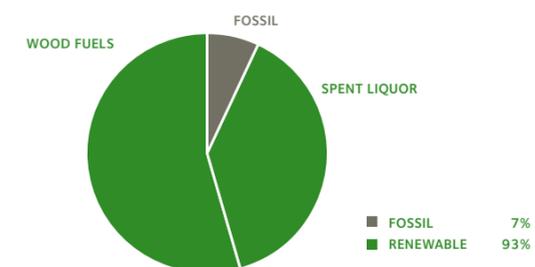
The forest industry is covered by several regulatory measures within the energy area, e.g. carbon emissions trading, electricity certificates and carbon dioxide tax. In addition to these legislative systems, the forest industry has also adopted a number of voluntary initiatives. One example of this is the zero vision for the use of fossil fuels in production processes. Increased bio-energy usage and measures for energy streamlining have led to reduced carbon dioxide emissions by 12 percent between 2007 and 2009 (calculated per ton of

### THE FOREST INDUSTRY'S OBJECTIVES:

- Energy efficiency in the forest industry shall be improved by at least 15 percent by year 2020.
- The forest industry's own electricity production shall increase by 2 TWh by year 2020.

produced pulp and paper). Other examples of voluntary initiatives include forest industry targets for increased back-pressure power production and energy streamlining.

### FUEL CONSUMPTION, PULP AND PAPER INDUSTRY 2009



### IMPORTANT ENERGY PRODUCER

The forest industry itself uses a lot of bio-energy in the form of bark and spent liquor produced during the production process. A large part of the forest's energy range, such as branches and tree tops, is also supplied to thermal power plants for electricity and heat generation. In addition, the industry also supplied about 2 TWh of heat to the municipal district heating networks during 2009. These deliveries could double by opening up district heating networks for third party access (TPA) and making upgrades in the mills.

The industry also produces electricity using back-pressure power. During 2009, a total of 5.4 TWh was produced in this way, and the aim is to increase production by 2 TWh from 2007 until 2020. This electricity is used primarily in the companies' own facilities, although 5 percent is also supplied to the main network.



### ENERGY EFFICIENCY THROUGH NEW EVAPORATION PLANT AT SÖDRA VÄRÖ

During November 2009, a new evaporation plant was commissioned at Södra Cell Värö.

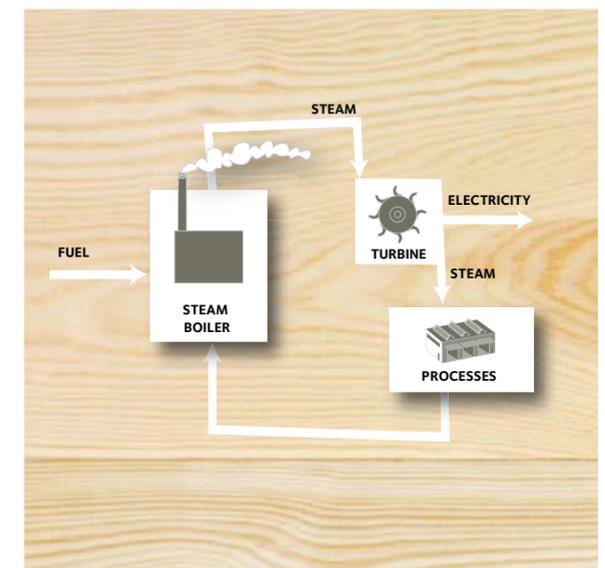
This plant is 30% more energy efficient than the previous evaporator and means that the works will only need its bark boiler when the factory starts up and stops, as well as on cold winter days. Otherwise, Södra Cell Värö is now self-sufficient in respect of energy that it can generate from its soda boiler.

*During evaporation, water is removed from the recovered liquor to increase its calorific value during combustion (energy recovery).*

In addition, some companies are investing in wind power. In Skutskär, VindIn AB (co-owned by 10 electricity-intensive base industries) built a wind power station during autumn 2009. The power generated will be used in Stora Enso's pulp plant. Other examples include SCA and Statkraft, which have plans to use wind power to generate 2.8 TWh of electricity. Holmen and Norrtelje Energi plan to produce 100 GWh and Södra Skogsägarna 140 GWh.

### PFE – A SUCCESS STORY

The program for improving energy efficiency (PFE) was launched by the Swedish Energy Agency in 2004. It is aimed at Swedish energy intensive industrial companies and shall contribute to increasing companies' energy efficiency. Through PFE, companies can get tax reductions for the electricity they use, provided that they streamline and work structurally on their energy use. The Swedish Energy Agency reports that participating companies managed to cut their annual electricity consumption by 1.4 TWh during the first programme period (2005–2009). Of this reduction, the forest industry's 55 participating companies account for around 63 percent, or 0.9 TWh. This is 50 percent more than was estimated at the start of the programme.



The production of pulp and paper requires huge amounts of energy in the form of steam and electricity. The steam is produced in recovery boilers (where spent liquor is heated) or solid fuel boilers (where material such as bark is burned). Electricity can be generated by allowing the produced steam to pass through a turbine. The steam that has passed through the turbine has a lower pressure, but can be used in production processes. Generating electricity in this way, by using residual steam to satisfy the energy needs of the process, makes the total energy use very efficient.

# OUR CONCERN FOR THE ENVIRONMENT PROCESSES

The forest industry started their environmental efforts in the 1970s, quickly reducing emissions to air and water. Nowadays, the environmental work is characterised by a holistic perspective, where raw materials, energy, waste and transportation are also taken into account. The industry today is resource efficient and emissions are low, but the industry's environmental adaptation is set to continue.

The forest industry's statement of intent establishes that environmental efforts shall be focused on achieving continual improvement. Measures must be taken, both as a result of legislation and through corporate decision-making. For the past 40 years, the industry has also run joint environmental projects in order to increase knowledge and awareness.

## CONSCIOUS WATER USE

Population growth, migration to urban centres and increased industrialisation have resulted in an increasing need for clean water in some parts of the world. However, Sweden is a country with good access to quality water.

Pulp and paper production requires a relatively large amount of water. Despite the fact that water is not a scarce commodity in Sweden, the Swedish forest industry still looks to reduce its water usage as this also leads to reduced energy consumption in the processes. The amount of water required is primarily reduced by further closing the systems in the manufacturing process, i.e. recirculating and reusing more process water.

The Swedish forest industry takes all its water straight from lakes and watercourses and does not use groundwater. After use, the purified process water is returned to the watercourse.

In sawmills, only a limited amount of water is used, primarily for timber watering. This takes place in climate-controlled sprinkler systems, and the water is recycled, usually in closed systems.

## WATER TREATMENT AND EMISSIONS TO WATER

Pulp and paper mills reduce emissions to water partly by implementing measures in their processes, and partly by treatment of effluents. Today, more than 95 percent of the effluent is treated in two or three stages before being returned into the watercourses.

## REDUCED EMISSIONS TO AIR

The forest industry's carbon dioxide emissions from fossil fuels have been reduced significantly since the early 1990s as oil continues to be phased out in favour of bio-energy. The reduction in oil use and the lower sulphur content in the oil have, in combination with improved combustion technology and more efficient purification equipment, reduced sulphur emissions to air by 95 percent since the beginning of the 1980s. However, it has not been possible to reduce emissions of nitrogen oxides to the same extent. Various methods have been studied, but there is currently no cost-effective technology to reduce emissions of nitrogen oxides from recovery boilers.

## IN THE FOOTSTEPS OF WATER

The market is increasingly demanding information about companies' water consumption or "Water Footprint". At Cepi (Confederation of the European Paper Industries) a project is underway to devise a joint methodology for calculation of the use of water in production processes and forestry.

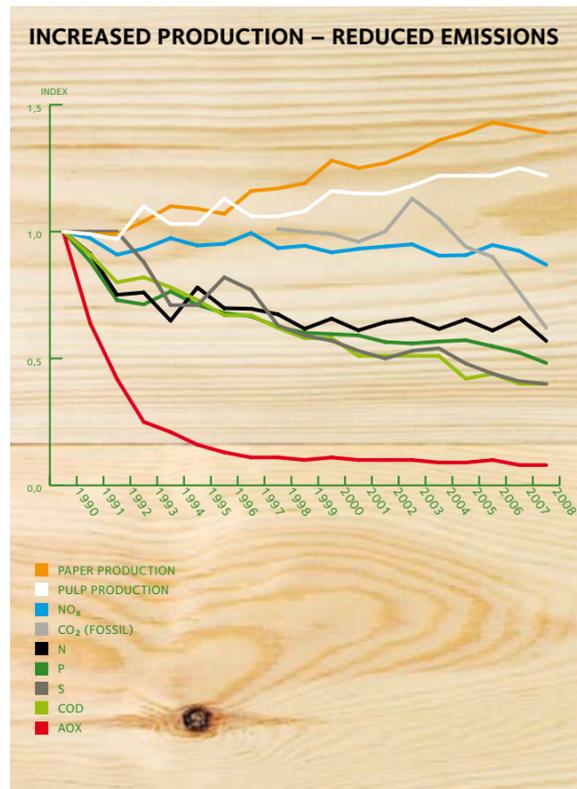
During 2009, the industry gave IVL, the Swedish Environmental Research Institute, the assignment of mapping the flows in the Swedish forest industry based on common definitions and indicators, thereby illustrating the current situation of water in the industry.



## NEW AND EXTENDED EFFLUENT TREATMENT PLANTS AT SCA MUNKSUND AND HOLMEN IGGESUND

SCA's paper mill in Munksund commissioned its new plant for the purification of outgoing process effluent in 2009. It is a biological treatment plant, where microorganisms are used to clean the water. Thanks to the investment of SEK 223 million, emissions of organic material into the water have been reduced by about 70 percent. Approximately 3–4 tons of bio sludge per day are incinerated in the mill's solid fuel boiler.

Holmen Iggesund has invested SEK 256 million in an improvement of its treatment plant. The existing mechanical and biological treatment stages have been completed with a stage of chemical flotation. This means that emissions of phosphorous, nitrogen and dissolved organic substances are reduced, helping the already eutrophicated Baltic Sea. The water released into recipient will also be clearer. This is a real benefit as sunlight can reach the bottom better, which in turn will benefit plant and animal life. The plant was taken into operation in autumn 2009.



Major efforts to reduce emissions from pulp and paper mills began in the 1970s and 1980s. The environmental work has continued and emissions have been reduced further. Production has gradually increased.

## ODOUR FROM THE PROCESSES

During the manufacture of sulphate pulp, sulphur compounds are produced, which have a bad odour even at very low concentrations. For a long time, all mills have had systems for collecting and burning bad-smelling gases from their major sources. More and more mills are now installing systems that also collect gases from minor sources such as diffuse emissions from storage tanks.

## WASTE CAN BE RE-USED IN A MANY WAYS

About 95 percent of the waste produced in pulp and paper mills is recovered in some way, and only five percent is sent to landfill. Companies are striving to further reduce this figure. Most waste goes to energy recovery in the mills' solid fuel boilers. Other areas of use include construction or coverage of finished landfills, and revitalisation of forest and agricultural land. Attempts are being made to rot sludge from the mills' effluent treatment plants to produce biogas.

Many forest industry companies are responsible for land where activities were conducted in the past. Although fully compliant with practice and environmental requirements of the time sometimes the land must be decontaminated, which may claim for considerable resources. Thorough investigations in consultation with the environmental authorities form the basis for how this is to be done.

# OUR CONCERN FOR THE ENVIRONMENT

## TRANSPORTS

Through its large export volumes, the forest industry is a driving force of the Swedish economy and transports are essential for a growing market. The exports lead to the industry carrying large volumes internationally, in addition to transporting significant quantities of raw materials and products within Sweden. All this brings about emissions that impact the environment.

The forest industry is using ship, train and lorry transports in combined logistical solutions.

Reducing emissions of fossil carbon dioxide from transports by 20 percent is difficult, but necessary with respect to the climate. This objective shall be achieved by improving logistics solutions and by imposing requirements on transport providers.

In order to facilitate calculation of transport related emissions, and to ensure that a common methodology is applied by companies, the industry has produced a guide and a calculation template.

### TAKING THE LEAD ON RAIL

The forest industry is the sector in Sweden that transports most goods on rail. Between 2001 and 2008, timber transports on rail increased by 75 percent – and it continues to increase. However, it is being held back by technical and administrative deficiencies in both the Swedish and the European railway systems.

### INTELLIGENT ROAD CHOICE

The fuel constitutes 30–40 percent of the hauliers' total costs. By more efficient planning, management and follow-up, the fuel consumption and environmental impact may be reduced, and traffic safety may be increased. Therefore, the industry promotes timber exchanges between forestry companies and optimisation of vehicle routes. During 2010, a project will be tested, which is a project for automatically calculating the best route from timber loading in the forest to the industry.

### REDUCED FUEL CONSUMPTION

Low fuel consumption has been given highest priority for reducing emissions from transports. As part of that effort, the industry tests newly-developed engines, hybrid solutions and resource and climate efficient fuels. For example, the world's first forest machine to use an electricity-diesel hybrid engine has been developed – the El-forest. It uses 35 percent less fuel than a standard forwarder.

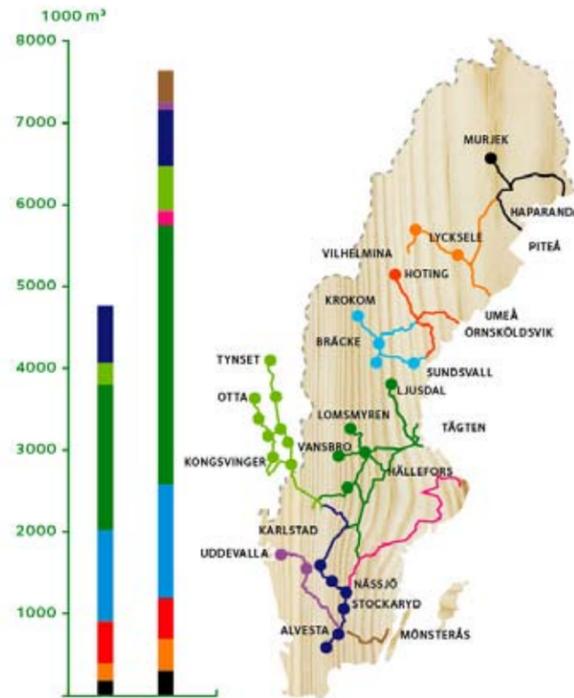
### THE FOREST INDUSTRY'S OBJECTIVES:

- By 2020 the forest industry shall have reduced its emissions of fossil carbon dioxide from transports by 20 percent.
- The forest industry shall develop common sustainability criteria for the procurement transportation services by year 2010.

### LONGER VEHICLES – LESS EMISSIONS

In order to improve the environmental efficiency of timber transports, the industry is conducting research and development in respect of special vehicles – the so called "ETT project – Modular system for forest transports". In the sub-project "One more stack", the vehicle used is both longer and can take a heavier load than standard vehicles. This means that three timber vehicles

### Timber on railway 2001 and 2008



Between 2001 and 2008, timber transports by rail increased by 75 percent. This has resulted in the number of truck transports falling by 77 000 loads and CO<sub>2</sub> emissions decreasing with 19 000 tons.

### SENSIBLE TRANSPORT SOLUTIONS AT SMURFIT KAPPA KRAFTLINER

Smurfit Kappa Kraftliner in Piteå is the biggest kraft liner producer in Europe, with an annual capacity of 700 000 tons. The majority of this, around two thirds, is transported by ship using an efficient system solution with return goods from Holland and waste paper from the Baltic States. Around one third of the products are transported by rail. The rail transports are coordinated with Korsnäs, Billerud, Mondi Dynäs and Setra, and travel with goods in both directions.

Spent liquor (black liquor) from Smurfit Kappa's pulp production process was the first in the world to be gasified in a black liquor gasifier, and now the world's first pilot plant for production of bio-based DME is being built on the factory site. The pilot plant will be managed by Chemrec and the energy research centre ETC. Bio-DME is a renewable fuel for heavy vehicles and will be tested in trucks that will transport products from the factory to the port of Piteå. So in Piteå, you can follow the process from "wood to transport"!

Sweden's longest timber load! The prototype vehicle produced within the framework of the ETT project (One more stack), will reduce carbon dioxide emissions by 23 percent compared to a conventional Swedish 60 ton timber vehicle. Photo: Erik Viklund



can be replaced by two, giving fewer trucks on the roads, reducing emissions and increasing traffic safety. Initial results show that carbon dioxide emissions are reduced by 23 percent. Because the ETT vehicle has

more axles than a traditional timber vehicle and the load per axle is lower, road wear is also reduced.

### BIOFUELS FROM THE SWEDISH FOREST INDUSTRY

The forest may be one of the raw material for the next generation of vehicle fuels. In Sweden, several projects are underway that could lead to production of forest-based biofuels:

- At the bio refinery Domsjö Fabriker, timber is being processed into the factory's main product of special cellulose, a process that also produces by-products such as ethanol and biogas that are used as vehicle fuels. Domsjö also has, together with Chemrec, long-term plans to manufacture Bio-DME.
- SEKAB is operating a test plant for the production of ethanol from forest raw materials. The process is based on enzymatic degradation of wood chips. The plant is located at Domsjö's factory site.
- Sveaskog and Södra are partners in SunPine, a company that will produce bio diesel using tall oil, a by-product from the pulp production process.
- Chemrec is developing production of Bio-DME at Smurfit Kappa's factory site, see information box above.

### RESPONSIBILITY AS A TRANSPORT PURCHASER

The forest industry is Sweden's biggest purchaser of transport services. By developing common sustainability criteria for the procurement process, the industry supports the development of more efficient and cleaner vehicles and vessels.

Many companies in the industry participate in various projects to ensure responsible procurement of transport services. In the case of maritime transport, there is the Clean Shipping project, which aims to create an environmental index where shipping lines can be environmentally assessed. Another example is the non-profit organisation QIII, which assesses procurement of road transport services, focusing on health, safety and the environment. Stora Enso and Setra are involved in both these projects. Other initiatives include the Forum for Sustainable Transport, in which Södra and Billerud participate, and KNEG – Climate neutral road transport, in which SCA and Stora Enso are involved.



The Swedish Forest Industries Federation is QIII's first supporting member.

# OUR WORK WITH SOCIAL ISSUES

## HEALTH AND SAFETY

The forest industry must, of course, offer workplaces that are safe and that encourage development. To this end, the industry has adopted a “zero vision” for work related accidents and continues to prioritise health and safety.

Accidents, occupational diseases and health-related absenteeism have all decreased steadily over recent years. However, there have been a few fatal accidents. This is why the industry is continually working to improve safety and has adopted a “zero vision” for work-related accidents.

### LESS SICK LEAVE AND FEWER ACCIDENTS

Over the past two years, total sick leave in the pulp and paper industry has decreased by over 20 percent. This is due to the implementation of more active rehabilitation programmes that feature improved procedures to handle absences. The objective is to bring the health-related absenteeism below 3.5 percent. In 2008, the absenteeism was 3.9 percent, with women representing a larger proportion than men. As a result, more efforts are currently being focused on improving women’s health.

Accident frequency, i.e. the number of accidents per number of employees, has in recent years decreased in both the pulp and paper industry and the sawmill industry. In the sawmill industry, the number of acci-

dents has decreased by 30 percent in the past six years. The most common injuries are the result of falls, trapping and cuts. The most common work related injuries in both industries are strain injuries, followed by noise-related injuries.

### NEW OBJECTIVE

In the case of work related accidents, the same objective has been set for both sawmills and the pulp and paper industry – 1.0 accidents per 100 employees. At the latest pulp and paper industry management conferences, held in 2007/2008, the industry adopted the objective of reducing the number of workplace accidents to half by 2010, a target proved to be only partially achievable within the short time frame. This has led the industry to retain the target and extend the deadline for its achievement to 2015. The current average in Swedish manufacturing industry is 1.1 accidents per 100 employees.

### ACTIVE SAFETY WORK

In order to reduce health-related absenteeism and the number of accidents, a systematic programme of health and safety is underway in the industry. Particular emphasis is being placed on taking steps to address behaviour-related accidents and to develop corporate safety cultures. For example, Setra has introduced a training programme for a “safety driving licence”. SCA is actively working to link work orders to risk inventories. In addition, machines have been made safer by installing barriers and switch locks.

For a number of years, the Swedish Work Environment Authority has been running an inspection campaign with the aim of reducing the number of injuries in the industry. The campaign requires all sawmill plants to employ perimeter fencing that prevents access to dangerous areas.

Health and safety issues are also addressed through cooperation agreements and work environment agreements between the forest industry and the unions.

### THE FOREST INDUSTRY’S OBJECTIVES:

- A maximum of 1.0 work-related accident with absence per 100 employees by year 2015.
- Health-related absenteeism below 3.5 percent by year 2015. Particular attention on measures to reduce absence among women. (Applies to the pulp and paper industry)

Photo: Setra Group

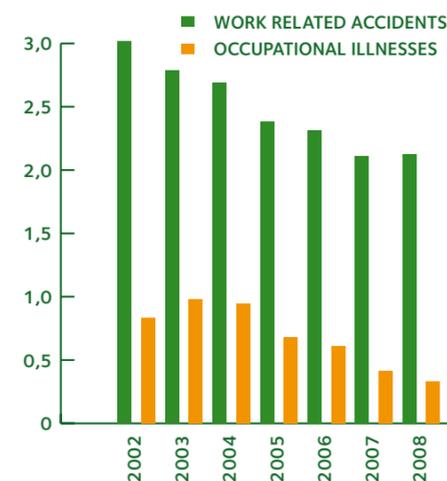


### SAFETY DRIVING LICENCE AT SETRA

At Malå Sawmill, an internal safety training programme has been started as a pilot project. The training covers workplace environment theory and practical exercises in the form of reviews of safety gates and safety areas. Staff learns about entering a risk area by performing a safe stop, and why such a procedure must be carried out.

The course ends with a test for which a pass mark must be achieved in order for the participant to receive their personal “safety driving licence”. The licence states which elements of the production process the employee is authorised to perform. The pilot project at Malå has turned out very well, and Setra has decided to roll out the programme to all production units.

WORK RELATED ACCIDENTS AND OCCUPATIONAL ILLNESSES IN SAWMILLS, PLANING MILLS AND WOOD IMPREGNATION WORKS (per 100 employees)



WORK RELATED ACCIDENTS AND OCCUPATIONAL ILLNESSES IN THE PULP, PAPER AND PAPERBOARD INDUSTRY (per 100 employees)



In 2008, the accident rate per 100 employees was 1.6 for the pulp and paper industry and 2.1 for the sawmill industry. This corresponds to 10.2 and 11.8 work related accidents per million working hours. Accident rates are based on the accidents reported to the authorities and which resulted in one or more days of absence. Occupational illnesses equals those that have been registered with the authorities. Source: Swedish Work Environment Authority / Statistics Sweden

### PIA AND SIA – REPORTING SYSTEMS FOR ACCIDENTS AND INCIDENTS

PIA and SIA are the web-based information systems for work related injuries and incidents, developed specifically for the Swedish paper industry and sawmill industry.

By reporting accidents and incidents in the system, a company can obtain injury statistics and easily follow up a particular type of injury, where it happened, who is taking corrective action and when that action shall be completed. By sharing information about incidents and accidents with companies that have similar workplaces, injuries can be prevented. The systems are free to use and managed by AFA Insurance.

### THE FOREST INDUSTRY'S OBJECTIVES:

- At least 30 percent of managers appointed during year 2012 shall be women. In this context, "managers" refers to everyone with staff management responsibilities.
- At least 60 percent of employees recruited during year 2012 shall have a higher education qualification.

# OUR WORK WITH SOCIAL ISSUES

## EQUALITY AND TALENT MANAGEMENT

Qualified and committed employees is a decisive success factor in an increasingly globalised world. The forest industry needs more women, from management level all the way down. In addition, a higher education level within the industry is needed in order to strengthen competitiveness and productivity.

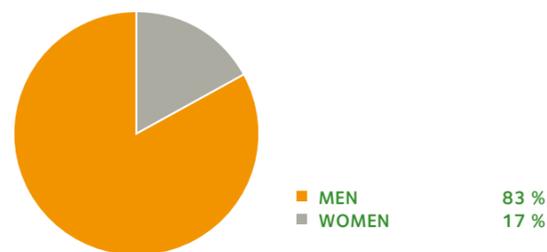
Within the forest industry, we know that an even gender spread is good for the business. More female managers create role models and will, in the long run, lead to more women on all rungs of the corporate ladder.

### FEMALE MANAGERS AN ASSET

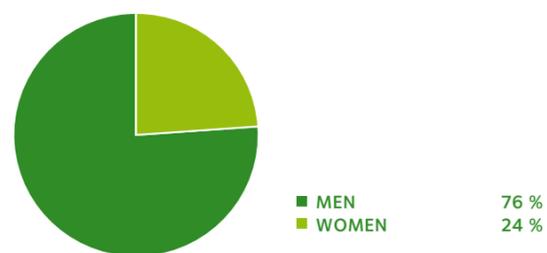
In order to achieve the forest industry's objective of at least 30 percent of all managers appointed to be women and to promote the development of women within the companies, special efforts are carried out, for exam-

ple leadership development programmes and individual development plans. During 2008, almost 25 percent of appointed managers were women. Continual follow-up will ensure that the development continues in the right direction.

**DISTRIBUTION BETWEEN MEN AND WOMEN (total, pulp and paper industry and sawmills, 2008)**



**DISTRIBUTION BETWEEN MEN AND WOMEN AMONGST RECRUITED PERSONS WITH STAFF MANAGEMENT RESPONSIBILITIES (total, pulp and paper industry and sawmills, 2008)**



### SIRIUS FOR INDUSTRIAL DEVELOPMENT

In order to meet the challenges of today and tomorrow, the SIRIUS (Skogsindustrins Råd för Industriell Utveckling i Samverkan) [Forest Industry Council for Industrial Development in Collaboration] joint council has been formed. Both employers and unions are members. SIRIUS works for:

- Better working environments – with fewer work related accidents and an improved safety culture.
- Increased competence – to meet the challenges of today and tomorrow.
- More efficient organisation – through increased integration of operation and maintenance.
- Increased diversity – for example by introducing more female operators.



### WOMEN ON HOLMEN IGGESUND'S TRAINEE PROGRAMME

Holmen in Iggesund chose to start its own trainee programme when they wanted to recruit an entire group of new operators. This led to the new employees feeling more secure in their jobs, but the program also had an unexpected and positive effect on equality; more than half of the new employees were women! Thanks to the trainee programme, 15 female operators have been recruited to Iggesund during the past two years.

– From always having a majority of male applicants for our operator jobs, it became apparent that women were more interested when we employed a larger group," says Gunnar Elgesjö, HR Manager at Iggesund Paperboard to the Swedish Forest Industries skills provision committee's magazine Brainpower.

Previous recruitments usually involved quick fixes, such as extending temporary posts or recruiting directly from other departments at the mill. The trainee programme, on the other hand, was a pure training initiative and part of a cohesive and well-considered recruitment strategy.

### INCREASED COMPETENCE

A company's position on the market depends, to a large extent, on its competitiveness and efficiency. Employee competence is an important factor in this respect. The industry has therefore adopted a target of at least 60 percent of all employees recruited during 2012 having a higher education qualification. In 2008, the corresponding figure was about 45 percent.

The education level in the pulp and paper industry is increasing, as in the sawmill industry, even if the trend there is not as clear. A high education level is becoming more important in order to make the most of the ever more technically advanced production equipment.

In order to ensure the industry's competence sourcing, consideration must also be given to demographic factors such as age structure and future generational shifts. It is therefore important to profile the industry and attract new employees. To attract potential em-

ployees, the forest industry is working with initiatives such as Journey to the Future in upper secondary schools, and industry evenings for technical colleges and the Swedish University of Agricultural Sciences (SLU). Journey to the Future is a theme day, which has toured around Sweden's upper secondary schools since 1999 and so far reached more than 100 000 students. It is an initiative aiming at increasing the awareness of the opportunities that the industry has to offer and the importance of getting a good education. Journey to the Future has also a dedicated page on Facebook.

One of the challenges that the industry is facing is to encourage university graduates to settle down in small towns, where the pulp, paper and sawmill operations usually are located. Efforts are therefore made for making rural areas more attractive by encouraging young people in those areas to get a higher education qualification.

# THE FOREST INDUSTRY IN FIGURES

Data relates to 2008 unless otherwise stated.

FINANCE	PULP AND PAPER INDUSTRY	SAWMILL INDUSTRY	SOURCE
TURNOVER	SEK 102.7 BILL	SEK 45.7 BILL	STATISTICS SWEDEN, PRELIMINARY DATA
EARNINGS	SEK 11.6 BILL	SEK 0.2 BILL	STATISTICS SWEDEN, PRELIMINARY DATA
VALUE ADDED	SEK 23.4 BILL	SEK 7.1 BILL	STATISTICS SWEDEN, PRELIMINARY DATA
PRODUCTION COST (RAW MATERIALS, COMMODITIES AND OTHER EXTERNAL COSTS)	SEK 79.3 BILL	SEK 38.6 BILL	STATISTICS SWEDEN, PRELIMINARY DATA
PERSONNEL COSTS	SEK 14.2 BILL	SEK 5.8 BILL	STATISTICS SWEDEN, PRELIMINARY DATA
AX ON EARNINGS	SEK 0.8 BILL	SEK 0.1 BILL	STATISTICS SWEDEN, PRELIMINARY DATA

MATERIALS, RAW MATERIALS, EMISSIONS	PULP AND PAPER INDUSTRY	SAWMILL INDUSTRY	SOURCE
<b>RAW MATERIALS</b>			
WOOD	36,5 MILL M <sup>3</sup> SOLID VOLUME UNDER BARK	38,4 MILL M <sup>3</sup> SOLID VOLUME UNDER BARK	VMR, SDC
CHEMICALS	2,86 MILL TONS	-	SWEDISH CHEMICALS AGENCY (Refers to 2007)
RECYCLED PAPER	2 MILL TONS	0 TONS	SWEDISH FOREST INDUSTRIES FEDERATION
WATER USE - PROCESS WATER	515 MILL M <sup>3</sup>	0 M <sup>3</sup>	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
WATER USE - COOLING WATER	305 MILL M <sup>3</sup>	0 M <sup>3</sup>	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE

ENERGY - PURCHASED	PULP AND PAPER INDUSTRY	SAWMILL INDUSTRY	SOURCE
OIL	13 500 TJ	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
NATURAL GAS	530 TJ	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
LPG	2 190 TJ	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
COAL	440 TJ	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
PEAT	30 TJ	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
BIOENERGY	207 000 TJ	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
ELECTRICITY (55% RENEWABLE)	60 700 TJ	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
STEAM / HEAT	2 520 TJ	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE

ENERGY - PRODUCED	PULP AND PAPER INDUSTRY	SAWMILL INDUSTRY	SOURCE
ELECTRICITY	21 100 TJ	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE

ENERGY - SOLD	PULP AND PAPER INDUSTRY	SAWMILL INDUSTRY	SOURCE
STEAM / HEAT	6 600 TJ	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
ELECTRICITY	1 180 TJ	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE

EMISSIONS TO AIR	PULP AND PAPER INDUSTRY	SAWMILL INDUSTRY	SOURCE
GREENHOUSE GASES FROM PURCHASED FUELS (CO <sub>2</sub> EQUIVALENTS, FOSSIL)	1 611 000 TONS	129 700 TONS	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
GREENHOUSE GASES FROM PURCHASED ELECTRICITY (CO <sub>2</sub> EQUIVALENTS, FOSSIL)	545 700 TONS	-	SWEDENERGY
NITROGEN OXIDES (AS NO <sub>2</sub> )	13 400 TONS	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
SULPHUR COMPOUNDS (AS S)	3 040 TONS	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
VOC	15 100 TONS**	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
DUST	4 100 TONS	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE

WASTE	PULP AND PAPER INDUSTRY	SAWMILL INDUSTRY	SOURCE
TOTAL AMOUNT RECYCLED	530 000 TONS DRY MATTER	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
OF WHICH HAZARDOUS WASTE	250 TONS DRY MATTER	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
TOTAL AMOUNT INCINERATED	1 510 000 TONS DRY MATTER	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
OF WHICH HAZARDOUS WASTE	1 250 TONS DRY MATTER	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
TOTAL AMOUNT TO LANDFILL	170 000 TONS DRY MATTER	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE
OF WHICH HAZARDOUS WASTE	0 TONS DRY MATTER	-	SWEDISH FOREST INDUSTRIES FEDERATION'S ENVIRONMENTAL DATABASE

WORKFORCE	PULP AND PAPER INDUSTRY	SAWMILL INDUSTRY	SOURCE
NO. OF EMPLOYED OFFICIALS	7 500	1 500	STATISTICS SWEDEN, CONFEDERATION OF SWEDISH ENTERPRISE
NO. OF EMPLOYED WORKERS	17 900	11 800	STATISTICS SWEDEN, CONFEDERATION OF SWEDISH ENTERPRISE
HEALTH-RELATED ABSENCE	3,9%*	I.U.	SWEDISH WORK ENVIRONMENT AUTHORITY, STATISTICS SWEDEN
ACCIDENTS	1,6% (409)	2,1% (279)	SWEDISH WORK ENVIRONMENT AUTHORITY, STATISTICS SWEDEN
FATAL ACCIDENTS	0	2	SWEDISH WORK ENVIRONMENT AUTHORITY, STATISTICS SWEDEN

THE ENTIRE FOREST INDUSTRY, I.E. ALL PRODUCTION OF TIMBER AND WOOD PRODUCTS AND PULP, PAPER AND PAPER PRODUCTS MANUFACTURERS, EMPLOYS JUST OVER 70 000 PEOPLE (SOURCE: STATISTICS SWEDEN, PRELIMINARY DATA FOR 2008).

\* REFERS TO APPROXIMATELY ONE THIRD OF THE INDUSTRY \*\* STANDARD BASED FIGURE

# GLOBAL REPORTING INITIATIVE (GRI)

The Swedish Forest Industries Federation's sustainability publication has been adapted to comply with Global Reporting Initiative's guidelines (version G3). GRI is an independent institute that has developed guidelines for sustainability reporting. The guidelines are used on a voluntary basis by companies and organisations to report on the environmental, social and economic aspects of their activities. The Swedish Forest Industries Federation considers its reporting to be compliant with GRI's reporting level C, which has also been verified by the Global Reporting Initiative. The index shows which GRI indicators that are reported on and where the information can be found (pages in the publication or on the website).

www = The Swedish Forest Industries Federation's website, [www.forestindustries.se](http://www.forestindustries.se)



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## GLOSSARY

**AOX.** Adsorbable Organic Halogens. Used as a measurement of the amount of chlorine bound to an organic substance.

**BACK-PRESSURE POWER.** Combined production of electrical energy and heat energy. Back-pressure power delivers a high overall level of efficiency.

**BIO-ENERGY.** Energy derived from biomass, which is material with a biological origin formed during photosynthesis. Examples of biomass derived from the forest industry are branches and tree tops, bark, tall oil, and spent liquor. When burned, bio-energy does not increase the amount of carbon dioxide in the atmosphere provided that the biomass is allowed to regrow and reabsorb the same amount of carbon dioxide.

**BIOFUELS.** Fuel for transportation purposes derived from biomass, either liquid or gaseous.

**BIOGENIC CARBON DIOXIDE.** Carbon dioxide derived from bio-energy, see Carbon dioxide.

**BIODIVERSITY.** Variations amongst all living things in all environments and ecological processes that they exist in. This includes diversity within and between different species and within ecosystems.

**BLACK LIQUOR.** See Spent liquor.

**BY-PRODUCT.** Product of substance that is generated as a result of a process, but is not the process' primary objective.

**CARBON DIOXIDE (CO<sub>2</sub>).** Gas that is formed naturally when living organisms respire. With the help of photosynthesis, the plants transform carbon dioxide and water into cellulose. Carbon dioxide is released when anything is burned. Carbon dioxide is a greenhouse gas. Biogenic carbon dioxide is released when biological material decomposes or when biofuel is burnt. Fossil carbon dioxide is released when fossil fuels, such as coal, oil or natural gas are burnt.

**CARBON FOOTPRINT.** Measure of emissions of fossil carbon dioxide and other greenhouse gases given off by a product or activity.

**CELLULOSE.** The most important constituent element of the cell walls in all plants – the most common organic substance in nature.

**CHEMICAL FLOTATION.** Purification process where contaminants are separated from waste water using chemicals. The contaminants are brought to the surface in a treatment basin and then separated off.

**CHEMICAL PULP.** Produced by removing and dissolving lignin from the wood chips by applying high temperatures and pressures using chemicals, releasing the fibres. Chemical pulp has a low lignin content and consists of cellulose. Approximately 50 % of raw material used is converted to pulp, with the released lignin used for energy production.

**COD.** Chemical Oxygen Demand. Used as a measure of the amount of dissolved organic material in water.

**COOPERATION AGREEMENT.** Agreement between employers and unions in the pulp and paper industry regarding the company health service, skills development, equality and discrimination and local joint action practices.

**DM.** Dry matter.

**DME (DIMETHYL ETHER).** A gas vehicle fuel produced from synthetic gas. DME is designed for modified diesel engines.

**FOSSIL CARBON DIOXIDE.** Carbon dioxide derived from fossil fuels, see Carbon dioxide.

**FOSSIL FUELS.** Fuels that are created in the earth's crust over millions of years, for example coal, oil and natural gas.

**FRESH FIBRE.** Wood fibre that comes straight from felled trees, as opposed to recovered fibre. Also known as virgin fibre or new fibre.

**FSC.** Forest Stewardship Council. An international forest certification system that seeks to ensure that the world's forests are used in a way that is acceptable from an environmental, social and economic perspective.

**GREENHOUSE GASES.** Gases that contribute to the greenhouse effect (carbon dioxide, methane, nitrous oxide, fluorinated hydrocarbons, perfluorocarbons and sulphur hexafluoride).

**GRI.** Global Reporting Initiative. Guidelines for sustainability reporting.

**MECHANICAL PULP.** Produced by mechanically separating fibres using refiners. The process requires a large external energy input. Mechanical pulp contains both lignin and cellulose, and almost 100 % of the raw material used is converted to pulp.

**NITROGEN OXIDES (NO<sub>x</sub>).** Gases composed of nitrogen and oxygen that are formed during combustion. In moist air, nitrogen oxides can form nitric acid, which is precipitated as acid rain.

**PEFC.** Programme for the Endorsement of Forest Certification schemes. International certification system for forestry and timber trade.

**PHOTOSYNTHESIS.** The biological process during which green plants are developed with help from sunlight, water, carbon dioxide and nutrients.

**RECOVERY BOILER.** Chemical reactor for recovery of chemicals and energy from spent liquor in the chemical pulp process.

**RECYCLED FIBRE.** Wood fibre from recovered paper.

**REVITALISATION.** Addition of fertilisers and trace elements to the forest soil.

**SPENT LIQUOR.** Used cooking liquor in the chemical pulp process. Contains chemicals and wood residues. At the same time as the chemicals are recovered, the wood residues are used for energy production. Also known as black liquor.

**SUSTAINABLE DEVELOPMENT.** The term came into international use after the UN's 1987 report "Our Common Future", also known as the Brundtland Report. It describes the fundamental principle of sustainable development as being "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

**TALL OIL.** By-product from the manufacture of chemical pulp. Used as fuel or as a raw material in the chemical industry.

**TON KILOMETRE.** A transport work measurement. Calculated by multiplying the cargo weight (in tons) by the distance it is transported (in kilometres).

**TRACEABILITY.** The ability to trace a product's origin during the entire process, from raw material to finished product.

## SWEDISH FOREST INDUSTRIES FEDERATION MEMBER COMPANIES

A.T.A. Timber AB AB Bruksbalken AB Hilmer Andersson AB Karl Hedin AB Karl Hedin Emballage AB Karl Hedin Sägverk AB Krekula & Lauris Säg AB Molla Sägverk AB Moraträ AB Möckelns Sägverk AB Okome Träindustri AB Rundvirke AB SCA Finans AB Tenhults Impregneringsverk AB Widtsköfle Sägverk AB Viking Timber AB Woodman AbsorbBest AB Ahlstrom Stålldalen AB Akzo Nobel Industrial Chemicals AB Annebergssågen AB Arctic Paper Häfreströms AB Arctic Paper Munkedals AB Arctic Paper SA Sverige (Polen) filial ATA Timber Eneyda AB ATA Timber Moheda AB Aven Forsa AB BAC Säg & Hyvleri AB Backe Trä AB Ballingslövs Sägverk AB Bergkvist-Insjön Trävaru KB Bergs Maskin Lillpite AB Bergs Skog AB Bergs Timber AB Bergs Timber Mörlunda AB Bergs Timber Orrefors AB Bergshamra Säg- och Snickeri AB Bergsåker 5:18 AB Billerud AB Billerud Karlsborg AB Billerud Skärblacka AB BIN Consulting AB Bitterna Säg och Trävaru AB Bjernareds Sägverk AB Black & White Paper Mfg AB Bloms Trä Försäljnings AB Bodafors Trä AB BooForssjö AB BooForssjö Energi AB Brattby Sägverks AB Brinks Träindustri AB Burträsk Bygg & Trä AB Bäckebo Sägverk Jarl Franzén AB Bäckhammars Bruk AB Böja Trä AB Callans Trä AB Cargotec Sweden AB Cascades Djupafors AB Chemwood Alvesta AB DalaFloda Group AB Dalalist AB Dals Länged Coating AB Derome Bioenergi AB Derome Skog AB Derome Timber AB Domsjö Fabriker AB Ekenäs Timber AB Eksjö Industri AB ELE Trävaru AB Eltete TPM Sweden AB Engbergs Förvaltning AB Engbergs Transportsystem AB Ess-Enn Timber AB Fegens Sägverks AB Fiberweb Sweden AB Finess Hygiene AB Fiskarhedens Trävaru AB Fiskeby Board AB Fjällbonäs Trävaru AB Fohrmans Trä AB Foldy Pac Nordic AB Frödinge Sägverks AB Glimåkra Trävaruaffär AB Gotlands Värmepellets AB Gotlandsfås AB Grycksbo Paper AB Gällö Säg AB H Bergström Säg i Kvarnbro AB Hanåsa Sägverk AB Harry Nilssons Sägverks AB Hedin-Västanfors AB Hedlunds Timber AB Hedlunds Trävaru AB Herweg Träexport AB Holmen AB Hällanders Sägverk AB Hällerums Trävaru AB Ingarps Trävaror AB INNVENTIA AB J D Stenqvist AB J. G. Anderssons Söner AB JGA Skog AB JK-Trä Karlsson & Söner AB Jutos Timber AB Jämtlamell Skog AB Järvsö Bioenergi AB Jörnträ AB Karl Segerström AB Karla-Trä AB Kinnaredssågen AB Knauf Danogips GmbH Tyskland - filial Knäredssågen AB Korsnäs AB Korsnäs Rockhammar AB Kurt Lagergrens Trävaru AB Kvarnarps Lifthylvleri AB Lagerfors Konvertering AB Lamiflex AB Lantmännen Agroenergi AB Lantmännen Agrovärme AB Levene Säg AB Lignoboost Demo AB Ljungan Trä i Medelpad AB Ljungträ AB Lundquists Säg & Hyvleri AB Marks Trä & Byggvaru AB Martinsons Byggsystem KB Martinsons Säg AB Martinsons Trä AB Masonite Beams AB Metso Mill Service AB Metso Paper Karlstad AB Metsä Tissue AB Metsäliitto Sverige AB Millcon AB Moelven Component AB Moelven Dalaträ AB Moelven Edanesågen AB Moelven Industrier AB Moelven Norsälven AB Moelven Notnäs AB Moelven Notnäs Wood AB Moelven Nössemark Trä AB Moelven Ransbysågen AB Moelven Tom Heurlin AB Moelven Valåsen AB Moelven Valåsen Wood AB Moelven Wood AB Moelven Värmlands Trä AB Moelven Årjäng Säg AB Mondi Dynäs AB Mondi Örebro AB M-real Nordic AB M-real PaperTec Sverige AB M-real Sverige AB Munkedal Skog & Event AB Munksjö Aspa Bruk AB Munksjö Holding AB Munksjö Paper AB Munksjö Sweden AB Munktell Filter AB Munktorps Träförädling AB Mårdträ AB N K Lundströms Trävaror AB Neova AB Nordic Paper Seffle AB Nordic Paper Åmotfors AB Nordsjö Trävaror Bror-Erik Westén Norra Skogsägarna Ek. för. 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