



Forest assets for the future

Climate Change & Forests: The Paper Play

- ▶ **Forests as a positive global externality** and a major source of carbon storage are already recognised under the Kyoto Protocol. Plantation projects can be rewarded with carbon credits, and a framework to reward avoided deforestation is likely to be implemented post-2012.
- ▶ **Forestry resources represent the second largest bio-energy resource** and a key material for the development of new markets that include clean energy, bio-materials and molecules – a trend supported by **increasing regulatory momentum**, notably in Europe, that puts **upward pressure on wood prices and forest assets**.
- ▶ **Paper companies owning substantial forestland** are thus becoming increasingly attractive for investors looking for sustainable exposure to climate change.
- ▶ **Deforestation** (20% of GHG emissions) is a major issue that **creates new challenges for companies** in their wood and pulp procurement policies, notably the **need to comply with certification labels** (FSC, PEFC, etc.), although a "green premium" for certified products has not materialised yet.
- ▶ While higher wood raw materials and energy prices challenge the cost-pass-through capacities of the paper sector, **on-site biomass power generation and forest ownership work as a good hedge** and also mitigate the impact of the European carbon market.
- ▶ We conclude that **SCA and Holmen are the best investment vehicles in Europe to play sustainable forest assets**. In our view, increased wood prices in 2007 **may result in positive revaluation effects** on balance sheets that will start to be recognised in earnings.

In collaboration with:

- *Crédit Agricole's Industrial Research*
- *Agriculture and Agrifood Department*

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EXECUTIVE SUMMARY

Forestry resources represent the second-largest resource of bio-energy, behind crops, in terms of both energy reserves and efficiency, as well as a major source of carbon storage. In the near future, up to 20% of the Earth's forestland could be devoted to these new markets, which include clean energy, materials and molecules, an objective that requires the implementation of further sustainable biomass policies in order to avoid cuts in the food resources, local tension on resources and increased risks regarding deforestation.

Forests as a positive global externality are recognised under the Kyoto Protocol. Afforestation projects can already be rewarded with carbon credits, and a framework to reward avoided deforestation is likely to be implemented post-2012. A growing tree absorbs CO₂ and if the wood is used as building material or furniture, the CO₂ will be captured for a long period of time, normally several decades. The amount of absorption differs according to geography and the age of the forest.

Our analysis is, although carbon storage is a particularly tricky path to implement, the carbon sink properties of forests are acknowledged and should gradually be financially rewarded in some form. One major problem is the long-term nature of the commitment (without which the storage is wiped out very quickly), another is the fact that the protection or creation of forest must not have the counterpart of deforestation elsewhere. In particular, deforestation (20% of anthropogenic greenhouse gas emissions) is a major issue in climate negotiations, which implies new challenges for companies in their wood and pulp procurement policies, notably the need to comply with certification labels (FSC, PEFC). While there is no "green premium" for certified products, the use of certification often enables continued access to markets, which now require this type of guarantee.

Our conclusion is that paper and pulp companies owning substantial forestland, such as SCA and Holmen, are becoming increasingly attractive from both a financial and an environmental standpoint for investors looking for sustainable exposure to climate change. SCA, Sweden's largest private forest owner, has 2 million hectares of productive forestland that absorbs 0.5-1.0 million tonnes of CO₂ annually. At the same time SCA emits 2 million tonnes of CO₂ in Europe and 3 million tonnes worldwide.

The European strategy on energy independence and climate change constraints and the introduction of steering mechanisms by the European Commission are clear drivers. The purpose of these measures is to curb emissions of greenhouse gases, such as carbon dioxide. A number of Directives have already been set up and further regulatory changes are taking place. In its Biomass Action Plan of December 2005 the EC has put forward a scenario for the increase in biomass energy production using current technologies. The targets are aimed at raising the overall share of renewable energy to 12% of total energy production vs. the 2005 level of 6%. The percentage of electricity produced by renewable energy sources is expected to increase to 21% in 2010 vs. 12% in 2003.

Another point to take into consideration is growing environment-driven demand for wood-based building and packaging materials, as a better ecological alternative to most other materials as well as a result of their carbon absorption properties, either through consumer demand or through this type of building material receiving subsidies in various forms. In the forest harvesting process the best part of the log, ca. 60%, is used to produce plank.

The remaining parts are currently mainly used in the pulping process to produce cellulose fibre and, out of this, paper or environmental friendly packaging material. While wood resources do not appear to be competitive for second-generation biofuel technologies using the ligno-cellulose chain (e.g. straw), 'Biomass to Liquid' technologies using wood chips reinforce the price impact for the industry in the long term.

Last but not least is the potential impact of the implementation of the carbon market. It should be noted that the pulp and paper sector does not and is not likely to face a direct carbon constraint under the EU ETS since initial figures of National Allocation Plans show that the pulp and paper sector will remain over-allocated in CO₂ emission rights over Phase II (2008-2012).

However, the sector is highly exposed to carbon regulation due to its electro-intensive profile (thermo-mechanical pulp). Since the implementation of the EU ETS electricity prices reflect the CO₂ factor. Energy represents 8% of total costs of paper makers. The best hedge is to limit dependence on external supplies either by consuming less (improving the energy efficiency of the process) or by investing in on-site power production units (typically Combined Heat & Power plants). With self-generated electricity covering respectively one-quarter and one-third of power consumption, SCA and Holmen rely relatively more on grid supplies. We see a very limited risk though, as both companies have hedged prices thanks to long-term supply contracts secured at competitive prices.

In terms of short-term valuation impact, SCA and Holmen have stated that wood price increases seen in 2007 will result in positive revaluation effects that will be recognised in Q4 earnings. We believe that these revaluation effects will result in positive share price performance, as the true value is not currently reflected in share prices. A conservative sum-of-the-parts valuation of SCA, using market values for the 2 million hectares of productive forestland assets, works out at SEK181 per share, 60% above the current share price, and a similar SOP on Holmen gives a fair value of SEK354, 55% above the current share price.

In our view, SCA, Holmen are the best-positioned companies in Europe.

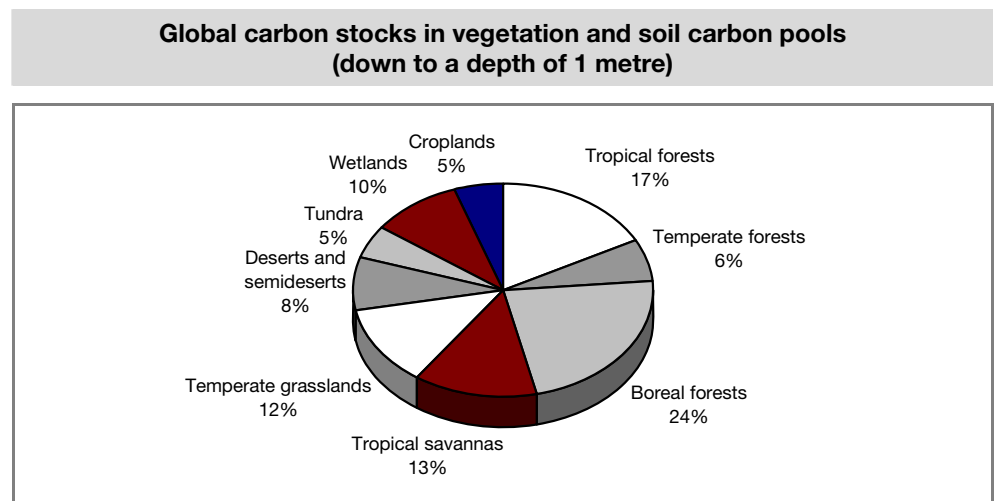
I – FORESTS: CLIMATE STRESSED

Sustainable and valuable assets

In addition to the value of marketable wood or of the land, the world's forests offer positive externalities with regard to global warming, that are still poorly valued and not remunerated.

Carbon sinks

In a special forestry report published in 2001, the IPCC (Intergovernmental Panel on Climate Change) estimated the quantity of carbon sequestered in terrestrial ecosystems (vegetation and soils) at 2,477 billion tonnes. The world's forests account for 46% of this total.

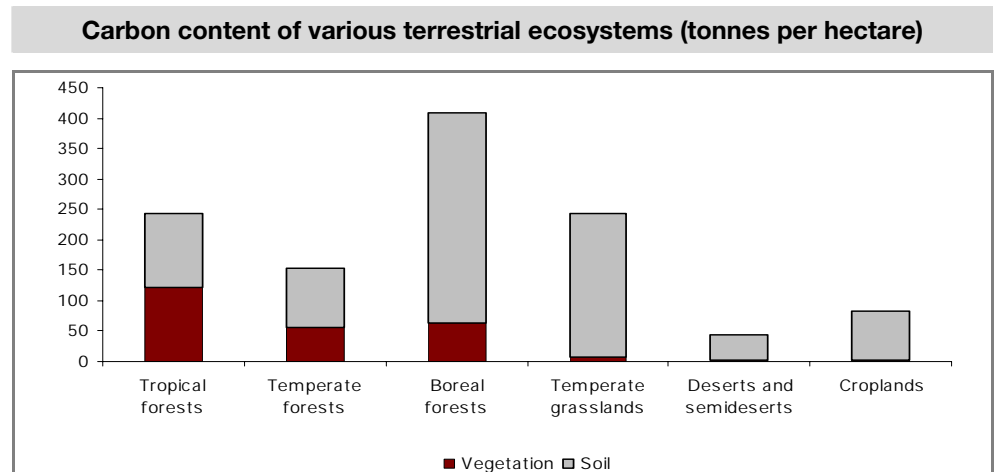


Source: IPCC 2001

Forests lock up huge amounts of carbon

On average, a mature forest contains around 275 tonnes of carbon per hectare. However, this average figure masks significant disparities according to the type of forest; boreal forests store up to 2.7x more carbon than European temperate forests for example. Moreover, this figure includes the **carbon contained in:**

- The wood and branches of trees.
- **Also, and above all, the forest soil**, which is extremely rich in carbon, stored in the form of roots, humus and various other micro-organisms.



Source: IPCC, Cheuvreux

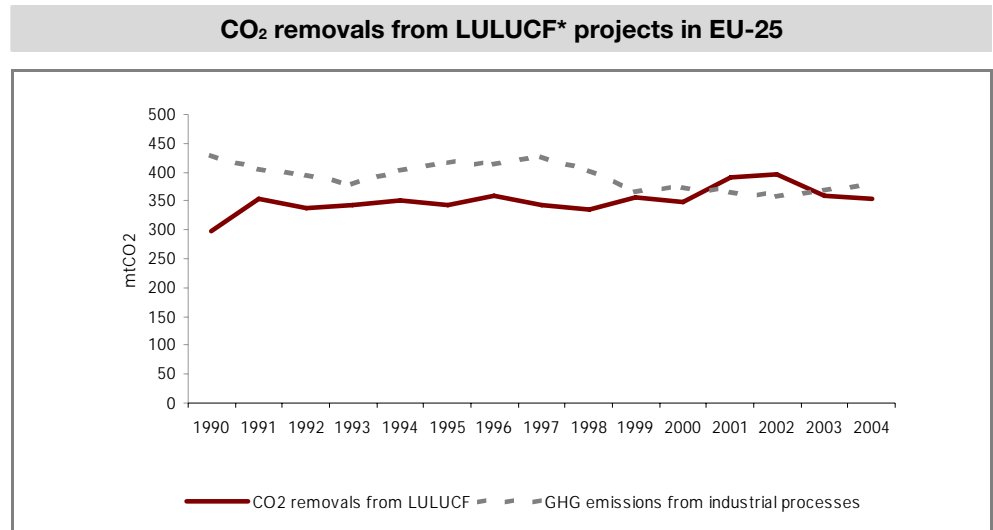
However, the carbon balance for old forests, i.e., that are more than 100 years old, is neutral overall as emissions linked to rotting dead wood offset CO₂ absorbed by the growing parts of the forest.

In Europe, growing forests have a positive carbon balance...

... and offset a part of anthropogenic GHG emissions

As a result, only young forests in the growth phase play a role in reducing the amount of CO₂ in the atmosphere. Growing forests absorb and "trap" CO₂ in the air via photosynthesis. Newly planted or regenerating forests continue to uptake carbon for 20 to 50 years or more after establishment, depending on species and site conditions. Forests play a key role in the carbon cycle, as they thus participate, along with the oceans notably, in carbon exchanges with the atmosphere.

In Europe, unlike other regions of the planet where deforestation is rampant, sustainable forestry management ensures the expansion of forest surface area, at a rate of an equivalent 4,000 football pitches a day according to the CEPI. This growth enables 350 million tonnes of CO₂ to be captured every year. The table below shows that, in 2001 and 2002, soil management more than offset greenhouse gas emissions resulting from industrial processes (e.g. the production of cement, iron and steel, nitric acid and lime).



* Land Use, Land-Use Change and Forestry

Source: EEA

The carbon balance of a group that owns forests can thus be assessed in this light. For example, SCA, Sweden’s largest private forest owner, has 2 million hectares of productive forestland that absorbs 0.5-1.0 million tonnes of CO₂ annually. At the same time SCA emits 2 million tonnes of CO₂ in Europe and 3 million tonnes worldwide.

Controversies exist regarding the role forests play: The recent discovery of methane emissions by plants may suggest that it would be useful to abandon afforestation. However, an evaluation of the amplitude of this phenomenon is very premature. It is also asserted that forests reflect less sunlight than deforested areas, and thus contribute to global warming. This would be substantial, but mainly in boreal regions (especially snow-covered areas) or temperate regions, and would not call into question the usefulness of storing carbon in tropical regions.

Other positive externalities

- The role of forests in watershed management

Forests play a role in the stabilisation of soils and the circulation of rainwater, notably with regard to filtering and access to groundwater. Forests thus ensure access to water resources for numerous populations.

- Protecting biodiversity

Old forests contain a high level of biodiversity and thus have long constituted a fruitful area of research for the pharmaceutical industry and for medicine in general. The disappearance of numerous species therefore represents as many lost chances of discovering unknown medicinal virtues.

- Social benefits: the local economy

The WWF estimates that 1.6 billion people depend on the forest economy: timber products, wood fibre for paper, medicinal plants, etc. According to a recent study commissioned by the CEPI, using biomass to produce paper rather than to generate energy is more advantageous in terms of the creation of value and jobs.

Conclusion

In conclusion, it appears that old forests store greater quantities of carbon but have a stable carbon balance. Conversely, young forests that are still growing have a positive carbon balance: they absorb more CO₂ that they emit, thus helping reduce the concentration of CO₂ in the atmosphere.

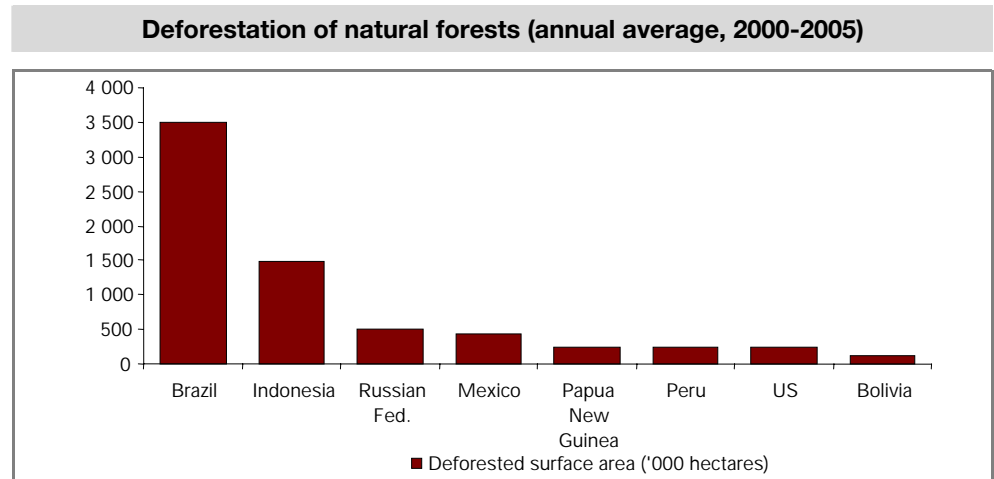
Endangered assets

Massive deforestation...

In a report of November 2005, the Food and Agriculture Organisation (FAO) estimated that 13 million hectares of natural forest disappear every year: the equivalent of 36 football pitches a minute. Forests, which once covered half of the earth, now only occupy a quarter of its surface; and prospects for the future look alarming.

The tropical forests of Asia and Latin America are particularly at risk.

Deforestation is responsible for 20% of greenhouse gas emissions...



Source: R. Butler

At this pace, deforestation is responsible for around **20% of anthropogenic greenhouse gas emissions.**

... resulting from major underlying trends

Deforestation reflects major underlying trends that pose a real threat in the long term, and which are difficult to reverse, namely:

... and is driven by major underlying trends

- 1) Demographic expansion and higher standards of living in developing countries create strong pressure on virgin land, given increased needs for:

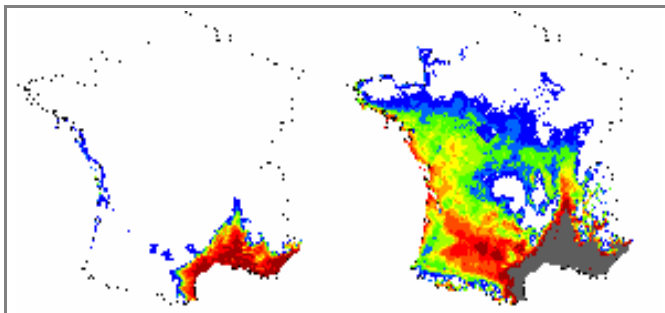
- Dwelling space: the extensive urban development model.
- Transportation infrastructure (i.e., motorways)
- Agricultural capacity: vast areas of forest are being burned in order to make way for arable land. This is particularly important, as it is a focal point for tensions over food requirements and, in recent years, biofuel needs. The boom in demand for palm oil for example has led to massive deforestation in Indonesia.

2) Climate change is also endangering the world's forests. The latest IPCC report states that an increase in average temperatures of 2°C by 2100 is now a reality. This introduces a twofold threat to forest areas via:

- **More severe droughts**, which are likely to result in more and more forest fires. The latter have a particularly devastating effects in terms of the release of CO₂, as ground-level carbon sources (roots, humus) are also affected.
- **An increase in the intensity of tropical cyclones** likely to reach and destroy forest areas.

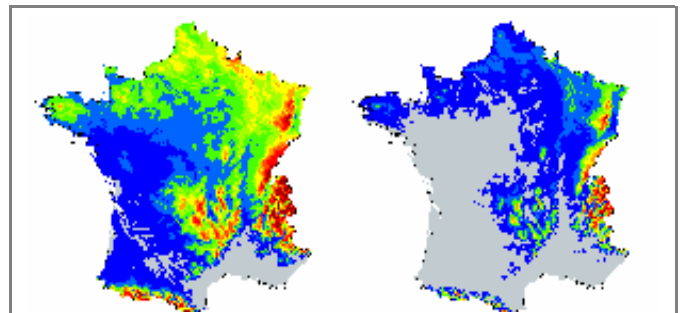
Global warming, which is now scientifically recognised, thus places the problem of the conservation of natural carbon sinks in a vicious circle. **The consequences of global warming on forests** are considerable: substantial changes are expected to occur throughout the world, such as entire western part of the Amazon region becoming savannah.

Climatic niche of the evergreen oak: today (left) and at the end of the 21st century (right)



Source: INRA

Climatic niche of the beech: today (left) and at the end of the 21st century (right)



Source: INRA

Profound changes are expected in France, as indicated by French agricultural research body INRA (see charts above) and French meteorological institute Météo-France.

Increased atmospheric concentration of CO₂ (the only source of carbon for plants) and global warming are likely to speed up forest growth to a certain extent. However, the consequences could also be extremely negative; the main problem to be expected is a shortage of water resources. Studies are already underway with a view to adapting silviculture, the choice of tree in particular, to a changed climate. There is likely to be a sharp decline in beech and pedunculate oak¹ in the future.

¹ One of the French oaks with high economic value (along with the sessile oak), it requires rich soil and considerable water needs.

Tackling illegal logging thanks to chain-of-custody

Certification: a response to forest overexploitation and clear-cutting

**Forest certification:
a tool to limit
damage of illegal
logging**

Forest certification is a process that consists of assessing **good forest management**, i.e. that takes into account the **sustainability of resources, the environment and social impact, while being economically viable**. The **Chain of Custody** (or CoC) certificate, an essential element in the certification process, enables wood from a certified source to be traced from its origin to the consumer. The certificate is required for all companies through which the wood transits, which ensures that the integrity of the product flow is never compromised.

Countries are focusing on certification of **sustainable forest management** as a means to **support exports to environmentally-conscious markets**. Thus, in Asia for instance the market for certified forest products is growing in Japan and Malaysia via the creation of new systems. In China, certified products are essentially intended for export to North America and Europe.

State purchasing agents are committed to taking into account sustainable forest management criteria in public wood contracts in France, following the adoption of a ministerial circular on public wood purchasing in April 2005. **In 2007, 50% of State wood purchases must have such a guarantee, and 100% in 2010.**

Major wood trading groups, wood product manufacturers and other related groups such as retailers in Europe **are increasingly taking into account certified sourcing**. This is attributable to direct or indirect pressure from non-governmental organisations (NGOs). For example, major listed companies such as Carrefour are required to issue a sustainable development report. Some of these groups focus their communication on the use, promotion and distribution of certified wood products. These groups promote the various certifications equally and are passing the message on to consumers. Major DIY retailers have already included eco-certified products in their strategies.

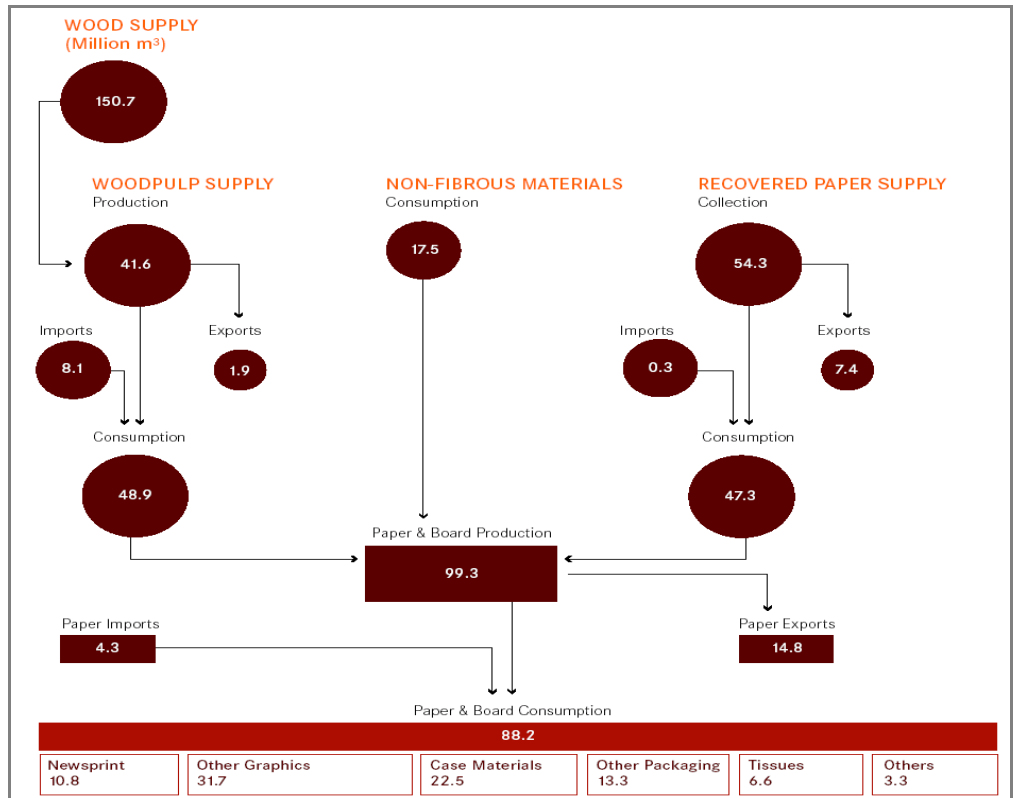
While **there is no "green premium" for certified products**, the use of certification **often enables continued access to markets, which now require this type of guarantee**.

An overview of the supply chain

**Only 9.45% of pulp
imports are certified**

In 2004, 45.39% of virgin fibre used was certified (CEPI figures). However, this figure only illustrates a portion of the total supply chain, in which market pulp imports do not appear, whereas they represent 16.6% of pulp consumption in Europe. This is an important fact, as only 9.45% of these imports are certified, due to the slow take-off of certification and certification of the chain of custody in some parts of the world.

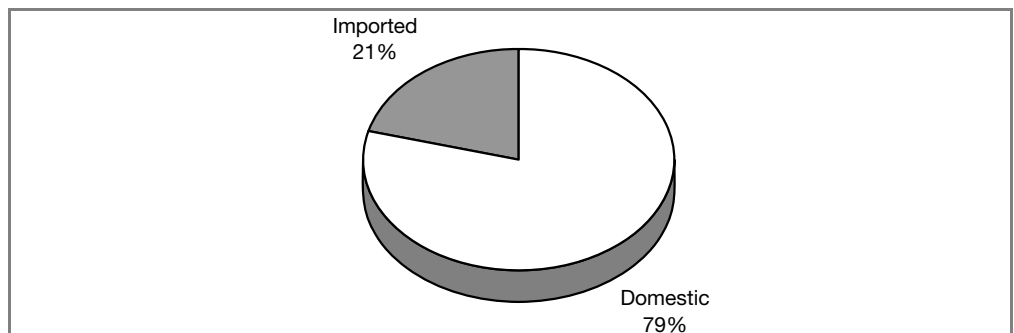
Supply chain for paper and board consumption in Europe (CEPI countries)



Source: CEPI

Most pulpwood (virgin fibre) comes from domestic forests, with 45.4% from certified forests. European forests have a higher rate of certification. Despite some recent efforts, countries like Russia – an important wood supplier for the EU – still face major illegal logging issues. Wood supply is a sensitive part of the supply chain from an environmental standpoint because traceability of the wood in some emerging countries remains very poor.

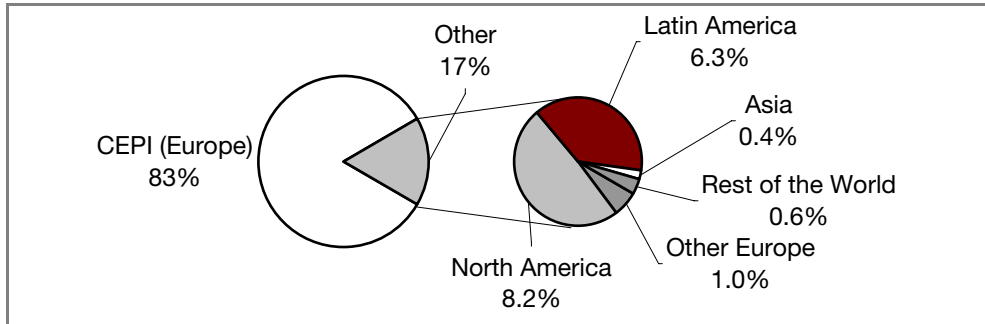
Pulpwood supply by origin
(total pulpwood consumption: 150.7 million cu. m)



Source: CEPI

In 2005, 48.9 million tonnes of pulp was used for European paper and board production, with 16.6% (8.1 million tonnes) procured from non-CEPI countries. North America is the EU's main foreign pulp supplier (49%). In our view, this is the most sensitive part of the supply chain, as pulp imports add a level to the traceability of wood. Our next section focuses on this issue.

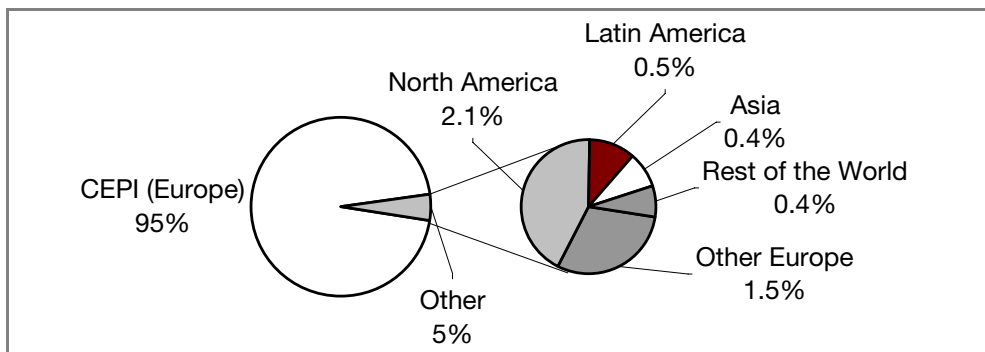
**Pulp supply by origin
(total pulp consumption: 48.9m tonnes)**



Source: CEPI

At the very bottom of the chain, Europe imports very little of its paper and board needs, with only 5% of finished paper products coming from abroad (mainly from North America: 43%)

**Paper and board supply by origin
(total paper & board consumption: 88.2m tonnes)**



Source: CEPI

Rapid expansion of certification – especially in northern countries

The world surface area of forests under sustainable management grew 12% in 2006 vs. 2005 to 270 million hectares, i.e. a surface area equal to France, Spain, Sweden, Finland, Germany, Norway and Poland combined. This still represents just 7% of world forest surface area, and is still largely limited to temperate and boreal forests in the northern hemisphere and to developed countries. 87% of certified forests are in North America (58%) and western Europe (29%).

50% of forests in western Europe and North America are now certified as being managed according to modes ensuring their sustainable exploitation. In tropical forests, the proportion of certified forests is much lower (around 4% of all certified forests).

Several competing systems

The first certification system was created in 1993, namely, the **FSC (Forest Stewardship Council)**, an NGO founded at the initiative of major environmental organisations (mainly **WWF**). It also comprises social players and representatives of the wood products trade and the industrial forestry sector. FSC developed Principles and Criteria for forest management (FSC P&C), which determine what constitutes good forest management. An FSC certificate requires a forest audit based on regional standards, which must comply with the Principles and Criteria of forest management.

Since then, **other sustainable management labels** have been developed, generally at the initiative of the professional forestry sector, partly to propose an alternative to the FSC system: SFI in the US, CSA in Canada, and **PEFC (Program for the Endorsement of Forest Certification Schemes, formerly Pan-European Forest) in Europe**, which is expanding via mutual recognition, including in Africa with PAFC (Pan-African Forest Certification), and MTCC (Malaysian Timber Certification Council) in Asia.

At present, the PEFC system and labels that it recognises (notably SFI) are predominant worldwide, with 196 million hectares certified, vs. 91.5 million hectares for the FSC system.

PEFC was drafted to take better account of the identity of European forests, which are very different from tropical forests and the major forests in northern Europe with:

- An existing legal framework for forest management, with the means to ensure compliance;
- Fragmented forest ownership, hence a high cost for audits;
- A general absence of sensitive indigenous populations.

It is based on the results of official international talks on sustainable forest management, on the directives of the International Organization for Standardization (ISO), and on a regional approach that leads in Europe to a **simplified certification process** (no systematic audit), a reference to various good management commitments in effect, and monitoring via surveys.

The **ISO 14000 standards** are part of the certification process. They enable environmental policies, objectives and targets to be drafted, implemented, maintained and evaluated. These standards are related to environmental management systems, environmental audit, product lifecycle analysis, environmental labelling and environmental performance evaluation. These standards alone do not constitute a commitment to good management.

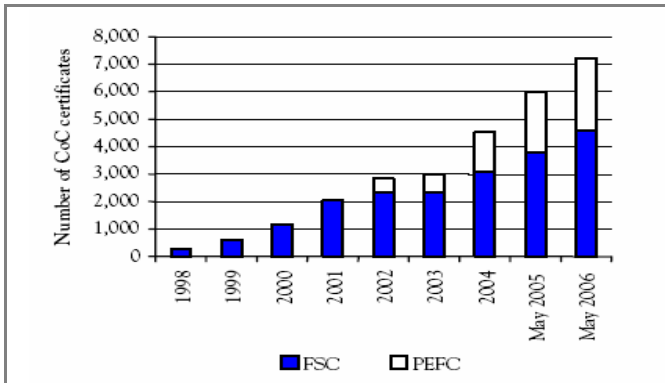
This **increase in the number of certification systems** has resulted in a **brand war** and a need felt by consumers for clarification. A few initiatives have been undertaken to compare the various systems. The strengths of one system are often judged as weaknesses by its rivals.

Environmental NGOs are very favourable to the FSC system and reserved or even critical with regard to other certifications not based on performance criteria. Criticism of non-FSC certification systems is particularly strong for tropical forests².

² "The mechanism is simple: forestry operators just need to purchase or create a certificate, sometimes with the complicity of corrupt civil servants, for wood to miraculously come from a sustainably managed forest." (Friends of the Earth, France, 2005).

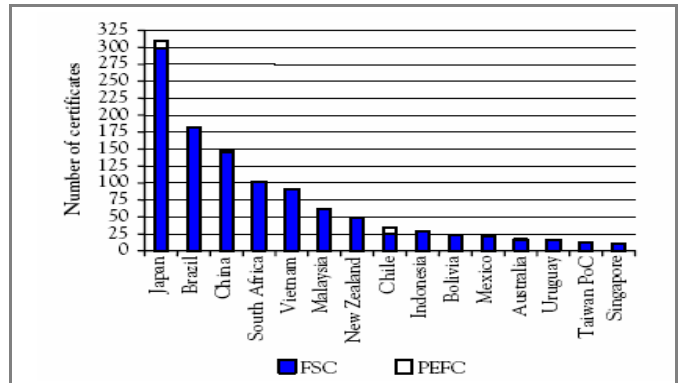
This **lack of recognition from one system to another can hamper exchanges**. To overcome this obstacle, the only solution for the time being is to adhere to various systems, which some players have already done. This is a notable weakness, as certification is intended to minimise commercial distortion and avoid obstacles to trade by increasing confidence in the market.

Certification trends worldwide, 1998-2006



Source: UNECE

Certificates distribution outside the UNECE region



Source: UNECE

For the time being, **there has been little monitoring or evaluation of the impact of certification on forests or trade**. It remains to be seen whether most of the objectives at the heart of the forest management debate have actually been achieved. Certification is not a miracle cure, but most of the stakeholders will nevertheless be satisfied if certification succeeds in both improving forest management and ensuring market access for well-managed forests.

The commitment of companies to the certification process is presented in a table below (see the conclusion to this section). The largest players (SCA, UPM-Kymmene and Stora Enso) are working with the WWF to tackle this issue.

Possible carbon credits or cash rewards

The temporary nature of carbon sequestration in forests means that forest carbon storage projects are heavily criticised. Moreover, the targets agreed on by the signatory countries to the Kyoto Protocol do not take into account the LULUCF assessment for want of a consensus on the subject. The eligibility of certain reforestation or afforestation projects has been criticised by some environmental NGOs. Apart from planting projects, attributing a value to forest preservation ("avoided deforestation") is a solution that is still being discussed.

Plantation projects rewarded with carbon credits

Carbon storage is a particularly tricky path to implement. One major problem is the long-term nature of the commitment (without which the storage is wiped out very quickly), another is the fact that the protection or creation of forest must not have the counterpart of deforestation elsewhere; afforestation of land must not succeed deforestation. This type of phenomenon could easily occur if there are no checks on the use that players — encouraged to store carbon — make of land elsewhere.

Conversely to deforestation, **reforestation is likely to enable carbon storage**. A growing forest absorbs carbon ipso facto, as the carbon constitutes the biomass; on the other hand, a balanced forest barely absorbs carbon (net balance) and does not emit oxygen, as the amount of biomass does not increase (the decomposition of dead matter reemits the carbon stored in the form of CO₂ from organisms active in the decomposition process).

Carbon stored in wood corresponds to around 1 tonne CO₂ per cu. m.³. The wood contains the majority of the aerial biomass, but the stock of carbon is not limited to the wood content: it is also present to a significant extent in the ground (the root network and above all organic ground matter). This stock is largely released in the event of deforestation.

Storage is far from the only way of using the forest in the fight against the greenhouse effect: **the production of wood**, whether used as an energy substitute for fossil fuel sources or as a material (which would enable continued storage for a certain time, and energy savings⁴) compared to rival materials, **is a more attractive alternative**, which does not prevent carbon storage in forests.

Kyoto Protocol flexibility mechanisms: A strict framework for afforestation/reforestation projects

Implementation of so-called LULUCF projects is contested, as the sequestration of the carbon associated with these projects is difficult to verify, and is uncertain and temporary. As a result, whilst reforestation and afforestation are possible projects that meet the flexibility mechanisms provided in the Kyoto Protocol, these are subject to a specific regime that gives the right to so-called temporary credits (CERT).

Only governments are allowed to use temporary CER (CERT) to comply with their Kyoto commitment.

Reforestation and afforestation projects are eligible within the framework of **Clean Development Mechanisms (CDM)**. Ten different methodologies have been validated by the Bonn Executive Committee to date, but only one project has been registered (see the full description below), whilst another three are awaiting validation. All in all, these projects are likely to generate just 0.3% (6 million tonnes of CO₂ by 2012) of all the credits expected from the current pipeline of projects.

– An example of a CDM project

The registered reforestation project aims at facilitating reforestation for Guangxi Watershed Management. This project is likely to serve as a model for future proposals. The box below presents extracts of the Project Design Document, as submitted to the Bonn Executive Committee for validation.

Kyoto Protocol flexible mechanisms already reward reforestation and afforestation projects with carbon credits

³ .92 tCO₂ per cu. m according to IPCC data, with 0.5gC/g of dry matter and a density of anhydrous wood of 0.5

⁴ The production and use of wood requires half as much energy as concrete and five times less than steel production, for example

**PROJECT DESIGN DOCUMENT FORM FOR AFFORESTATION AND
REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) - Version 01**

A fourfold objective:

- 1 - To sequester CO₂ through forest restoration in small watershed areas and test and pilot how reforestation activities generate high-quality emission reductions in greenhouse gases that can be measured, monitored and verified.
- 2 - To enhance biodiversity conservation by increasing the connectivity of forests adjacent to nature reserves.
- 3 - To improve soil and water erosion control.
- 4 - To generate income for local communities" (social benefit).

To this end, the project proposes:

- 5 - Establishing 2,000 ha of multiple-use forests in Huanjiang County of Guangxi. Species and afforestation models include 5 different tree species.
- 6 - Establishing 2,000 ha of multiple-use forests on sites with severe soil and water erosion in Cangwu County of Guangxi. Major species and afforestation models include 5 different tree species.

NB: In order to guarantee the success of the project and its environmental effectiveness, it is important to introduce a mix of species, each of which have difference properties (water needs, resistance to fire, resistance to disease, soil consolidation, etc.). Massive planting of eucalyptus trees alone, although this is apparently of interest in light of the rapid growth rate of the trees, is potentially harmful from an environmental standpoint.

- 7 - Promoting legal structures to aid the sale of Certified Emission Reductions (CERs), test carbon purchase transactions and accumulate experience in practical and technical measures for A/R CDM project activities.
- 8 - Developing and testing local financing mechanisms for watershed management and degraded land restoration.
- 9 - Developing, testing and disseminating the best practice in watershed management and strengthening capacity building through support for training and technical assistance to the relevant agencies and communities.

Source: UNFCCC, Cheuvreux

This project is thus likely to generate an average of **22k CERts per year** over a period of 30 years. This calculation takes account of greenhouse gas emissions emitted as part of the implementation of the project (N₂O from fertilisers, vehicle use, etc.)

The financial profitability of the project is only achieved thanks to the distribution and sales of CERt credits, which is sine qua non for project eligibility under the CDM system.

The **Joint Implementation (JI)** mechanism potentially offers a broader framework for LULUCF in transitional economy countries, but this implies the agreement of host countries such as Russia. Given the substantial amount of forestry resources and the significant potential for improvement in forestry management, Russia offers a very attractive potential.

Note also that France and Germany support the implementation of **domestic projects along the lines of the JI model**. However, initial methodologies do not include overly controversial forestry projects. This system is currently encountering some hesitation on the part of the European Commission but it could bring new resources for groups such as Holmen, SCA or UPM Kymmene, owners of expanding forestland, in Finland and Sweden.

Compensation projects (Verified Emission Reductions)

Although minor with regard to CDM/JI, there are numerous tree-planting projects on the emissions compensation market. The framework for these projects is more flexible, and lower transaction costs improve profitability. An amount of VERs (Verified Emission Reductions) equal to the quantity of carbon sequestered, has been created, although this type of carbon credit is not recognised within the framework of the Kyoto Protocol. VERs are geared to companies (even individuals) that are anxious to present a neutral carbon balance.

For example, ClimateCare, a company that is active on the voluntary emissions compensation market, has "wiped out" 30% of its clients' emissions via reforestation projects. However, renewable energy and energy efficiency projects have been favoured at the expense of reforestation.

The voluntary market is very tiny but is expected to grow quickly, especially in the U.S.

Rewarding avoided deforestation

A reduction in forest-related GHG emissions involves controlling tropical deforestation. The problem is that the cost (or earnings shortfall) of the CO₂ savings achieved by limiting deforestation is not very high, but is higher than for other types of measures. The obstacle is the immediate economic income generated at present by deforestation (agricultural land, wood exploitation). It tends to be higher in Southeast Asia, due to the commercial value of wood and palm oil production. Therefore, these forests are the hardest to protect.

However, the **accelerated loss of biodiversity linked to tropical deforestation** is not included in these cost calculations. It is clear that specific measures are needed as the Amazon region will, based on the current trend, have lost 20% of its current surface area within the next 20 years and the equatorial forests of Indonesia might have disappeared ⁵ by 2022.

At the Conference of the Parties to the Convention (COP) in Montreal in December 2005, the idea of creating credits to reward avoided deforestation was placed on the agenda. Since that date, talks have been underway on the subject and these are likely to result in a system whereby industrialised countries reward forest conservation actions in developing countries. Thus countries such as Papua New Guinea, were they to reduce the pace of deforestation on their territory, compared to a baseline scenario established on the basis of historical data, could cash in these "avoided emissions" with industrialised countries that wish to offset their emissions.

We believe deforestation will be one of the hot spots of the negotiations in Bali in December 2007. Some proposals have already been enounced. Still, it remains to be seen what methodologies can be applied for deforestation.

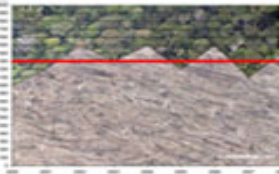


Indonesia may promote a proposal for emissions reductions from deforestation in developing countries during the Bali conference, and the Environment Minister stated that Indonesia could earn USD10 per hectare of conserved forest.

In response to a request by leaders at a G8 summit in June to help finance developing countries' efforts to combat deforestation, the World Bank recently launched a Forest Carbon Partnership Facility (FCPF). The facility will pilot methods to compensate developing countries for CO₂ reductions realised by preserving their forests.

**Ongoing
international talks
on rewarding
avoided
deforestation**

⁵ Source: National Geographic, January 2007; PNUE, February 2007.

Avoided deforestation system

<p>1. Establish baseline deforestation rate by analyzing</p>		
<p>2. Reduce deforestation by establishing protected areas and implementing reduced-impact development activities</p>		<p>Avoided deforestation</p>
<p>3. Get paid by industrialized countries looking to offset greenhouse gas emissions. Avoided deforestation = reduced GHG emissions</p>		

Source: Mongabay

Conclusion

As the forest sink debate is still far from over, it is not possible to assess the future financial effects. However, a plausible long-term view is that the carbon absorption properties of a growing forest will be acknowledged and financially rewarded in some form. We believe that it should thus be regarded as positive to own forestland.

Moreover, we believe that in the future the international community, in the fight against climate change, will reach agreement to confer a value on old forests.

The forest owner should therefore in theory benefit. However, this so-called forest sink effect has not been acknowledged in the current international emission credit system.

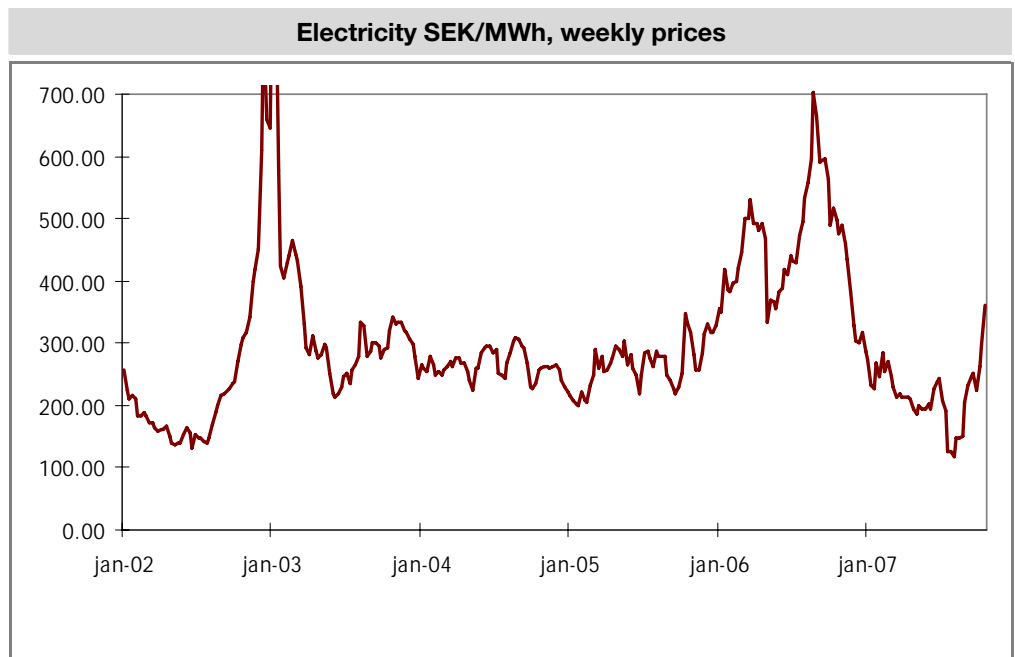
II – FOREST ASSETS: PULP & PAPER PLAYS

Increased Interest in biomass

European paper-producing companies are facing a situation that potentially could result in increased costs. Part of the changed environment is already visible, as electricity pricing has increased substantially during the past two years in the Nordic region.

An increased use of wood and wood residuals for producing energy and heat could result in an increased price for fibre raw materials, which normally represents 16-20% of total costs for a papermaker. A 1% increase in fibre costs would, on average, result in a 3% earnings decline.

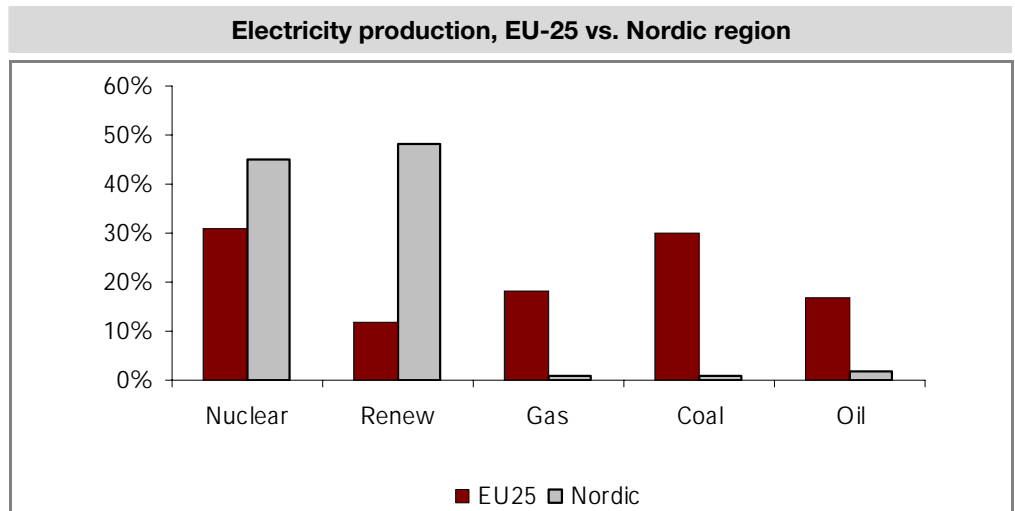
In its Biomass Action Plan of December 2005 the EU Commission put forward a scenario regarding the increase in biomass energy production using current technologies. The targets are aimed at raising the overall share of renewable energy to 12% of total energy production vs. the 2005 level of 6%. The percentage of electricity produced by renewable energy sources is expected to increase to 21% in 2010 vs. 12% in 2003.



Source: Nordpool/Datastram

The changes are driven by the Kyoto Protocol and the introduction of steering mechanisms by the European Commission. The purpose is to curb emissions of greenhouse gases, such as carbon dioxide. A number of directives have been put in place and further regulatory changes are being implemented.

- According to a number of Nordic papermakers the EU Emission Trading System (ETS) has resulted in higher electricity prices. According to SCA, 70-75% of the price increase can be explained by the introduction of the EU ETS.
- The Biomass Action Plan aims to double the production of heat and energy from biomass. For papermakers the relevant question is whether this demand growth will result in higher raw material costs for the woodfibre raw materials used in paper producing process.



Source: SCA

- New regulations regarding waste incineration are also expected to affect fibre raw material prices. At present, waste paper is collected and reused in the papermaking process as a raw material. Should the use of waste paper for producing energy and heat increase, this is expected to result in higher costs. A number of countries have also decided to raise incentives for producing energy from carbon neutral or carbon free sources.

All in all, the changed playing field will in our opinion result in higher raw material costs for paper producers. Furthermore, there will be some additional effects such as an increased price for forest assets. A few of the Nordic players, SCA and Holmen, together with UPM-Kymmene, have substantial forestland holdings.

However, pulp production assets could be negatively affected by higher wood raw material costs. The product flow from the forest includes logging and running the log through a sawmill to produce building materials. The residuals are then used as either biomass and burned for energy or used to produce wood pulp. Note that this is a very schematic picture of the product flow and that there are differences. In some papermaking processes the woodfibre is extracted directly from the log using pressure, heat and chemicals, i.e., so-called thermo-mechanical pulping.

The EU Biomass Action Plan

Increased use of wood for producing renewable energy is viewed as positive by many observers given that it is expected to result in lower emissions of greenhouse gases.

According to the EU Commission's Biomass Action Plan, the EU's potential to produce biomass for energy use can be increased substantially. To achieve the 2010 potential, the use of wood in various forms would increase substantially from 59 million toe in 2003. According to the European Commission the potential could be increased 2.5x by 2010 compared to the contribution in 2003-04. The increase from forestry is to come from an increase in both the felling of trees and the use of residues.

EU biomass production potential

(m toe)	Biomass consumption	Potential, 2010	Potential, 2020	Potential, 2030
Wood direct from forest (increment and residues)		43	39-45	39-72
Organic wastes, wood industry residues, agricultural and food processing residues, manure	67	100	100	102
Energy crops from agriculture	2	43-46	76-94	102-142
Total	69	186-189	215-239	243-316

Source: EU

In its Biomass Action Plan of December 2005, the EC put forward a scenario regarding the increase in biomass energy production using current technologies. The targets are aimed at raising the overall share of renewable energy to 12% of total energy production vs. the 2005 level of 6%. The percentage of electricity produced by renewable energy sources is expected to increase to 21% in 2010 vs. 12% in 2003.

A scenario to increase biomass energy using current technologies

(m toe)	Current (2003)	Future (2010)	Difference
Electricity	20	55	35
Heat	48	75	27
Transport	1	19	18
Total	69	149	80

Source: EU

However, from the perspective of papermaking companies this transformation offers some challenges. In the Nordic region the most common use of woodfibre has been to turn the cellulose fibre into paper. Effectively this has been one group of users/purchasers. However, with the increased use of woodfibre/biomass for the production of heat and energy in various forms, the most likely outcome is that the price of wood will increase over time. This could have adverse effects on the companies' profitability. However, at this stage it is unclear how much profitability pressure the increased use of biomass will have.

Increasing competition for woodfibre

Fibres amount to c. 16-20% of an average papermaker's total costs, in the universe of stocks we cover. To illustrate this we have listed Stora Enso's cost structure below. In our view, Stora Enso can be used as a proxy for the papermaking industry in terms of its cost structure. It is a global company with operations in all geographic regions. It is one of the largest papermakers in the world and it produces both paper and packaging materials. However, according to CEPI, the average weighted cost for fibres in the European pulp and paper industry amounts to 32%. This shows that for a pulp producer the main raw material cost is woodfibre, as opposed to a papermaker that either buys the processed pulp or has integrated pulp production. The larger North European papermakers are highly self sufficient in pulp production.

It is worth pointing out that all papermakers include waste paper and woodfibre in the cost structure. As a result it is impossible to distinguish between these two items. The volatility in prices of these two items differs somewhat, with waste paper prices showing higher volatility.

Stora Enso cost structure

(EUR bn)	% of total costs	Costs
Variable costs	67%	8.60
Fibre	18%	2.31
Chemicals and fillers	9%	1.15
Other materials	2%	0.26
Energy	8%	1.03
Production service	12%	1.54
Logistics & commissions	12%	1.54
Other variables	6%	0.77
Fixed costs	24%	3.08
Payroll expense	17%	2.18
Other	7%	0.90
Depreciation and amortisation	9%	1.15
Total	100%	12.83

Source: Stora Enso

To illustrate the effects of fibre price changes, the sensitivity analysis in the table below shows that a 1% increase in fibre costs would translate into a 3.9% EPS decrease when calculated on the basis of our 2008 EPS forecast. On the EBIT line this would correspond to a 2.3% decrease, reducing the EBIT margin from 6.3% to 6.15%.

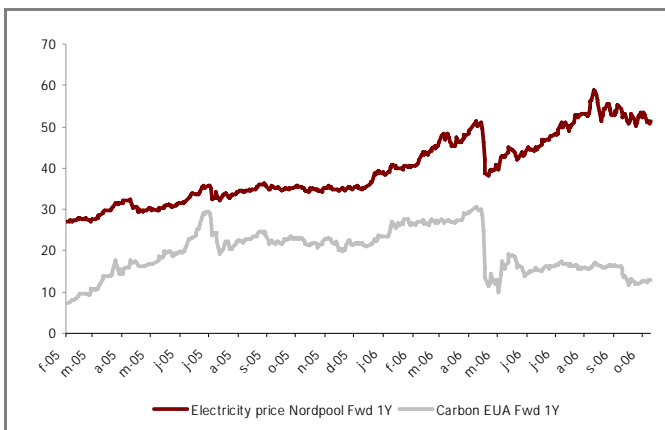
EBIT and EPS sensitivity to fibre cost increases

	EBIT (EUR m)	% Chg. in EBIT	% Chg. 2007E EPS
Sensitivity to a 1% fibre cost increase	-23	-2.3	-3.9

Source: Cheuvreux

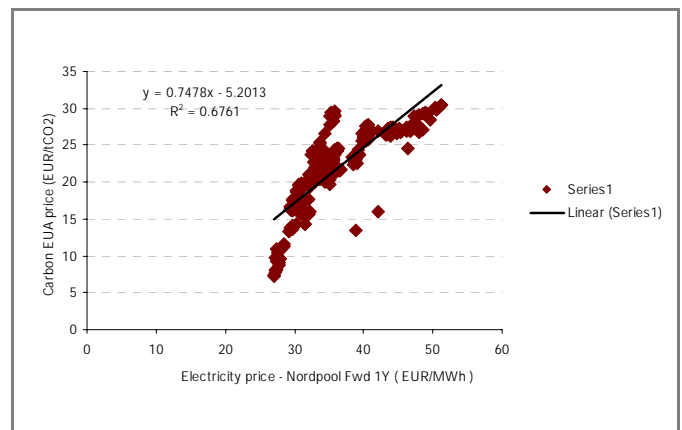
Papermaking is essentially a process in which the main raw materials are woodfibre and energy. For historical reasons there has been an ample supply of woodfibre in the Nordic region. Furthermore, electric energy has been priced at lower levels than in many central European countries. Due to the introduction of the Kyoto Protocol mechanisms, including the carbon dioxide emissions trading system, energy pricing in the Nordic region has reached historically very high levels.

Carbon and electricity price trends



Source: Reuters

Correlation between electricity and carbon prices



Source: Reuters, Cheuvreux

The higher energy prices have so far not been passed on to customers with the exception of newsprint paper. A balance in the supply and demand situation has enabled the companies to implement price increases of 7% in Europe from the beginning of 2006 and 4.5% in 2007. Price negotiations are currently starting up for 2008 and we expect prices to decline c. 10% as a result of the current large difference to North American prices that are now c. 25% below European pricing.

Energy demand in woodfibre processing

- Processed wood products – low energy intensity. Main energy demand in kiln drying.
- Market pulp – wood to fibre and energy. Modern pulp mills have fuel/heat to sell.
- Chemical pulp integrated with paper or board production. Efficient combination of energy supply, pulp mill, and energy demand, paper/board mill.
- Printing papers – wood for fibre using purchased electricity. Steam supply partly by recovered Thermo Mechanical Steam (TMP). High share of purchased electricity.
- Recovered fibre (waste paper) based paper/board – recycling pulping energy. Dependent on external fuel supply for steam and electricity generation.

Source: Stora Enso

Production capacity

	Billerud	Holmen	Norske Skog	m-real	SCA	Stora Enso	UPM-K
Newsprint		69%	66%		11%	21%	22%
SC		6%	21%		7%	13%	15%
LWC		6%	13%	23%	7%	14%	31%
UWF				26%		11%	13%
CWF				28%		14%	13%
Cartonboard		20%		12%		18%	
Containerboard	57%			6%	40%	5%	
Specialities	43%			4%		3%	6%
Tissue					34%		
Total Capacity	100%	100%	100%	100%	100%	100%	100%
Pulp Balance (+ = net seller)	21%	-5%	-4%	-4%	-13%	0%	-4%
Total Capacity (000 tonnes)	1400	2705	6700	5700	6700	15900	12620

Source: Company data, Cheuvreux

However, European papermakers have started to address current oversupply problems. All the quoted larger producers have announced substantial capacity reductions, closing entire mills and closing individual paper machines. As a result, we see an improved likelihood of papermakers gaining pricing power and potentially being able to pass on higher energy costs as well as potentially offsetting the effects of increasing wood prices. However, should there not be sufficient further capacity closures, the potential negative effects from increased demand for woodfibre would have to be borne by the pulp and paper companies.

Forestry ownership

Ownership of forestry has become strategically important for papermaking companies. Increased prices for wood and competition for woodfibre has resulted in a changed stance from the Nordic Pulp & Paper companies. During the second half of the 1990s the quoted pulp and paper companies came under heavy pressure from equity market participants regarding forestry ownership. The thesis was that carrying forest assets on the balance sheet tied up capital and held down returns on total assets. Furthermore, wood was regarded as a raw material that was in ample supply. Some companies adapted to this view: for instance Stora Enso decided to sell off parts of its Nordic holdings.

At present, however, due to the increased use of woodfibre for the production of heat and energy, long-term availability and prices of wood has become a concern for the papermaking industry.

Furthermore, the Finnish paper and pulp industry is dependent on wood imports from Russia, and in the long term we estimate that Russian authorities will encourage increased use of wood raw material domestically. This results in further upward pressure on wood prices in the Nordic region. We estimate that the Finnish industry imported up to 25% of its wood needs from Russia last year. However, following a number of paper mill closures in Finland in 2006 and further closures already announced in 2007, the need is expected to be reduced to 10-15% of the Finnish industry's needs. Nevertheless, the current situation in Finland is marked with a sense of urgency. The Russian Export tariffs have been raised to EUR10 per cubic metre, and according to Russian authorities a further increase to EUR50 will be implemented from the beginning of 2009. This would effectively stop imports into Finland. The effects have been that wood prices have increased in Finland due to increased harvesting and a wood shortage. Wood price increases have amounted to c70% YTD in Finland and c25% in Sweden.

Our conclusion is that papermaking companies that own forests and control a substantial part of the raw material internally will be in a better position to offset potential availability problems than those who are currently purchasing all of their needs.

The largest private forest owners are SCA and Holmen. SCA owns 2m hectares of productive forest land and Holmen owns 1m hectares of forest land. Relatively speaking, Holmen is in the best position given that it is substantially smaller compared to SCA.

Forest ownership

Company name	Forest owned	Number of mills with FSC/PEFC C-o-C certificates	% of wood from certified forests	Comments	Sales 2006 (EUR m)
Holmen	1m hectares (FSC/PEFC)	FSC system in 2006, PEFC C-o-C		Wood supplied by Estonia, Latvia, Scotland, and Russia	2,036
SCA	2.6m hectares (FSC)	11 FSC certificates, 6 PEFC		Cooperate with WWF, strict agreements with external timber suppliers	10,996
Stora Enso		26 FSC and 28 PEFC certificates		Audit carried out at its Russian wood supplier, new requirements in 2006, cooperation with WWF	14,477
UPM Kymmene	1m hectares (2 PEFC)	All mills (PEFC and/or FSC)	63.30%	Special wood sourcing units; acquired 99% of its Russian wood supplier; 235 sites checked in Russia; cooperation with WWF	10,074
Billerud		Both certificates for the three Swedish mills		Wood suppliers: Stora Enso, Sveaskog, and Holmen	801
M-Real		6 FSC / 16 PEFC certificates	63.40%	Test the PEFC Chain-of-Custody in Russia; Audit realised at 70% of Russian sites	5,647
Norske Skog	Not significant, plantation projects in Brazil	5 PEFC	59%	Presence in Asia: only 39% of wood certified	3,613
ENCE	0.2m hectares (1 PEFC) (+81% in 2005)	All mills (PEFC and/or FSC)		Reforestation in Uruguay with clones, reduction in the specific consumption of wood	657

Source: Company data, Cheuvreux

Reducing oil dependency

The introduction of the emission rights trading system aimed at curbing CO₂ emissions has resulted in the paper and pulp industry increasing its utilisation of wood residuals for energy and heat production over the past few years. This trend is likely to continue. However, there are some practical issues that affect the transformation.

According to industry sources, recovery boilers will be rebuilt to utilise a higher degree of biomass when an overhaul is needed. Nevertheless, there have already been substantial increases in the use of carbon neutral fuels. For instance 63% of Stora Enso's annual fuel consumption currently comes from biofuels, up from 35% only five years ago. Another example of the rapid change in the industry is Billerud which in 2002 purchased c. 75,000 cubic metres of oil and c. 1.1TWh of electricity. Following an investment programme to modernise and upgrade its turbines and recovery boilers, oil purchases are expected to be reduced to c. 15,000 cubic metres and purchased electricity to 0.65TWh. As a result the company expects to save SEK250m in reduced energy costs, or 3.7% of 2005 sales.

In our view, papermakers will continue to reduce their dependency on purchased oil and electricity. However, a large part of this step change is most likely taking place in the current years. Once that has occurred the paper companies will have a hard time offsetting increasing energy prices.

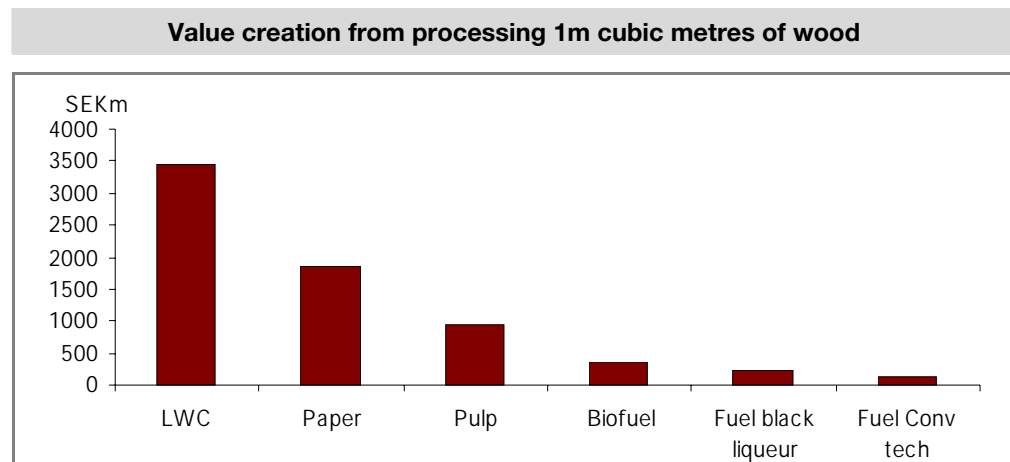
If the increased use of woodfibre for biomass energy and heat production leads to increased wood costs, something that we view as highly likely, the effects will most likely be margin pressure. However, at this stage it is impossible to assess the impact on future margins.

Effects of changed use of woodfibre

The changed environment for wood demand and the introduction of the Kyoto Protocol via the emission trading system is likely to result in a number of issues that the Nordic and European paper producers will have to face.

In the previous section we discussed effects on energy pricing, but another issue will be the economic effects in terms of value creation for society in regions where woodfibre traditionally has been used as a raw material for paper production.

According to observers such as Swedish Skogsindustrierna. The value creation of using 1 million cubic metres of wood is clearly higher from producing paper, such as LWC (coated magazine paper) than if the wood were used for producing energy in various forms. Furthermore, turning woodfibre into paper or pulp also creates export revenues for Nordic societies. This should be compared to the positive effects of a reduced import need for oil when woodfibre is used to produce energy in various forms.

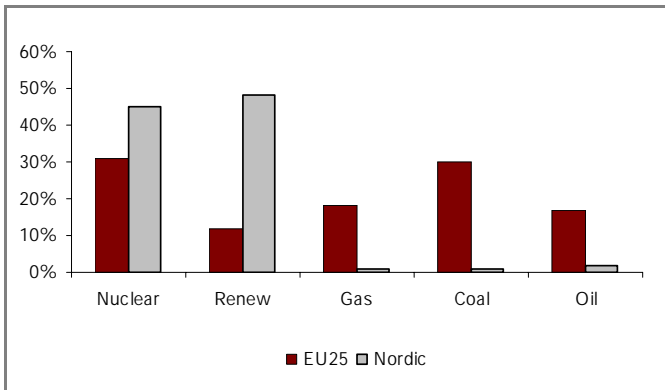


Source: Skogsindustrierna

Nordic/European energy production

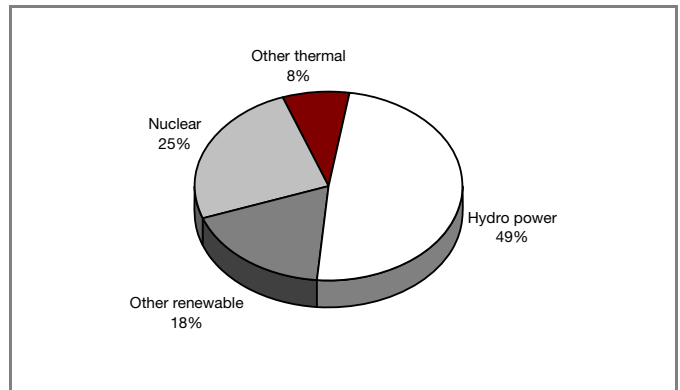
It is our belief that an increased use of biomass to produce energy and heat will have adverse effects on papermaking companies in Europe. However, the magnitude of increased costs for woodfibre is hard to assess at this stage. Nevertheless, it might be interesting to compare electricity production in the Nordic region to the situation in EU-25.

EU-25 electricity production



Source: Swedish Energy Agency

Nordic electricity production



Source: Nordel

In EU-25 electricity produced via nuclear power and renewable sources add up to slightly more than 40% of the total, vs. the situation in the Nordic region where these sources add up to slightly more than 80% of electricity production. The conclusion according to our opinion is that there will be substantial investments made in energy production based on carbon neutral fuels, such as biomass. And as a natural consequence we expect the price of woodfibre to head north.

Key: European magazine paper consolidation

... could be addressed by closures...

We have witnessed a string of capacity closures during the past two years from the quoted producers. As a result, pricing power is currently evident in the packaging paper segment, as well as in the uncoated fine paper segment. However, in coated magazine papers (LWC) pricing has been weak, affecting uncoated magazine (SC) and coated fine papers (CWF) negatively. Current overcapacity is estimated at c500,000 tonnes, but probably more than that needs to be closed before the market reaches equilibrium.

The question arises as to who will carry out the additional closures needed. The strictly logical answer would be that the weakest producers with the highest costs would eventually have to close. However, history shows that paper mills seldom die. Instead owners lose their money and the machine keeps running with lower equity, still producing paper.

We believe that in order to reach supply/demand equilibrium, closures will have to take place in an organised way, preferably via a consolidation process in the magazine paper segment creating large enough producers that can take out the weakest machines, and eventually reap the benefits of a more balanced European supply/demand situation.

... if the sector consolidates, as we expect

The current circumstances have depressed UPM's share price in 2007. The company is in some respects hostage to the weaker players as long as they continue to produce paper. UPM could lean back and hope for economics to play its part, but this could still take a some time. However, we expect current low profitability will force the weaker players to consolidate in some form. We have very low visibility on this process, but see strong grounds to believe that the coming six months will be marked by asset swaps and consolidation in the magazine paper segment and that the outcome will most likely be capacity closures, resulting in improved paper prices. The alternative is simply too depressing.

Capacity comparison

	Billerud	Holmen	Norske Skog	m-real	SCA	Stora Enso	UPM-K
Newsprint		69%	66%		11%	21%	22%
SC		6%	21%		7%	13%	15%
LWC		6%	13%	23%	7%	15%	31%
UWF				26%		10%	13%
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Tissue					34%		
Total capacity	100%	100%	100%	100%	100%	100%	100%
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Total capacity (000'tonnes)	1400	2705	6700	5700	6700	15900	12620

Source: Company data, Cheuvreux

Raw material cost increases set to drive change

Wood deficit

Raw material costs have risen dramatically in the Nordic region during the past year. The cost of standing wood is up c. 35% in Sweden and 70% in Finland YTD. Furthermore, Finland has a wood deficit that traditionally has been handled by importing wood from Russia (c. 25% of its needs have been supplied by this region). The Russian government is in the process of increasing export tariffs on wood, which is likely to result in a continued situation of wood deficit, high costs, and eventually mill closures in Finland. The wood deficit will also have spread effects into the Swedish mills due to the large amount of wood trade between the Nordic countries.

The increased use of wood for energy purposes is also likely to keep wood pricing high, as we showed in our report: *A new leaf for the paper industry*, published in February 2007.

We believe that these cost pressures will increase the willingness of paper producers to cut capacity in order to reach a situation of pricing power.

More closures badly needed

Cutting capacity would strengthen pricing

The implications of UPM-Kymmene's decision in 2006 to carry out significant capacity closures are profound, in our view. We believe that this marked the beginning of a new way for the large caps to approach profitability targets. The Nordic companies had previously focused on building new capacity and in conjunction with the start up of a new large paper machine often closed some smaller old production lines, but the net effect was very often a substantial increase in European paper capacity.

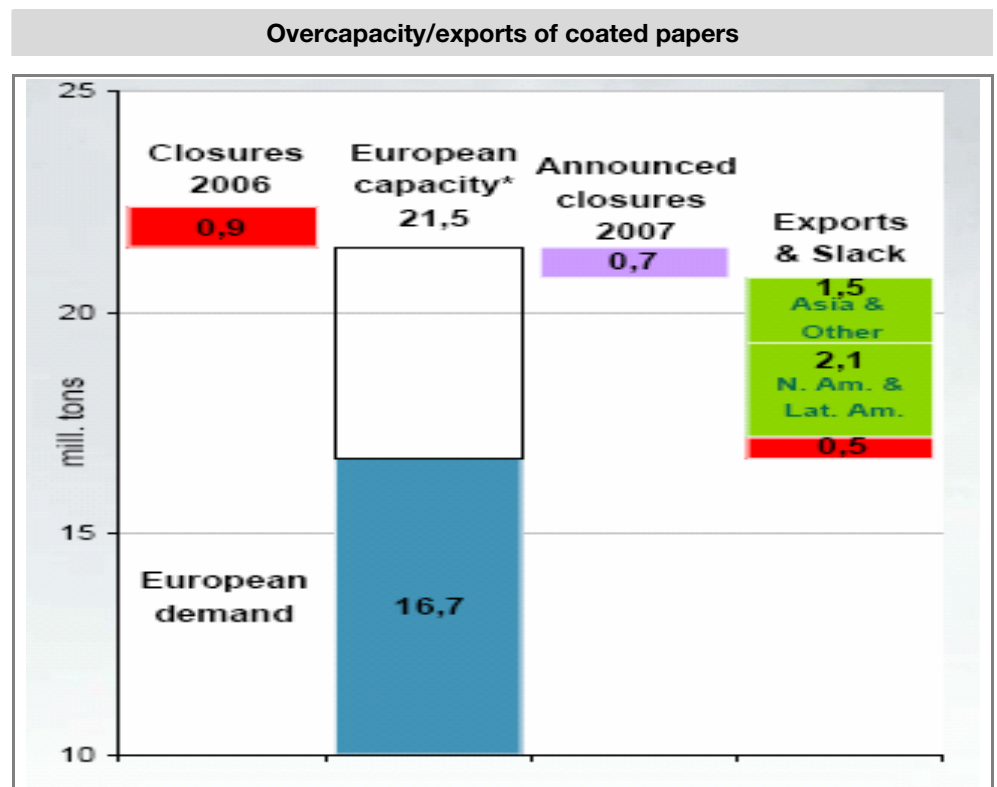
In the autumn of 2005, however, Stora Enso launched an asset performance review and decided to plan for closure of 405,000 tonnes of coated magazine and fine paper, 2.5% of its total capacity. It later decided to close an additional 2.5% of its capacity base. Furthermore, in September 2005 SCA decided to close 17% of its testliner capacity and closed 100,000 tonnes of tissue capacity during 2006. In addition, Norske Skog decided to close its Union Mill in Norway with a capacity of 280,000 tonnes of newsprint and book paper.

All the European large caps have taken closure decisions. Although not all the overcapacity has been eliminated by these moves, we believe that the psychology regarding capacity expansion plans has changed among the larger players. We view this as positive and believe that should we see another round of closures in magazine papers it would pave the way for higher publication paper pricing going forward. The benefits of closures made have already started to become visible in packaging papers, where producers currently have pricing power.

Size of overcapacity

How much overcapacity in European coated printing and writing?

According to recent statements by UPM's management, there is c. 500,000 tones of overcapacity. However, all in all a total of 4m tonnes is exported out of Europe: 1.5m tonnes to Asia and 2.1m tonnes to North and South America. Long term, we doubt that exports to South America and Asia will be profitable. However, North American paper capacity is lower than local demand, so given a EUR/USD rate of c.1.3, those exports would be profitable and sustainable.



Source: UPM

... could augur well for profitability targets

The implications of these decisions are profound, in our view. We believe that this marks the beginning of a new way for the big caps to approach profitability targets. The Nordic companies had previously been focused on building new capacity and, in conjunction with the start-up of a new large paper machine, often closed some smaller old production lines; but the net effect was very often a substantial increase in European paper capacity.

A change of psychology?

We have now reached the stage where all of the European big caps have taken closure decisions. Although not all excess capacity will be eliminated by these measures, we nevertheless believe that the psychology regarding capacity expansion plans has changed among the larger players. We view this as positive and believe that should we see a new round of closures it would pave the way for higher paper pricing during the coming two years.

The amount of paper and board that is being traded between regions amounts to 112m tonnes, accounting for 31% of global consumption. The main exporting regions are Central Europe, the Nordic countries and North America, as can be seen in the table below.

Main global trade flows of paper and board

(m tonnes)	Destination								
	Nordic	W Europe	E Europe	Russia	N America	S America	Africa	Australia	Asia
Production									
Nordic countries	x				3.3	1.3			8.5
Western Europe		x		5.2			1.5	0.7	
Eastern Europe		2.4	x						
Russia				x					
North America		1.9		3.5	x	3.7			3.5
South America						x			
Africa							x		
Australia								x	0.7
Asia									x

Source: Stora Enso

The old export-driven business model...

The "old way" of doing business for a Nordic paper producer was characterised by building production capacity in northern Europe and exporting to North America and Asia. This is very evident when studying the current trade flows. Unfortunately, as Nordic paper producers have grown in Europe this business model has largely prevailed. As a consequence, the current European balance of supply and demand in many grades is marked by substantial overcapacity and is highly dependent on exports.

...is no longer profitable

This business model has not worked well over the past few years. Adverse currency movements against the EUR, SEK and NOK, together with slow paper demand in Europe have been major factors explaining the weak profitability seen during the period 2002-05. Going forward, increasing paper capacity and lower need for imports in the traditional destination markets, mainly Asia and South America, will add to pressure on this export-driven business model in the long term.

Closure announcements are thus good news...

For this reason, we are delighted at the decisions made by the big caps to focus on closing obsolete European production capacity. Although the decisions made so far do not fully take out the overcapacity, the behaviour pattern has clearly changed, in our view. Furthermore, it is important to point out that the trade flows and imports into regions such as Asia will not disappear immediately:

M-Real is planning to close two paper mills and an additional two paper machines, a total of 485,000 tonnes of paper capacity will be shut by end 2007 (Sittingbourne, UK - 210,000 tonnes of CWF; PM 6&7 in Gohrsmuhle, Germany - 100,000 tonnes of CWF; Wifsta Sweden - 175,000 tonnes of UWF), resulting in a reduction of 15% of M-Real's capacity in the relevant grades. The company also decided in November 2007 to add to the closure list. It will close two mills in Finland, a pulp mill in Lielähti with 105,000 tonnes (BCTMP) and paper machine 2 at Kangas with capacity of 100,000 tonnes of coated magazine paper. Total non-recurring costs will amount to EUR73m, (EUR23m in cash) and will be recorded in Q4 and Q1 2008. There will also be a non-cash impairment cost of EUR181m in Q4. The group is targeting profit improvement of EUR100m.

Earnings momentum to gather pace

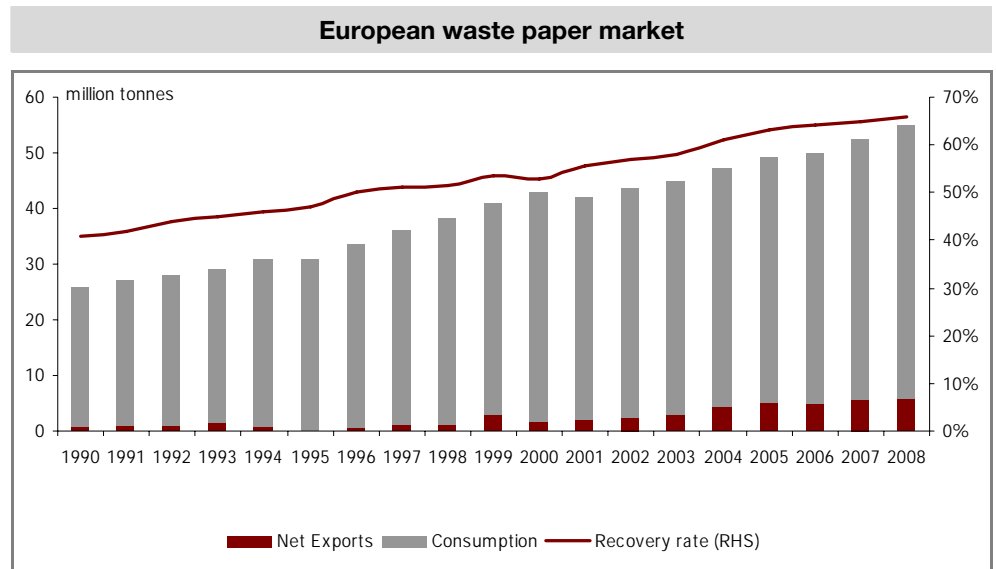
Oversupply in Europe to be taken out

Paper markets in Europe have suffered from oversupply, which has had a negative impact on the pricing power of the European paper companies. However, in good times, exports out of Europe have saved the day for the companies in our universe. We now believe that the closure measures seen and future expected closure decisions will result in a more balanced supply and demand. This is likely to lead to improved earnings momentum, as the operating leverage to higher pricing is high.

Use of recovered fibre for energy production

Background

Recovered fibre, or waste paper, is currently collected on a large scale in Europe and used in the production of paper and board. It is used in particular for newsprint, certain board and packaging papers and some tissue products. Furthermore, substantial volumes are exported, mainly to Asia, and China in particular, which is in the process of increasing its waste paper-based paper production, but has not developed a collection system that supplies the necessary volumes.

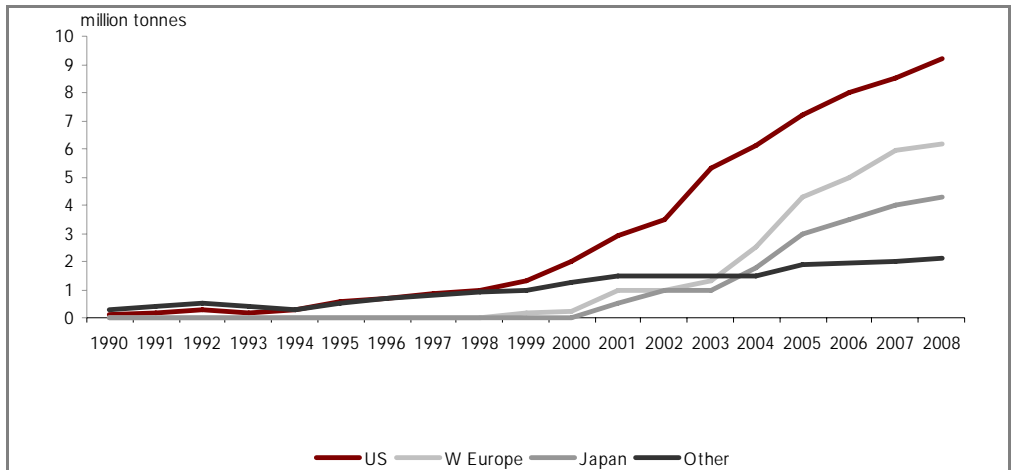


Source: RISI

Current market trends

Chinese/Asian imports of recovered paper have increased substantially in recent years and industrial pundits expect this trend to continue. The European collection rate currently stands at around 65%. In the Nordic region, the recovery rate is closer to 85%, implying room for increased collection. However, the latter would also result in higher costs associated with the collection, resulting in higher pricing.

Chinese waste paper imports, by region



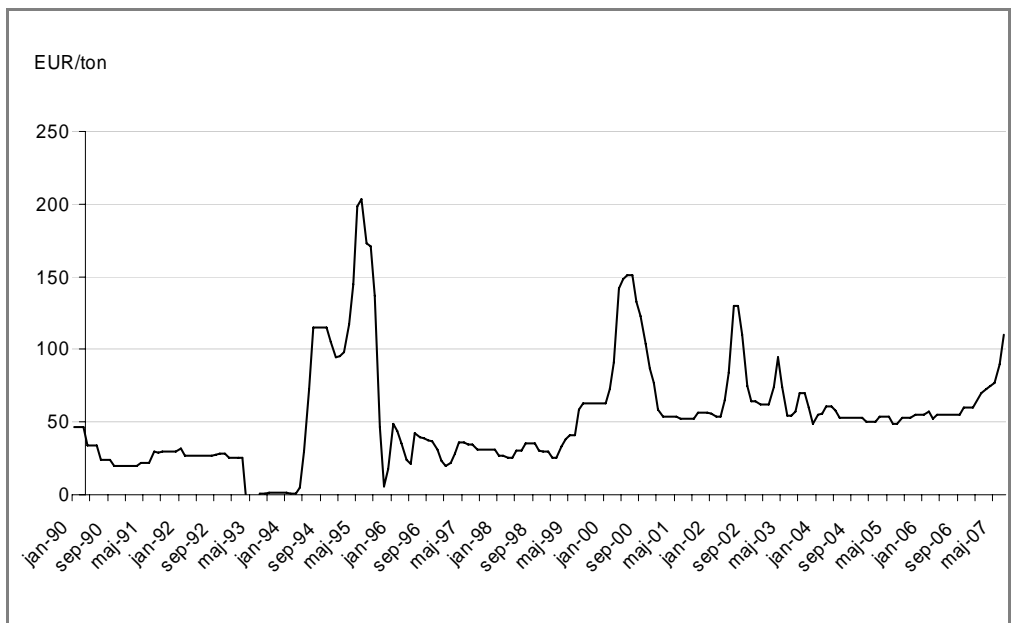
Source: RISI

The effects of the biomass directive

One of the possible consequences of the drive to increase biomass-based heat and energy production in Europe is that the demand for waste paper will increase. Due to the availability of the raw material, paper production using waste paper is generally located close to large population centres in Europe, and not in the Nordic region.

For this type of paper production, the impact of increased demand could prove challenging and push up raw materials costs. Note that there are no energy benefits when this type of paper or board is produced (see p 13 for an energy demand comparison for the paper production process). Pricing has also tended to be very volatile, and price increases have been dramatic. It is worth noting that the long-term pricing trend has been rising since 1990. We expect this trend to continue.

Waste paper prices (OCC*)



* Old corrugated cardboard

Source: PPI

Conclusion

The waste paper market already faces a growing challenge from Asian import needs and, if there is an excessive increase in the use of this raw material as an energy source, the main effects will most likely be higher costs for paper producers. Fibre costs (waste paper) amounts to around 16-20% of total costs. Depending on the supply/demand balance in respective paper grades, paper producers could push for higher pricing. Newsprint is a market in which paper is mainly produced using waste paper as a raw material. At present, this market is strongly driven by a high utilisation rate as a result of capacity closures that have already affected the market and there is a strong likelihood of price increases at the beginning of 2007 — we expect a 7% hike. However, long-term pricing is set globally in most paper grades and companies in Europe will have limited leeway in which to offset higher raw material costs.

Energy: What are the perspectives for biofuels?

The market for biofuels places high hopes on the development of second-generation biofuels. Second-generation biofuels use ligno-cellulosic materials and can be ready in the next five years. Two kinds of next-generation biofuels are the focus of the research: cellulosic ethanol and "biomass-to-liquid", a next-generation biodiesel manufactured by a gasification process.

As stated in our recent report on the biofuels challenge, we believe that the development of these new biofuel technologies using the lingo-cellulose chain (wood, straw and other herbaceous plants) is very promising, as it will be more environment friendly and widely available overall, at a lower cost, benefiting from a much more abundant resource, and available locally. Whether it can be another growth market for wood management companies depends on the most efficient resource to be used to produce these biofuels.

As its name indicates, cellulosic ethanol needs cellulose to be produced. When using wood, cellulose needs to be separate from lignine, a very complex and energy intensive process. Therefore, what is mostly used to make second generation ethanol is clearly straw or herbaceous plants, resources that are easy to obtain from farmers who can also switch crop production to plants such as Miscanthus for example. In this context, wood producers will not be called upon.

However, Biomass-to-Liquid, manufactured by a gasification process, can be made from any biomass resources, providing they are the driest possible as the wetness needs to be extracted before processed.

The companies that are at the cutting edge of this technology, such as Choren, use mainly wood chips. A new market is thus opening up here for paper companies (see our report *Biomass for the Future No. 1: "Biofuel Challenges"* of January 2007)

Building materials

Introduction

A growing tree absorbs CO₂ and if the wood is used as building material or furniture, the CO₂ will be captured for a long period of time, normally several decades. In the forest harvesting process, the best part of the log, around 60%, is used to produce planks. The remaining parts are mostly used in the pulping process to produce cellulose fibre and, from this, paper or packaging material.

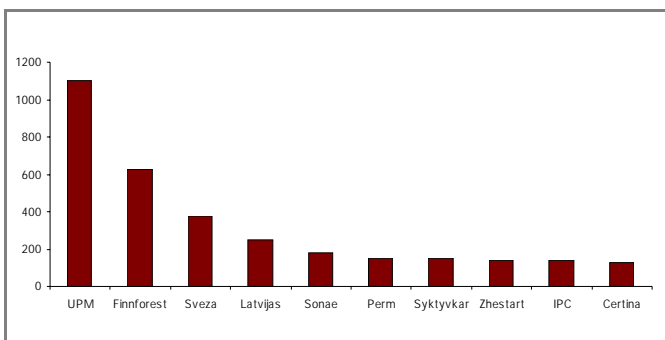
Exposure to the sawmilling industry

Paper producers have for historical reasons adopted different strategies with regard in their sawmilling exposure. In countries where companies have their own forests, such as Sweden, it is not common to own sawmills. However, forest ownership is fragmented in Finland and paper producers in this country have extensive sawmilling operations. The main purpose for this has been to control the flow of wood raw material to the papermaking process. The focus has not, until recently, been on maximising profitability in the sawmill industry. However, this attitude has changed and all companies have now initiated cost cutting and streamlining efforts.

The positive effects of carbon absorption in wood based building materials could result in increased use of these materials in Europe, greater demand and potentially a positive impact on pricing. Such a scenario would be favourable for the wood processing industry, although we are unable at this stage to quantify its effects on the earnings level. Nevertheless, the benefits could be offset by higher raw materials costs should competition for wood residuals increase as a result of the drive towards carbon neutral energy and heat production in Europe.

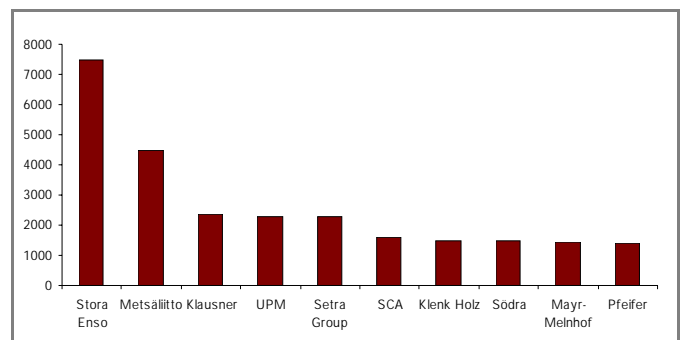
In the charts below we present the largest sawn timber and plywood producers. Finnish based groups UPM Kymmene and Stora Enso are among the leading groups.

European plywood producers, capacity of 1,000 cu. m per year



Source: UPM

European sawn timber producers, capacity of 1,000 cu. m per year



Source: UPM

Wood used in construction

There is a high proportion of wood used for construction purposes in the Nordic region and the level is expected to grow substantially in the rest of Europe in coming years. At present 90-95% of all single-family house construction involves wood, and, in terms of the total construction volume, this amounts to roughly 50% of the total Nordic market. However, the demand driver is not environmental but cultural preferences and the availability of the material.

The wood market share for housing with three or more storeys is in the range of 10%, and somewhat higher in Norway at 15-20%. There is a slightly higher-than-average market growth in this segment, and the demand driver is the benefit in terms of the strength of wood and its weight as a construction material.

Conversely, the percentage of wood used in other type of construction in the Nordic region is low, at around 5% for offices and public sector buildings, for example. For industrial and commercial building, the market share of wood stands at around 10%. However, wood market share has shown above-average growth in the past few years, due to high steel prices. Furthermore, use of OSB (Oriented Strand Board, wood planks glued together for increased strength) has been on the increase, but OSB industrial capacity is currently too low to support growth in this market.

According to industry sources, the environmental aspect is more important with regard to the choice of building material in Europe compared to the Nordic region. This is due to a number of factors, such as the availability of the material, cultural preferences and available relevant wood processing capacity.

Industrial pundits expect the growth in wood usage to be substantially higher in continental Europe and the UK compared to Nordic countries, driven by a focus on environmental aspects, such as the carbon absorption capabilities, and the current low starting levels of wood use for single-family houses.

However, investors should bear in mind that wood supply is expected to continue to stem mainly from the Nordic region. The result will most likely be increased long-term demand growth. However, we are unable to estimate an exact growth rate at this stage, we can merely state that wood demand is likely to post healthy growth, exceeding the European average, as a result of wood-based building materials capturing market share compared to other materials.

Conclusion

We expect increased demand for wood-based building materials, given their carbon absorption properties, driven by either consumer demand or various types of subsidies for this kind of building materials. However, it is not crystal clear in our view that the sawmilling and plywood industry will benefit from these trends, as the increased demand will most likely affect raw material prices. In a historical perspective, EBIT margins have been low in this industry, at 3-4%. Furthermore, prices are set globally and there is recurring cyclicalities, with a few profitable quarters followed by a long string of quarters with negative earnings. However, we strongly believe that the main beneficiaries of this development will be forestry owners, as wood pricing will most likely will be pushed north by this trend.

Forest assets Value

We have looked at the potential impact on companies of the increased use of biomass for energy and heat and focused on the use of wood. Our conclusion is that there are three different groups of companies in our universe, and that the impact within these groups will differ according to factors such as the relative size of companies, their production focus and most importantly, the ownership of forestland.

In 2007 the increase in Russian export tariffs on wood has already resulted in substantially higher wood costs. Finnish wood prices are up c. 70% YTD and Swedish prices are up c. 25%. Also, underpinning this trend, the mild winter last year reduced harvesting levels and left wood inventories at low levels at the end of Q1 2007. We believe that the increased use of biomass as an energy source will already underpin high wood prices during the coming years.

We conclude that ownership of forestland acts as a powerful hedge against increased use of wood-based biomass for producing energy and heat. In our opinion this trend will result in higher fibre raw material costs regardless of whether virgin fibres or recovered paper is used in the papermaking process. However, at this stage we are unable to quantify the impact on future earnings levels, as a result of potentially higher costs. Moreover, we would like to stress that the difference between neutral and vulnerable positions is not clear-cut. Based on the above factors, this is our best assessment at this point in time.

Forest asset re-rated

Both SCA and Holmen own substantial land assets, 2m and 1m hectares respectively of productive forestland. We have now explored one side of the equation taking a close look on the cost effects of higher wood prices. The effect on the paper making cost is clearly negative. However, higher wood costs as well the value of the forestland in a sum-of-the-parts calculation should be integrated.

Furthermore, there are accounting effects that we expect will focus investors' attention on these values. With the implementation of IFRS in Swedish accounting two years ago, the companies could no longer use acquisition values in book values. Instead they had to use the valuation metrics provided for biological assets. This resulted in both companies using a 100 year DCF as the valuation metric. However, in those valuations both SCA and Holmen used very conservative annual price development numbers, c. 1%. At present, there is a clear need for these two companies to align their forest valuation DCFs to actual price trends. We expect this to partly take place in Q4 2007, and expect the sums to be considerable. We know that this is only an accounting adjustment. Nevertheless, we expect investors' focus to shift to the fact that both SCA and Holmen should be actual beneficiaries from the changed trends in wood prices, partly created by Russian wood tariff trends, but also in a longer perspective from the anticipated increased use of biomass as an energy source.

In the table below we have outlined a sum-of-the-parts valuation of SCA using competitors' multiples for the various businesses. Furthermore, we have applied the latest available land statistics regarding sales to value the forestland. This approach results in a fair value of SEK181 per share or 60% above current share price.

SCA: sum-of-the-parts valuation					
(SEK m)	Value	2008E multiple	% of total value	Comment	EBITA 2008E
Hygiene	69,445	12.5	42%	KMB multiple	5,556
Packaging	34,487	12.5	21%	Stora Enso's multiple	2,999
Forest Products	31,986	12.5	19%	Stora Enso's multiple	2,781
Other	-7,223	14	-4%	Normalised level	-516
Forest holdings	36,000		22%	Based on latest stats for deals Owns 2m hectares of productive forestland	
Total EV	164,695				
Debt 2007E	-37,397				
Associates	350				
Minorities	-100				
Implied market cap	127,548				
Number of shares (m)	705				
SOTP fair value/share (SEK)	181				

Source: Cheuvreux

In the table below we have carried out a similar sum of the parts valuation on Holmen. This results in a sum of the parts value of SEK354 per share or c. 55% above the current share price.

Holmen sum-of-the-parts valuation

(SEK m)	EBIT 2007E	Multiple (x)	Value	Comment
Paper	688	14	9,639	In line with Stora Enso & UPM-Kymmene
Paperboard	624	14	8,731	In line with Stora Enso & UPM-Kymmene
Forest	684	0	20,826	Forest assets marked to market
Energy	250	12	3,005	European avg
Timber	142	5	709	Currently very high profitability
Other & Internal	-180	10	-1,800	
Enterprise value			41,109	
Debt			-5,985	
Tax liability			-5,100	
Equity value			30,024	
Number of shares (m)			84.76	
Fair value per share (SEK)			354	

Source: Cheuvreux

Conclusion

We believe that SCA (1/Selected List, target SEK137) and Holmen (2/Outperform, target SEK280) will be rewarded by the stock market as they have substantial forestland assets that in our view are not fully appreciated in the current valuation of these stocks. Furthermore, we believe that the necessary accounting adjustments, with forestland revaluations, are likely to focus investors in this direction.

III – ENVIRONMENTAL FOCUS ON PULP PRODUCTION

The Southern Hemisphere forestry impact

We expect that new pulp mills and source of fibres will increasingly depend on short-fibre pulp produced in the southern hemisphere. The benefits for this region are lower costs and the fact that it is more efficient to transport bales of pulp than finished paper. Paper is mainly a customised product, so it still makes sense to produce it close to the consumer. This trend will have a mitigating effect on Nordic wood consumption. However, it is worth pointing out that we refer to the incremental growth in paper demand that could lead to saturation.

Pulp production capacity			
(millions of tonnes)	1990	2010E	CAGR (%)
North America & Nordic countries	19.8	24.5	1.1%
Other regions	13.5	31.9	4.4%
Total	33.3	56.4	

Source: PPPC

Paper and board consumption in emerging markets in Asia and Russia/Eastern Europe is expected to grow 6-12% p.a. As production worldwide currently amounts to around 180 million tonnes, an annual increase of ca. 2.5 million tonnes is needed to meet the incremental increase in paper production capacity. This is equivalent to around three new mill lines p.a. South America is expected to post the strongest growth. The main growth driver is the benefits that can be reaped due to shorter harvesting cycles and thus sharply reduced costs for logistics and wood compared to the cost base in the Northern Hemisphere. The growth difference due to the climate difference and species is tenfold if we compare Brazil to Nordic countries, especially as this part of the world will become increasingly important as a pulp supplier.

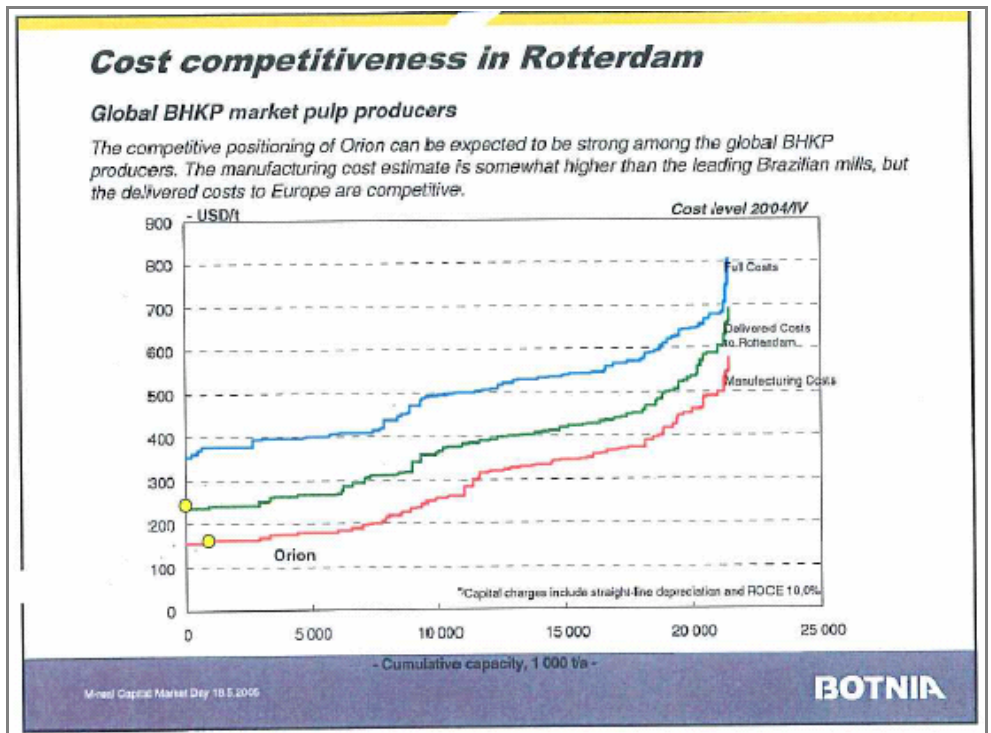
Growth differentials					
	Brazil average	Portugal average	South China average	Indonesia average	Finland/Sweden
Rotation period, years	7	12	7	7	40-70
Growth, cu. m/sub/ha/yr	35	8.5	18	27	3-5
Cost at mill gate, USD/cu. m/sub	17	43	30	28	37
Yield, cu. m/sub/t	3.9	3.0	4.0	4.0	3.8
Wood cost, USD/tonne of pulp	70	120	120	112	220

Source: Stora Enso

The negative financial implications of this trend for Nordic countries will most likely be limited. A number of producers have already started to find suitable spots in Latin America, and Stora Enso, in collaboration with Veracruz, already has a 1-million tonne pulp mill up and running. In terms of closure costs, the implications are harder to assess, and there will most likely be costs associated with the environmental clean-up of old sites. However, as much of listed Nordic companies' pulp production capacity is located in countries where the cost of closing industrial operations is low, we do not see this impact as material.

Furthermore, there are considerable benefits to be gained from investing in new pulp mills in regions with fast growing wood resources. This is particularly evident when looking at the cost curve for short-fibre pulp production. In our analysis we have used Botnia's Orion pulp mill project, which involves production of around 1 million tonnes of pulp and is due to come into operation in Q3 2007. It is clear that at the current pulp price of USD670 per tonne, the profitability of this project will be very good. Moreover, expect producers at the right-hand end of the cost curve to dwindle and die out. But this will most likely be an extended process. High cost producers are present in the northern hemisphere, and at current exchange rates, Canadian producers are at a disadvantage.

Pulp production capacity cost curve



Source: Botnia, M-Real

Environmental view on wood resources for pulp mills

One is often encouraged to save paper, in order "to save trees" or forests. Whilst there are many advantages to saving paper (especially energy efficiency), **the idea of paper as the enemy of the forest has to be put into perspective: it is false in most cases, but remains very true in certain parts of the world, as we shall see below.**

The world's major pulp-producing regions are North America (especially the US) and Northern Europe by far, but pulp production is on the increase in South America and Asia (especially southeast Asia and China). In every case, wood resources provide the cornerstone for the industry. Crushing plants (for pulp and chipboard) are partially fed by the by-products of sawmills and other wood industries, but their main source is always round wood.

Northern Europe has long been renowned for sustainable (and sustained) management of its forest resources. However, the region now has to import wood (especially pulp wood) from Russia and the Baltic countries.

Canada and the US suffer from a poor reputation in this field. The cause is not the decline in forest surface area, but the practice of clearing over very wide areas, the virtual absence of regeneration and cutting in existing virgin stands still raises criticism. **However, the situation is now being improved.**

Russia has still not brought its pulp production back to the level it had reached before the fall of the Berlin wall, but production in this region is on the increase, and the issue of **illegal harvesting is a subject of growing concern**, given its consequences on the state of the country's forests and the negative impact on public finances.

These questions are even more problematic in the **new pulp-producing countries**, i.e., Brazil and neighbouring countries, and in Asia.

As a rule, pulp production uses plantations of deciduous trees, essentially eucalyptus. These new pulp-producing countries generally benefit from very competitive costs for the production of crushing wood, given the high growth rates that can be obtained (30 to 50 cu. m per hectare p.a.), and relatively low land and labour costs.

However, with regard to sustainable development, the validity of this model has to be verified according to the prevailing conditions.

In South America, plantations are generally established on non-forest areas, but in certain cases these are still seeded after deforestation (in the Atlantic coastal forest zone, notably; they are generally subject to environmental regulation aimed at preserving natural forest. Thus in Brazil, 20% of the surface area has to be preserved. Certain Brazilian producers go further than this requirement; Veracel for example has preserved 50% of its land). However, this does not prevent new plantations from potentially posing a series of problems: competition over land with traditional users (small farmers), deterioration of the water regime (afforestation tends to dry up the soil, which could be beneficial or harmful), or the loss of biodiversity, which could be high even for land that was not previously woodland.

This damage does not occur systematically: plantations can also provide jobs or offer new biotypes in the case of very damaged areas. Some players are developing techniques such as agriforestry (Votorantim), but it is important to verify the actual situation in each case.

Reputational Issues

Finnish company Metsa-Botnia's pulp mill in Uruguay, which is now under construction, provoked and is still provoking very strong opposition, notably from people in neighbouring Argentina. This protest is not primarily due to the question of wood resources (although this question is not entirely clear, as NGOs have cast doubt on the capacity of existing plantations to meet requirements); it is more to do with the feared negative impact of an industrial site. In any case, this polemic illustrates the consequences of shortcomings in the initial impact studies and communication surrounding the project.

The situation is currently more problematic in Asia. Indonesia and China are the main pulp-producing countries in the region; the former is quite rightly the focus of attention, as the **pace of deforestation in this country is very rapid**. It is widely acknowledged that there is much greater installed pulp production capacity than plantation resources, and even now the wood supply for sawmills, plywood units and pulp mills primarily comes from cutting primary forests, as the rate of establishing plantations is lagging behind the programmes set up. There is thus a combination of environmental consequences and negative effects on the indigenous population.

Supply problems and international pressure against their forestry practices have added to the difficulties encountered by companies such as Asia Pulp & Paper (Sinar Mas group), which was delisted in 2001 after suspending payments on USD13bn worth of bonds, the financing of which had to be thoroughly restructured.

This group, and others in Indonesia, are subject to embargos on the part of clients: US group International Paper, for example, has embargoed all pulp coming from Indonesia. More generally speaking, problems of illegal forestry operations have resulted in political initiatives, such as the European programme FLEGT⁶, which is aimed at tackling illegal harvesting, notably via close monitoring of imports. It will thus be increasingly in the interest of companies to present more acceptable operating methods. Along with the other companies, APP, which is at the forefront of this process due to the intense pressure on the group, is shifting towards a supply chain audit for some of its mills in order to establish the legal origin of the wood used and has got full marks from the Indonesian government, which is itself drawing up an improved set of management rules. Nevertheless, APP continues to be accused by NGOs of logging in sensitive forestry zones. The government also affirms that many other players are still operating illegally.

The financing of the pulp industry is the subject of a report by CIFOR⁷, which underlines shortcomings in sector risk analyses by financial establishments, in particular with regard to resources. Indonesian pulp companies have effectively caused serious environmental damage and recorded poor financial performance, or even gone into liquidation.

⁶ Forest law enforcement, governance and trade

⁷ Financing pulp mills: an appraisal of risk assessment and safeguard procedures, 2006 CIFOR: Centre for international forestry research, an internationally renowned Indonesia-based research body.

China is the largest importer of pulp, notably from Indonesia and other countries in the region; it is thus involved in the problems of the pulp industry. However, China's own pulp production capacity is also expanding rapidly, with resources that are likely to increasingly come from its own plantations. The country's MDF⁸ production capacity is also growing fast. If the number of plantations in China do not keep pace with this expansion, Indonesia will probably bear the brunt of the impact. However, it is not easy for **China** to seed such plantations, as **it is a country with limited land resources and there is already widespread conflict** between peasant communities and other land users (for industrial purposes, for example).

Thus any investment in the pulp industry has to be viewed from the angle of wood resources, which have to be secured prior to starting up a mill and guaranteed under correct conditions with regard to habitats converted into plantations and the impact on local populations (setting up viable production contracts, for example). In Indonesia, no new industrial project can in practice meet these requirements, as existing production capacities are already insufficiently supplied by plantation resources.

An important factor in an analysis of forestry resources used for pulp mills is **certification of their forestry management**. However, certification of sustainable management for plantations runs into numerous problems. The world benchmark system in terms of sustainable forestry management is the FSC. The FSC is opposed by both the industry itself, which is critical of its requirements (the Indonesian pulp and paper federation opposes the fact that plantations on land deforested since 1994 are excluded from certification) and certain associations, which criticise the certification granted to some major plantation zones, notably in South America. The debate is focused on the conflict between the positive role of plantations (which supply wood, but avoid encroachment on forestland) and their negative role (replacing natural habitats by a monoculture with biodiversity that is generally much poorer). This debate is far from over.

Socio-economic factors

Pollution in the regions where new pulp mills are located could be a negative, but we believe that, as long as North European environmental standards are met, this is unlikely to pose a threat. Nevertheless, we would like to question the behaviour of pulp producers that are either not listed on the stock market or, listed on markets where these types of issues are not scrutinised.

On the positive side, a pulp mill provides export income and work opportunities for the community in which it is located. For example, the Botnia mill in Uruguay is expected to employ 300 people just at the mill itself and lead to employment for a total of 8,000 people, of which 5,000 directly and 3,000 indirectly, in forestry work, transport, private investment, etc.

We conclude therefore that, as long as a pulp mill operation is conducted in line with the stringent environmental practices of Northern Europe, the mill itself will not cause damage or nuisance.

⁸ MDF: medium density fibreboard

IV – CARBON EMISSIONS: IMPACT OF REGULATION

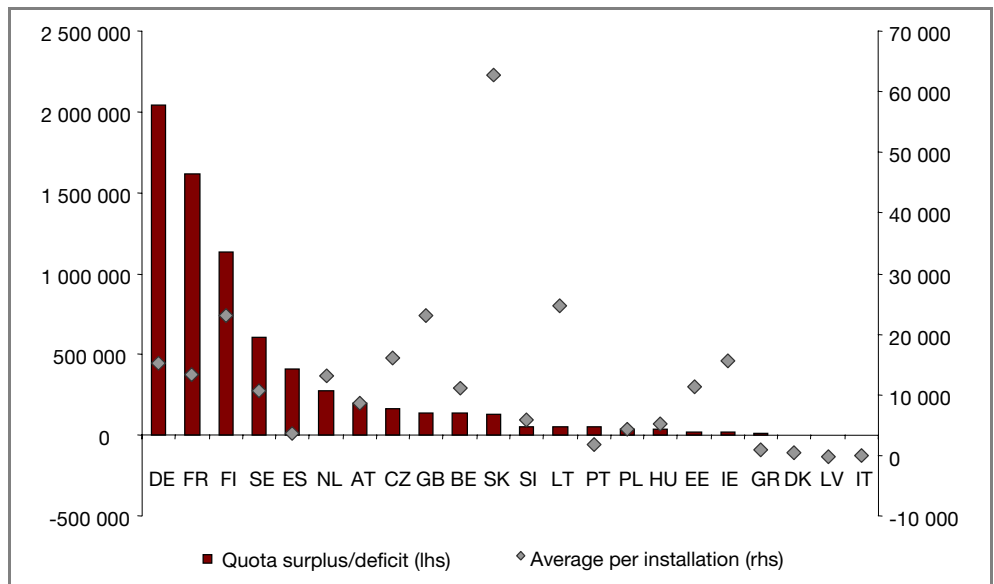
Direct carbon impacts are marginal...

Carbon profile of the pulp & paper industry

The European pulp and paper industry is responsible for less than 1% of overall CO₂ emissions in the EU. It is one of the least carbon-intensive of the sectors analysed. As a result, the sector is not overly exposed to the carbon constraint. However, this means that it benefits from over-allocation to a lesser extent as well. In 2005, the sector was over-allocated by around 7.2 million CO₂ emission rights. Conversely, the low carbon intensity of paper and pulp production means that should industry caps be tightened, the sector will not be threatened by the direct carbon constraint.

This over-allocation in the sector was not spread equally across Europe.

Quota surplus/deficit in the pulp and paper industry in Phase I of EU ETS, by country (tCO₂)



Source: CITL

...and abatement possibilities exist...

In addition, the majority of the CO₂ emissions in the paper sector derives from the use of fossil fuels for in-house electricity generation, while the rest originates from chemical processes (process emissions).

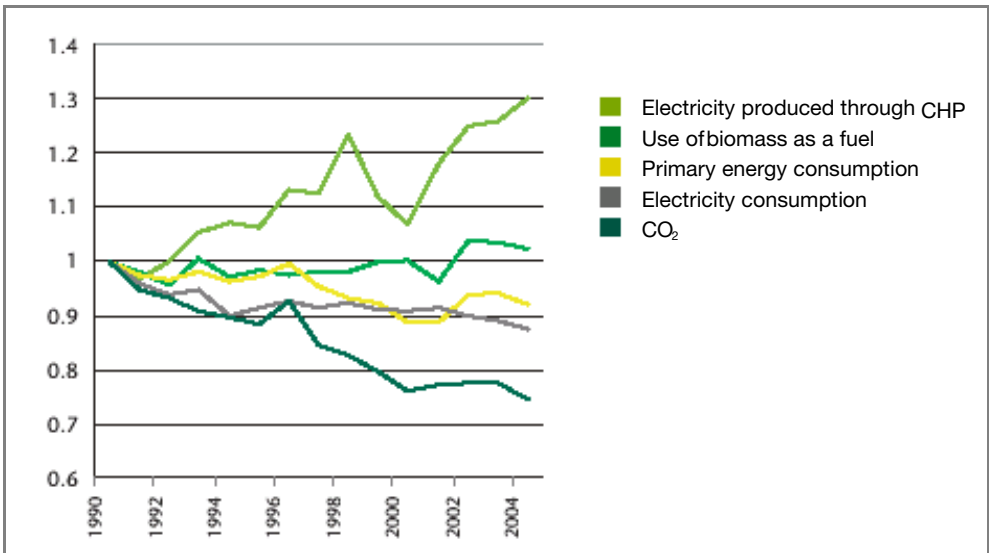
Thus, in general, paper company emissions will vary according to their production structure, energy production technologies and the fuels used. The abatement possibilities for the sector consequently are:

- Using renewable sources such as biomass for in-house energy production or other less carbon-intensive fuels.
- Enhancing the energy efficiency of production by minimising the energy consumed per unit produced. Improving energy efficiency is vital for the sector since the specific electricity consumption of pulp and paper production is increasing due to higher quality requirements, increased machine speeds and new technologies. Energy efficiency can be improved by reducing losses and by increasing the share of combined heat and power production. The efficiency and the power-to-heat ratio can be improved by enhancements to Kraft recovery boilers, fuel gasification and fuel drying, and extraction steam turbines.

- Building Combined Heat and Power Plants (CHPs), which are much more efficient than other plants, as they use the by-product heat which is normally wasted, and thus avoid transmission and distribution losses as they usually supply electricity locally.
- Developing new technologies that focus on the parts of the paper and pulping process in which a great deal of energy is used. In mechanical pulping, new pulping technologies requiring less electricity are being examined. Removing water from the paper web is the most energy consuming part of papermaking and thus a lot of research is being carried out into different drying and dewatering methods. Other new technologies being developed include black liquor gasification and the drying of moist fuel.

The following chart shows that in the paper industry the environmental performance trend is improving, as biomass and CHP usage is increasing, while primary energy, electricity consumption and CO₂ emissions are decreasing overall in relative terms.

European paper industry's environmental performance*



*Specific primary energy consumption, electricity consumption and production in the European paper industry (index 1990-2004: base 1 = 1990)

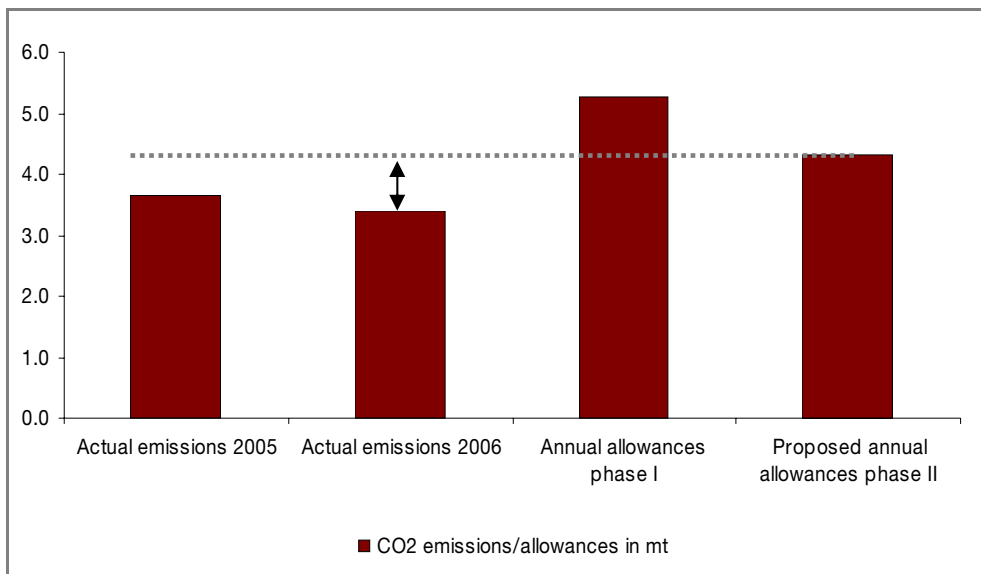
Source: CEPI

It should be noted that the 2005 over-allocation for the paper sector was partly due to the reduction in production as a result of a labour dispute in Finland. We think that no real CO₂ emission abatement took place, as in general, product-specific emissions stayed quite stable in the sector between 2004 and 2005.

Low risk on direct emissions: over-allocation of emission rights is likely to last

Over the first phase of the EU ETS (2005-2007), the sector has received much more emission rights than actually needed. After an analysis of initial allocations in the National Allocation Plans proposed to the European Commission for the second trading period, we come to the conclusion that this situation is likely to last. Over the second trading period (2008-2012). Governments are not ready to hurt the competitiveness of sectors highly exposed to international competitors facing no constraint on their CO₂ emissions.

Actual emissions vs. allowances in France: continued over-allocation for the pulp & paper sector



Source: CITL, France's NAP, Cheuvreux

Need to monitor electricity costs

Since the implementation of the EU ETS, electricity prices on wholesale markets and deregulated electricity markets integrate a carbon price signal equivalent to the carbon-intensity of the power plants producing power at the margin (thermal gas or coal plants). This peculiar situation of a new carbon component in the economy has led to sustained higher electricity prices in Europe so that electro-intensive players are required to pay the bill for indirect carbon emissions through electricity consumption.

In order to tackle the negative impacts, the paper industry is investing increasingly in biofuels. Biomass usage increased from 47% to 52% between 1990 and 2004.

In addition, in Finland, industries have succeeded in convincing the State to build a fifth nuclear plant, which will contribute to lower energy prices. (It is currently under construction and will be producing from 2010 on).

The table below presents the exposure of the P&P companies to electricity supply from the grid.

Securing electricity supply at competitive prices: the Finnish example

Self-sufficiency in electrical energy

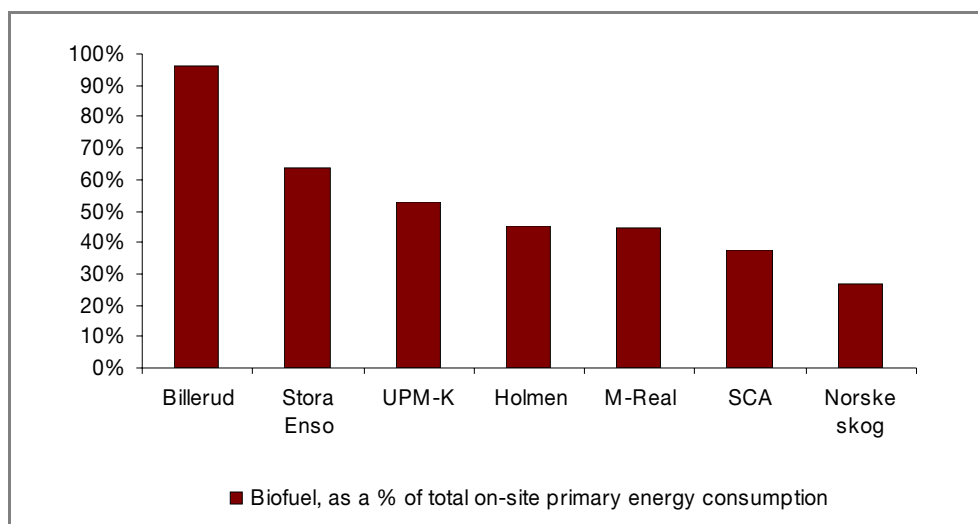
	% of electricity consumption generated internally	Comment
Ence	100%	Net seller, 78% of the electricity production is sold on the grid
UPM-K	70%	2.54GW of own power generating capacity (Nuclear + Hydro)
M-Real	60%	Hedging policy
Stora Enso	46%	Up 6pp vs 2005; owns nuclear power generation capacity in Finland
Billerud	42%	Up 12pp; MSEK1.090 invested in bark boilers and electricity turbines at Swedish mills
Holmen	30%	In Sweden 85-95% of purchased electricity hedged up to 2012; 70% from 2013 to 2015
SCA	25%	SCA is building a RDF (refused derived fuels) power plant in Germany, long-term supply contracts
Norske skog	8%	Norway: 80% hedged; electricity costs +10% in 2006 on per tonne basis
Ence	100%	Net seller, 78% of the electricity production is sold on the grid

Source: Company data, Cheuvreux

With self-generated electricity covering respectively one-quarter and one-third of power consumption, SCA and Holmen rely relatively more on grid supplies. We see a very limited risk though, since both companies have hedged prices thanks to long-term supply contracts secured at competitive prices.

CO₂ emissions from the burning of biomass are not accounted for under the EU ETS (due to the neutral carbon life-cycle). Consequently, the more a company uses biofuels for on-site electricity generation, the less it is exposed to a carbon constraint on combustion plants.

Use of biofuels in primary energy consumption



Source: Ccompany data