



Carbon Footprint – a key issue for the paper industry

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Benefits of cross-disciplinary research

What can be done when the properties of a paper do not correspond to those that are expected? How is it possible to generate new properties in paper and paperboard?

STFI-Packforsk is able to gather a team of people with expertise, knowledge and know-how in the fields of paper mechanics, paper chemistry and process technology. This combination leads to unique opportunities for fresh ideas, when it comes to creating completely new or substantially improved properties in the products. In order to know what needs to be done, it is often necessary to be able to make measurements and, furthermore, have an understanding of what is being measured and how to carry it out, all of which STFI-Packforsk is very well equipped for.

Mikael Nygårds, a researcher in paper mechanics, comments, "A number of possible choices are often presented to you. For example, if the problem concerns creep, it's possible to alter the fibre bonding, to add more chemicals that bind or control the processes. If you just focus on one single method, many other problems may still remain."

"There's a complex connection between chemistry and a process. To be able to understand it, we need to have measurement methods," says Mikael Ankerfors, a paper chemistry researcher.

Mikael Nygårds and Mikael Ankerfors both maintain that it is important to have a comprehensive understanding. By this, they mean it is necessary to have an understanding of what is taking place in the interactions among individual fields of expertise.

"That's where advancements can be made," adds Mikael Ankerfors.

The combination of paper mechanics, paper chemistry and process technology is especially important when developing new properties in the products.

"When developing properties, it's vital to have an understanding of what's happening, of what's contributing to what and then see it in relation to the end product. There's feedback taking place from paper mechanics to both paper chemistry and process technology," says Mikael Nygårds.

Marco Lucisano at the STFI-Packforsk pilot plant, EuroFEX, agrees and talks about how participants in a research cluster studied the effects of process chemistry in order to develop properties in multi-layer paperboard.

"It's quite usual that chemical suppliers come to us with ideas for us to evaluate. As a pilot machine, EuroFEX is strong in the field of process chemistry," he says and then adds that the pilot plant is going to be even stronger, with the rebuilding to take place in connection with CAPPI (The Centre for Advanced Paper Production Innovation).

Studies are sometimes carried out, involving several of the different STFI-

Packforsk research clusters. Moreover, exchanges of knowledge take place due to the fact that researchers work in close proximity to each other in the Company.

"Here, there's a company culture of working closely together. If you work in a problem oriented way, you have recourse to the different fields of expertise, irrespective of whether it's within a project or through personal contacts," concludes Mikael Ankerfors. ●

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 **Kombinationen** pappersmekanik – papperskemi – processteknik ger unika möjligheter till nytänkande för att skapa helt nya eller väsentligt förbättrade produkttegenskaper. För att veta vad man ska göra måste man ofta kunna mäta och dessutom ha förståelse för vad man ska mäta och hur man ska göra det. STFI-Packforsk har möjlighet att sätta ihop team av flera kompetenser för såväl produkt- och processutveckling som problemlösning. Forskarna Mikael Nygårds, Mikael Ankerfors och Marco Lucisano menar att det finns ett komplext samband mellan kemi och process och för att förstå det sambandet måste man ha mätmetoder. De betonar också vikten av att ha en tvärvetenskaplig förståelse eftersom det är i gränsområdena som framsteg skapas.

Recycled fibres – on to the next stage

Improved products, less expensive raw materials, smoother production and savings on energy. This might sound like a paper producer's secret dream, but in the recycled fibre project, EcoFracSmart, it has become a realistic aim. To some degree, this aim has already been achieved and, in the next few years, a new installation could well become a breakthrough for the whole concept. Europe's recycled paper mills will then have a brighter future.

"We regard EcoFracSmart as an opportunity for making better products from inferior raw materials," states Marco Lucisano, a Research Manager at STFI-Packforsk. "Today, there's a surplus of test liner and other more basic recycled fibre products. Mills need to get into the traditional virgin fibre markets to achieve good profitability."

Moreover, the recycled fibre based mills need to expand their raw material base. Top quality recycled fibres are in short supply these days, leading to higher costs. A technology that gives good runnability and quality, even with poorer raw materials, would mean a financial lift for many paper mills.

An industrial installation based on the EcoFracSmart concept was operat-

ing at a Swedish test liner mill, Smurfit Kappa Lagamill, during 2005 and 2006. This took place in collaboration with STFI-Packforsk, Smurfit Kappa Lagamill, Läckeby Water, Holmen Paper, Noss, Lyckeby Industrial and JLR Pulping.

At the same time, in pilot trials on EuroFEX, STFI-Packforsk proved that using hydrocyclones for fractionation gives even greater advantages, mainly in the form of improved printing surfaces. STFI-Packforsk is now putting efforts into raising money for an industrial installation based on the whole EcoFracSmart concept. The trials that were carried out have shown the enormous potential of EcoFracSmart. If there is a major installation in the next few years, this could mean a distinct breakthrough.

Less expensive, more effective, more profitable

The main equipment, tested at Lagamill, was a multifunctional pressure screen, developed by Roland Selin at JLR Pulping. Before this, it had been in operation at a paper mill, Technocart, in Greece, with enormous success. It was there that STFI-Packforsk carried out a pre-study. The installation at Lagamill was a new one, more than double the size of the one in Greece, with a capacity of 100,000 tonnes per year. That kind of scale is very attractive for many small and medium sized mills.

"Every one of our expectations was met during the operations at Lagamill," comments Roland Selin.



Marco Lucisano agrees. "The Lagamill trials confirmed the advantages that the multifunctional pressure screen would give. Such a plant would mean fewer process steps. It would be more compact and smoother to operate. We would improve on cleanness and save energy."

Things are now being taken one stage further. There are plans to build the whole EcoFracSmart concept on a full industrial scale, hopefully with financial support from the 7th EU Framework Programme. The project will lead to a new energy efficient solution, a multifunctional screen, such as the one at Lagamill, and a hydrocyclone for fractionating fibres.

"We've held positive discussions with several mills about building EcoFracSmart," says Marco. "It's worth repeating that this is a technology that is going to provide a new future for many recycled fibre mills in Europe." ●

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The main piece of equipment in the EcoFracSmart concept is a multifunctional pressure screen, developed by Roland Selin at JLR Pulping, seen standing to the left of 2 operators at Lagamill.

 **Bättre produkter,** billigare råvaror, smidigare produktion och energibesparingar låter som en papperstillverkarens hemliga dröm, men i returfiberprojektet EcoFracSmart har det blivit ett realistiskt mål. Konceptet innebär en ny varsam och energieffektiv upplösning, en multifunktionell sil och en hydrocyklon för att fraktionera fibrerna. Tekniken ger god körbarhet och kvalitet även med sämre råvaror. En industriell installation har drivits vid svenska testlinerbruket Lagamill under 2005-2006. Parallellt har STFI-Packforsk i pilotskala på EuroFEX visat att fraktionering med hydrocyklon ger ytterligare stora fördelar, främst i form av bättre trycktytor. Nu går man vidare för att bygga hela EcoFracSmart-konceptet i full industriell skala. Enligt Marco Lucisano kan det ge en ny framtid för många returfiberbruk i Europa.



New Research Programme under development

These are busy times for Anders Pettersson, Senior Vice President of Research at STFI-Packforsk and responsible for developing its Cluster Research Programme. He is in the middle of preparations for a new 3 year period.

Ideas are coming in from outside the company as well as in-house. The Company's 20 or so Partner customers will put forward their requirements and requests. Proposals from Cluster Advisory Boards and STFI-Packforsk research scientists are to be discussed, with it all resulting in a programme that provides participating companies with new development opportunities and value for their money. It needs to be very appealing to our prospective customers as well.

This time, many of the proposals must have, as their starting point, the National Research Agenda (NRA) for forest-based trade and industry in Sweden, which, in turn, is linked to the European equivalent, Strategic Research Agenda (SRA).

The NRA implies, among other things, that the industry itself has to gain an even stronger customer perspective and become more proactive towards the political sphere.

"Typical areas in this field are to further develop chemicals and energy from the forest industry biorefinery and another is fibre-based composite materials," says Anders. "STFI-Packforsk is at the forefront of these fields. It's collaborating with a number of companies that have the relevant state-of-the-art expertise. As a result of the investment in CAPPI (The Centre for Advanced Paper Production Innovation) that The Knut and Alice Wallenberg Foundation made, we are expecting further investments in process

In the footsteps of Clusters

For many years, a well established enterprise at STFI-Packforsk has been Cluster research work, with the results from it being implemented in its customers' own commissions or through developments in the companies themselves. Partner customers collaborate in the clusters to solve problems in common and generate new possibilities, using the resources and expertise available at STFI-Packforsk. The results are further developed and then applied to create competitive advantages for the particular companies.

Major Project Manager, Sven-Olof Lundqvist, describes how the work in the TOFU Cluster (Tools for Optimal Fibre Utilisation) built up knowledge and know-how in the long term and developed tools for obtaining more uniform and better wood and chips for pulp and paper mills, adapted to the specific products of each particular mill. The aim is to achieve a more uniform and improved quality, together with a production that is more efficient and freer from interruptions.

Commissioned research and development projects have been carried out, with Cluster research as a basis. Measurement methods, databases, models, simulation programmes, etc. have been jointly financed and then utilised by the companies to solve their own specific problems and to improve their competitiveness.



Data from case studies in the TOFU Cluster can now be utilised in commissions to evaluate fibre properties.

Sven-Olof comments, "We have been working on a long-term basis and, step by step, we've built up tools that can be used and successively complemented with new functions; tools for integrated databases that can be utilised jointly in different spheres."

"Now we have efficient standardised methods for taking samples, handling them, making measurements, making evaluations, etc. that can be used, for example, on spruce in Sweden, pine in South America and eucalyptus in China. This makes for very big synergy effects."

"A Cluster runs for an established period. Long-term research in a Cluster format has to be renewed successively. In the research we are carrying out for optimal fibre utilisation, we first turned to the forest to find out what kinds of fibres there were to be had there and how it is expected that fibres from the various types of wood will influence the pulp and paper. We are now developing applications from what we built up. We're also turning towards using these methods on other sources of fibres, not least those from short fibre pulp and plantation for-



Klusterforskning ger stora fördelar för de deltagande företagen. Det finns ofta branschgemensamma frågor att lösa eller områden att utveckla som ett enskilt företag inte har ekonomiska eller kunskapsmässiga möjligheter till själv. Bolagen delar på investeringarna, minskar riskerna och får flerfald igen på satsningarna. Just nu pågår förberedelserna inför det nya forskningsprogrammet för 2009-2011. Idéer samlas in både externt och internt. Företagets 20 avtalskunder ska föra fram sina behov och önskemål, förslag från referensgrupper och egna forskare ska diskuteras. Heta områden är bl a energi och kemikalier från biorafinaderier och fiberkompositmaterial samt processteknik för papperstillverkning.

technology for paper production, which is another field, in which we are world leaders (see Beyond no. 4/2007). Energy efficient processes is currently a hot issue, for example."

The new Research Programme is applicable to the 2009-2011 period. There are already ideas, concepts and proposals for projects and clusters, which will be discussed and analysed. It is difficult to predict the total scope of the programme in terms of costs, however, investments in the current programme that is continuing until 2008 will be approx. € 35m.

In Cluster Research, there are enormous advantages for participating companies. There are often problems and issues common to their lines of business

that need solving or dealing with. There might also be an area that needs developing, where an individual company does not have the financial resources nor the know-how, just on its own.

The participating companies share investment costs in R&D and reduce their risks, while benefiting many times over from the investment. The results that a research project end in can, for example, be further developed by an individual company or they can lead to a commission being placed with STFI-Packforsk, resulting in competitive advantages for a particular company. ●

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ests, together with understanding better how the fibres affect the properties of paper and pulp. Then the thing to do is to convert the results into a commission format. We've already studied eucalyptus and different kinds of spruce and pine on four continents."

Case studies with individual companies have been included in the Cluster. This provides a concrete direction for the research and the company is given a clearer picture of the possibilities. An example of this is a case study at one of the Stora Enso mills. It was necessary to obtain data about the fibre resources in the wood resource areas of the mill. As a result, the Regional Resources Databases concept was developed.

"In the aftermath of a destructive gale, Gudrun, we received many queries. This underlined the need and importance of possessing complete information for carrying out projects speedily. That concept has now been further developed and a database has been produced for all of Sweden, with information on volumes and properties of the wood and fibres, from the perspective of pulp and paper production. We utilise this in commissions, from Stora Enso, for instance, to evaluate the differences among fibres of various origins and how they can affect production in different mills. We're currently putting a database together in southern Norway and looking at different applications in the forest and at mills."

Klabin in South America became a Partner customer a few years ago. This

introduced South American pine fibres to the picture. Klabin is an active participant in the TOFU Cluster.

Other research projects contribute to the development of methods, yet Cluster research maintains an exceptional position, due to the fact that it provides stability to and a continual broad interface with the industry. Sometimes, it might concern a sensitive commission, dealing with confidential information, while, at the same time, achieving maximal synergy effects. But this is not at all out of the ordinary for STFI-Packforsk. ●

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Klusterforskning med resultat som implementeras i kunduppdrag eller genom företags egen utveckling är sedan många år en väl etablerad verksamhetsform hos STFI-Packforsk. I klustren samverkar avtalskunder för att lösa gemensamma problem och skapa nya möjligheter. Resultaten vidareutvecklas och tillämpas sedan för att skapa konkurrensfördelar för de enskilda företagen. Som exempel beskriver Sven-Olof Lundqvist hur man i TOFU-klustret långsiktigt byggt upp kunskap och utvecklat verktyg för att få bättre ved- och fliskvalitet. Utvecklingen har finansierats gemensamt men metoderna kan senare utnyttjas av de enskilda företagen samt för nya applikationer. Klusterforskningen har en särställning i bidragandet till metodutveckling genom att ge stadga och en ständig bred kontaktyta med industrin.

Profile



Sven-Olof Lundqvist

Goal oriented. Friendly, yet very resolute when necessary. The majority of those that have had contact with Sven-Olof Lundqvist would agree with this description of him.

Sven-Olof has had many responsibilities in his time at STFI-Packforsk. Following his graduation from the Royal Institute of Technology, Stockholm, in technical physics and measurement and automatic control engineering, he has been a research scientist, the manager of a large measurement and control technology operation, co-ordinator of EU projects and a Cluster Manager. He took a Lic. Engineering Degree in modelling and controlling oxygen bleaching at the start of the 90s. A great deal of research commissions and development projects in mills have given him significant experience and led to a broad contact network. He considers himself a research entrepreneur.

"I've done a lot of travelling on business during the years. I value the network I've established with customers and fellow research scientists all around the world."

Sven-Olof grew up in Värmland, a county in central Sweden, with his feet planted well and truly in the land and the forest. Working later with projects in pulp mills led him, via the pulp and chips, to fibres and their properties: How the various fibres in the forest can best be utilised in different kinds of paper.

"I find enjoyment in seeing how fibres work and in participating in the research process," he says.

Sven-Olof's family, including his two sons, is important to him. He enjoys taking his sons for driving lessons. Every now and then, he plays his saxophone, which has replaced the flute in recent years. ●

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Michael Sturges and Cathrine Löfgren are collaborating on several projects in the field of Carbon Footprint.

Carbon Footprint

– a key issue for the paper industry

The paper industry is now acting to create a total picture of how to influence the CO₂ balance. Every product and all production in the industry affect CO₂ in the atmosphere, while the climate problem today is a self evident part of an evaluation by industrial operations. STFI-Packforsk has the expertise for playing a role in creating tools for the industry to estimate its own influence on the CO₂ balance. Furthermore, it can contribute to achieving an unbiased picture of the Carbon Footprint in the paper industry.

Cathrine Löfgren of STFI-Packforsk is in charge of the work that the Company is currently carrying out in a trade and industry group called the European Paper Sack Research Group (ESG), which is providing the industry with a foundation for making the right strategic decisions, when it comes to Carbon Footprint.

“The paper industry can utilise its raw materials more effectively, including energy, and it will be able to further increase its sustainability,” comments Catherine, pointing out the fact that the paper industry already has many advantages in the area of Carbon Footprint.

“The paper industry uses a renewable raw material that consumes CO₂ when it's growing. This is often a big advantage in matters concerning climate and sustainable development. Carbon Footprint is nevertheless a rather complicated concept that implies a multitude of factors, difficult to calculate. We at STFI-Packforsk have excellent collective know-how and knowledge about raw materials, processes and products, which makes it possible for us to construct

reliable models that cover the entire life cycle for paper products. By means of the activities being carried out in the ESG, we are able to give its members a tool that provides them with a proper picture of their Carbon Footprints. Consequently, they will be able to make the right decisions for reducing any possible negative effects coming from their operations.”

Unclear footprint

Methods for measuring Carbon Footprint have not yet been established. For the European paper industry, its trade organisation, CEPI, has produced a joint framework with 10 parameters. CITPA, the International Confederation of Paper and Board Converters in Europe, is presently working on how these parameters are to be used in the various sectors. The next stage is to produce calculation templates for the different branches of the industry. These would be templates that individual companies could then use for calculating their own Carbon Footprint. STFI-Packforsk is constructing this calculation template for the sack paper and paper sack producers that are members of the ESG.

Strategic decisions vital

An accurate Carbon Footprint statement of accounts is becoming an all important issue, when it comes to contact with customers and partners, not least in the UK, where the new STFI-Packforsk office has several projects on the go.

Michael Sturges of STFI-Packforsk UK reports, “In collaboration with colleagues at STFI-Packforsk in Sweden, we are

working on a big project for the British newspaper distributor, ANMW. Today, ANMW is witnessing changes in the newspaper market, the growing number of free newspapers for instance. The industry needs to make strategic decisions for reducing contributions to Carbon Footprint, at points where the measures taken give the maximum benefits. The knowledge base for this project will then form a foundation for calculating how individual companies and organisations in the industry should react to reduce their Carbon Footprint.” ●

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Pappersindustrin

agerar nu för att skapa en komplett bild av hur man påverkar koldioxidbalansen. Klimatfrågan är idag en självklar del i bedömningen av industriell verksamhet. STFI-Packforsk kan skapa verktyg för industrins beräkningar av sin egen påverkan på koldioxidbalansen och bidra till att bilden av pappersindustrins Carbon footprint blir rättvis.

Cathrine Löfgren leder arbetet inom ESG, European Paper Sack Research Group, att ge branschen underlag för att ta rätt strategiska beslut. Bl a byggs nu en beräkningsmall för papperssäck- och säckpapperstillverkarna inom ESG.

STFI-Packforsk UK driver tillsammans med moderbolaget ett stort projekt för den brittiska tidningsdistributören ANMW. Kunskapsbasen från projektet kommer, enligt Michael Sturges, att bilda underlag för beräkningar för enskilda företag.

All facets of packaging in 13 days

Packaging makes a difference, a very big difference. It serves as a protective cover and a bearer of information, such as declarations of contents or pharmaceutical prescriptions. Packaging can also be a marketing tool or a strategic instrument in building up a proprietary name.

Every link in the chain, from the producer of a packaging material to the end-user of the product, makes its demands on a package. An opportunity of gaining a true insight into the complex, multi-faceted world of packaging is being offered, when STFI-Packforsk starts a new round of its Packaging Diploma Course in January.

The course leader, Stefan Engström, comments, "This Diploma Course is certainly one of the fastest ways of learning a lot about packaging in a short time. During the 13 days, participants acquire broad and deep basic knowledge about packaging, as well as a comprehensive view that covers everything from packaging materials to strategic approaches."

The Packaging Diploma Course has been constantly developing since it was first held 35 years ago. New for this particular course is that it has been condensed to fit into the efficient business climate of today. The course is divided into 4 parts, and finishes with a project assignment, where participants have to draw on all the fields of knowledge in a practical situation.

Exchange of experiences improves customer services

The course is primarily directed at those who are already working in the branch and who want to broaden or extend their knowledge, in order to further develop in their own sphere of work. For many, it is a way of gaining a quick overview of the whole world of packaging. Three years ago, when Michael Billow bought his company, Maskinlindell AB, he had no



Theoretical knowledge is illustrated with the aid of study visits and group work. These pictures were taken at the previous Packaging Diploma Course.

experience in the business. The Diploma Course provided him with the comprehensive information he needed to be able to offer his customers a service that focuses on problem solving rather than on selling equipment and processes.

"It was like stepping into a library. Everything was there. We not only got to study calculation models and development trends, but we were also given many sustainable and credible viewpoints for what's important, why we buy certain packages, etc. I'm now able to hold a discussion with all the parties in the entire value chain."

"Another big advantage was that those who participated had such diverse backgrounds. The exchanging of experiences was a valuable complement to the course itself," adds Michael Billow.

Jonas Adler from Iggesund Paperboard Europe sees this meeting with other participants as one of the most significant advantages of the courses. Discussing problems and issues after each session can lead to new insights and collaboration.

"For us, in Sweden, to be competitive, we have to learn to collaborate more to develop new materials and packaging solutions," says Jonas Adler.


He emphasises that meeting with other participants improves the level of



discussions with end-users and proprietary name owners.

"It's been easier to sharpen my arguments on behalf of paperboard, now that I can put them into relation to other packaging materials. Having this knowledge and know-how has turned us into a more interesting 'discussion partner'."

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 **En möjlighet** till verklig inblick i förpackningens mångfacetterade värld ges när STFI-Packforsk i januari startar en ny omgång av Diplombildning i Förpackningskunskap. Under totalt 13 dagar fördelade på fyra internatperioder ges deltagarna en bred och djup baskunskap och en helhetssyn omfattande allt från förpackningsmaterial till det strategiska perspektivet. Utbildningen vänder sig i första hand till redan yrkesverksamma som vill bredda eller fördjupa sina kunskaper för att utvecklas i arbetet. För Michael Billow, Maskinlindell AB, har den gett en heltäckande orientering som behövs för att kunna skapa erbjudanden till kunderna med fokus på lösningar i stället för utrustning och processer. Jonas Adler, Iggesund Paperboard Europe, betonar diskussioner och erfarenhetsutbyte mellan kursdeltagarna.



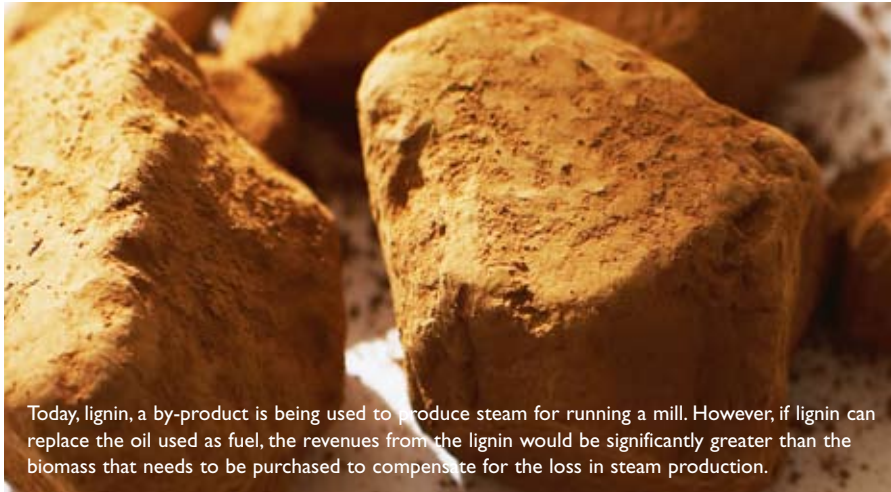
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B



An area of Nordic excellence



Today, lignin, a by-product is being used to produce steam for running a mill. However, if lignin can replace the oil used as fuel, the revenues from the lignin would be significantly greater than the biomass that needs to be purchased to compensate for the loss in steam production.

“We’re so good at this in the Nordic Region, which is a good reason for taking this initiative.” Åsa Samuelsson, who, together with Peter Axegård, is planning the 2008 Nordic Wood Biorefinery Conference (NWBC 2008), speaks enthusiastically about how it is possible to extract renewable very interesting products from low-value by-products.

This Conference, being held between 11 and 13 March, 2008, in Stockholm, is one of the first major international conferences in its field. Topics will include Biorefinery Separation and Conversion Processes, as well as Energy, Chemicals and Materials from the Wood-based Biorefinery. The speakers are especially selected and represent the global chemical, energy, pulp and paper industry as well as the global research community. This will result in a programme that will maintain an elevated level of quality, while providing very good coverage of the subject of Wood Biorefinery.

The Conference will give an account of the results of the soon to be finalised EU project, WaCheUp, which has been in progress since 2005; a very successful project with participants from Portugal, Finland and Sweden. In WaCheUp, making chemicals and materials for different areas of use is an interesting way of utilising by-products that come from pulp and cork production.

“Biofuel is another area that is very much in focus these days. It’s attracting a great deal of interest all around the world. That’s why we’ve chosen to have an entire session on it at the Conference, where research scientists and the industry

are going to present what they’re doing in this field,” continues Åsa Samuelsson.

“The main aim of the Conference is to disseminate information about various projects and results related to the Wood biorefinery. In the Nordic Region, we work a great deal with networking. This contributes very much to achieving concrete solutions and potential products. The network includes the Chalmers University of Technology in Göteborg, Lund University and, in Finland, the VTT Technical Research Centre of Finland, KCL and the Åbo Akademi University.

“Another aim is to demonstrate the world leading position that we, in the Nordic Region, have in this field. One explanation of this is that we are world leaders at processing wood into pulp, which is then used in paper production. We have modern industrial processes and very solid expertise in wood chemistry, process technology and complex systems.”

50% is by-product

About half of a tonne of pulp is produced from one tonne of wood. With the other half a tonne, it is possible to produce high quality biofuels, chemicals, materials and other marketable products. Lignin, for

example, is an energy-rich by-product, which, today, can be extracted from pulp mill black liquor and converted to a high quality by-product to replace oil. For many years now, STFI-Packforsk has worked on various projects for developing processes that effectively utilise the raw material. ●

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See also www.stfi-packforsk.se/nwbc2008



Konferensen 2008 Nordic Wood

Biorefinery Conference, NWBC 2008, som hålls den 11-14 mars i Stockholm, är en av de första större internationella samlingarna inom området bioraffinaderi. Ämnen som kommer att presenteras är separations- och konverteringsprocesser och energi, kemikalier och material från vedbaserad bioraffinering.

Huvudsyftet är att sprida kunskap om olika projekt och resultat, bl a från EU-projektet WaCheUp som forskar på att göra kemikalier och material för olika användningsområden från biprodukter.

Lignin är en energirik biprodukt som idag kan utvinna ur massabruks svartlutar och omvandlas till högkvalitativt biobränsle som kan ersätta olja.



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Beyond is published by STFI-Packforsk AB
Legally responsible for the publication:
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Editor: Veronica Rudheim (veronica.rudheim@stfi.se)
ISSN: 1652-6503
Print: SIB-Tryck, Norsborg



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