

EcoBuild – a competence centre for eco-efficient and innovative wood-based materials

Message from the Manager

EcoBuild has now entered its Phase 2, the second three-year period. Most of the plans that are defined in the research programme have been detailed and the activities initiated. An important change from Phase 1 is that we now can see a much clearer focus on "green chemical engineering". The earlier 21 projects have now been reduced in number to 15. This newsletter issue gives an overview of the five focus areas and the 15 projects. Some projects continue from before, like the one on UV resistant clear coatings for wood, or the one on novel protein-based adhesives for boards etc. Also completely new projects have been added, for example our big and exciting project entitled CelluNova. It is a cross-disciplinary project aiming at the development of novel cellulose-based textile fibres and technical fibres, in principle spanning over the whole value chain from the wood raw material to a spun fibre and its use in different applications. A large number of researchers, entrepreneurs and industrial stakeholders are already deeply involved in the work. CelluNova has definitely had a flying start (see a separate section in this issue).

Some evaluation criteria are particularly important for an institute based competence centre like EcoBuild, where the direct financing comes from both industry and the main financiers VINNOVA, the Knowledge Foundation and the Strategic Research Foundation. One such criterion is "valorization", and we can now clearly discern several cases of added value that are directly derived from the centre activities. One example is the concept of coil coatings with a reactive diluents, which has already reached the production stage. Another is the new boat deck material from Kebony, a successful replacement of environmentally questionable imported teak. There are certainly more examples, and we call for contributions from all of

you who are engaged in the centre. Can you come up with more such "success stories" that clearly show EcoBuild's valorization effects? It may include also academic breakthroughs, e.g. that a scientific journal article or conference paper has drawn a marked attention.

We begin to face the big challenge of how to realize EcoBuild's "Phase 3 and beyond", when the present base financing stops in 2012. The framework programmes of EU are a clear option, and we should already now mobilize efforts to seek and coordinate more EU projects in the future. We are also aware of several ideas among national financing bodies for forthcoming research programmes on biobased materials which seems to fit well to EcoBuild's profile.

As a last remark, the centre management wants to underscore the importance of the web team site as a project tool and a virtual meeting place, and to encourage the use of it in all projects! See also a separate article. In this early stage of the exciting Phase 2, we wish you all a pleasant and relaxing summer!

Magnus Wälinder

Centre Management



Magnus Wälinder
Centre Manager



Mats Westin
Deputy Centre Manager

Comments from the editor

A lot has happened during the three first years of EcoBuild. The Centre has become established as a cooperation platform of weight, and it is known in large groups of material scientists within and outside the borders of Sweden and Europe. Several large projects have been very successful.

The newsletters have been appreciated. They play a role in giving a sense of context and kinship to the participants, and they are important as a part of the outward image. Another part of the supporting structure which is important for the centre is the internal web team site, which required a thorough overhaul when the new project structure fell into place. Stricter demands have been placed on the intellectual property integrity, with a more detailed subdivision of the work areas and an access to information only to the exactly specified individuals who are authorized. When this work now is completed, the centre management expects an increased and more active use of the team site in all projects. It provides a higher level of security than e-mail in handling project documents, it allows internal announcements and can make us generally more efficient. Detailed

instructions have been sent out to everybody, and especially the project leaders are encouraged to propose wishes for improvements and new functions. For the work force of the centre, the information is repeated here in brief:

You should all have received e-mails with login details. The team site is reached from the public home page www.ecobuild.se and the small print "Login" at the top.

- The top level, the Start Page, gives you some general information and announcements.
- In the panel on the left-hand side you will find links to one or more subsites, depending on which rights you have been given. All of you have the rights to Read on the subsite for each Focus Area (FA1-FA5: Binders, Coatings etc.) where you are engaged, but only project leaders can also Contribute there.
- Below each Focus Area, you will find the sub-site(s) for the project(s) that you work in. Upload and download documents according to instructions from your project leader. Other projects are simply not visible to you.

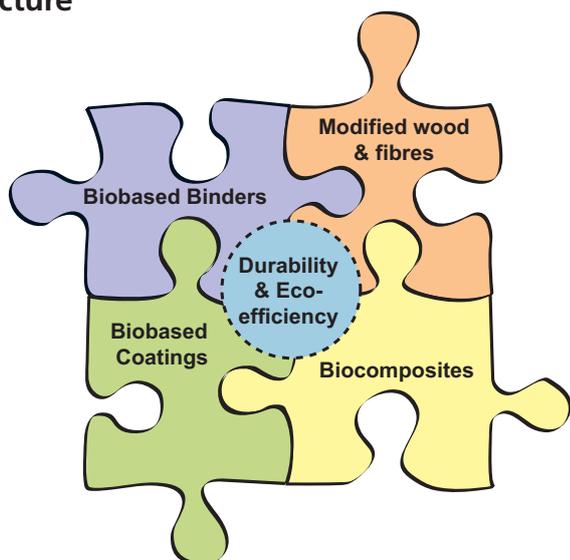
cont.

- Within several projects, some information is available only to a selection of users. You can only see the sub-sites and document libraries that you are entitled to.
- Generally, documents are only placed on the LOWEST levels, unless it is clear that the information is open to everybody in the whole project or the Focus Area. No project plans, results or meeting minutes are to be saved anywhere on the start page or the FA subsite. They are reserved for information of broad interest.
- On request, we can add simple subsites for the management or follow-up of individual meetings or brainstorming sessions.

Please contact us if you have questions or run into difficulties!

Finn Englund

Phase 2 (2010-2012) and the new project structure



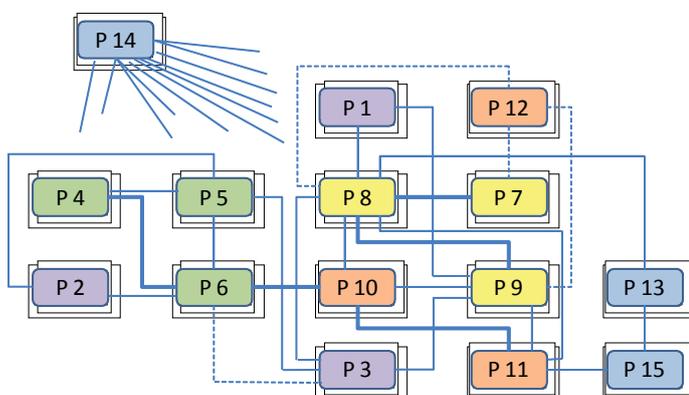
The schematic view of EcoBuild as a jigsaw puzzle is still as valid as before. The pieces are now called Focus Areas FA, but they keep their previous names. Their contents have changed a bit, though. The number of projects has been reduced from 21 to 15, three in each FA.

FA1 Biobased Binders

- P1 Protein binders
- P2 Emulsion polymerization
- P3 Extractive derivatives

FA2 Biobased Coatings

- P4 Clear coatings
- P5 Biopolyester coatings
- P6 Coatings for modified wood



The projects have many mutual contact points and synergy effects. Some links of special significance are marked with thicker lines, while other links are more hypothetical, but generally this graph should not be interpreted as a complete picture of all connections. The point is that many projects support each other.

FA3 Biocomposites

- P7 WPCs for furniture
- P8 Biocomposites for outdoor use
- P9 Thermoset biocomposites

FA4 Modified wood & fibres

- P10 Modified wood products
- P11 New chemistry for in-situ polymerization in wood
- P12 CelluNova

FA5 Durability & Eco-efficiency

- P13 Metal free preservatives
- P14 Durability and ecotox
- P15 Understanding of protection mechanisms

Project 3 is a widened version of a former subproject, where only a limited amount of work has been done, but it will now set a higher pace and it has direct connections to P5 and P8. Project 5 contains partly new tasks, even if it largely is a continuation of the fruitful work during Phase 1. P9 opens a brand new field that leads our paths to new applications. P11 builds on the work done so far, but the scope is now considerably wider and more ambitious. The CelluNova project, P12, is perhaps the most radical addition. It is also without comparison the largest individual project in EcoBuild at the moment, and it is described more further down in this newsletter. Otherwise the project titles can be recognized from Phase 1, but the contents of the research and development work is naturally continuously revised along the way.

For an easy overview, the responsibilities for the progress is spread over the following area coordinators and project leaders:

- FA1 Mark Lawther, Biovelop
- FA2 Malin Dalborg, SP TräteK
- FA3 Magnus Wålinder, SP TräteK/KTH
- FA4 Stacy Trey, SP TräteK/KTH
- FA5 Mats Westin, SP TräteK

- P1 Mats Johansson, KTH
- P2 Magnus Eriksson, SP TräteK/KTH
- P3 Finn Englund, SP TräteK
- P4 Sara Olsson, SP TräteK
- P5 Malin Dalborg/Magnus Eriksson, SP TräteK
- P6 Malin Dalborg, SP TräteK
- P7 Jonas Aspling, Swerea IVF
- P8 Kristoffer Segerholm, SP TräteK/KTH
- P9 Marielle Henriksson, SP TräteK
- P10 Pia Larsson Brelid, SP TräteK
- P11 Mats Westin, SP TräteK
- P12 Stacy Trey, SP TräteK/KTH
- P13 Jöran Jermer, SP TräteK
- P14 Mats Westin, SP TräteK
- P15 Gry Alfredsen, Skog og Landskap

As the works proceeds and the centre is changed it is natural that some of the partners leave the platform, while others climb aboard. Those who leave us now after fulfilling the agreed tasks in Phase 1 are duly thanked for excellent contributions. Three university partners have joined us: Universidade de Coimbra in Portugal, Karlstad university (chemical technology), and Lunds university (theoretical chemistry and physical chemistry). The present set of industrial partners are listed in the updated summary on the last page. We want to direct special attention to the newly arrived, who are warmly welcomed:

- Dellencat, Sweden
- Eastman Chemical Company, USA
- Heatwood, Sweden
- Hennes & Mauritz, Sweden
- Norner Innovation, Norway
- Svenskt Konstsilke, Sweden

The main financiers from the public sector are Vinnova and the Knowledge Foundation, as before. The Strategic Research Foundation are still present but in a new role through a special grant to EcoBuild through their programme ProInstitute that above all aims at strengthening the contacts with the universities.

The fourth EcoBuild Annual Meeting

The annual meeting was held in Stockholm 20 January, and after the shift from Phase 1 to Phase 2 there were quite a few new participants who had their first opportunity to get acquainted with the centre in earnest. The centre managers and the coordinators of the Focus Areas showed presentations that together gave a valuable overview of the centre activities. The formal meeting part was brief and had as its most important issue the confirmation of the new Centre Board. No big changes have been made. The efforts of Istvan Furó, KTH, are gratefully acknowledged, and he now leaves his place to Pernilla Walkenström, Swerea IVF.

The Centre Managers on stage.



The chairman of the Board queries about the projects.



Intermission mingle.

A flying start for the CelluNova project



In March, the team of almost 30 people cooperating in this large new project met for the first time. As already mentioned elsewhere, this is the largest of the projects, with a three-year budget of about 6 MSEK. The aim can briefly be described as a cost-effective extraction of cellulose from forest resources and its processing to textile fibres. This can become a Nordic alternative to cotton, a textile fibre which

is burdened by a very high water consumption and requires large amounts of pesticides before harvesting, and which also requires long-haul transportation. It is true that synthetic cellulose fibres have existed for long times through the viscose process, but we see here opportunities to reach considerably improved fibre properties and textile materials with a lower environmental impact than others.

The discussions at this first workshop were held on many levels, from process technology to deep theoretical speculations around the true nature of cellulose. It was on the whole a very stimulating day that surely stimulated all participants for the coming work.

The research is mainly performed at SP, Swerea IVF and four universities: Coimbra Univ. in Portugal, Karlstad Univ., Lunds Univ., and Chalmers in Göteborg. Among the persons involved we find two professors who are also members of the committee for the Nobel prize in chemistry, Björn Lindman (physical chemistry, LU) and Gunnar Karlström (theoretical chemistry, LU). 5-6 postdocs och tre PhD students are also part of the team. Industrial partners are Hennes & Mauritz, Ikea, Kiram, SödraCell and Svenskt Konstsilke, and they represent the full value chain from the forest to the consumer goods. The work covers methods for activation of dissolving pulp, theoretical modeling, new methods to dissolve cellulose, development of spinning technology, post-treatment of fibres, weaving and nonwoven technology, and assessment of the sustainability aspects of the new methods and products.

A new doctor flying

Annica Pilgård won her doctor's degree the 4th of June at Chalmers University of Technology by the defence of her thesis entitled "Fungal degradation patterns and toxicity of furfurylated wood". Magdalena Kutnik from FCBA in Bordeaux acted as opponent. Annica is an SP employee, but she has done most of her work during a long stay at the Norwegian Forest and Landscape Institute. The results presented in the thesis gives important contributions to the understanding of the mechanisms involved in making furfurylated wood resistant to decay fungi. Annica also showed that differences in the design of the modification process have a great influence on the toxicity of leaching waters from the modified wood. An explanation to this may lie in different levels of completeness in the polymerization. EcoBuild extends warm congratulations to Annica for her new title and looks forward to her continued achievements in FA5 and elsewhere.



Upcoming conferences 2009

- 20-22 juni 2010 - Forest Products Society, 64th International Convention, Madison, Wisconsin, USA. <http://www.forestprod.org/ic-2010callforpapers.html>
- 9-23 juli 2010 - 9th World Congress on Computational Mechanics & 4th Pacific Congress on Computational Mechanics, Sydney, Australien. Inkluderar ett mini-symposium "Computational Material Modeling of Wood and Wood Products". <http://www.wccm2010.com/>
- 20-21 september 2010 - ECWM5 - the 5th European Conference on Wood Modification, Riga, Lettland. <http://www.ecwm5.lv/>
- 22-24 mars 2011 - 3rd Nordic Wood Biorefinery Conference (NWBC), Stockholm. <http://www.innventia.com/nwbc2011>
- 16-17 juni 2011 - International Conference on structural health assessment of timber structures, Lisbon, Portugal. <http://shatis11.Inec.pt/>
- 29-31 augusti 2011 - BIOPOL 2011, the 3rd International Conference on Biodegradable and/or Biobased Polymers, Strasbourg, France. Home page not yet available, but see <http://biopol.free.fr/index.php/after-bio-pol-the-blog-biopol-the-conference/>

Key facts about EcoBuild

EcoBuild is a competence centre for cooperation between universities, institutes and industry. The centre is located in the Stockholm campus site of KTH and SP Technical Research Institute of Sweden. The 27 industrial partners cover the whole range from small and medium-sized enterprises to large international corporations, and several of them are based abroad.

The centre is estimated to have a turnover of ca. 140 MSEK during the period 2007-2012, spin-off effects included. VINNOVA, the Knowledge Foundation and the Swedish Foundation for Strategic Research contributes with 40 MSEK. The industry co-finances with 65 MSEK, half of which is as cash contributions and the rest as their own work efforts.

At the moment ca. 120 persons are connected to the activities of EcoBuild. Around 80 researchers are directly involved in the projects. 71 of these are senior researchers, out of which 46 have a PhD degree. Ca. 40 pursue their research mainly at institutes or universities and ca. 40 at the partner industries. The cooperation is reinforced by several cases of double affiliation. 8 PhD students work directly as EcoBuild students, and another 2 external students work within connected projects.

Industrial partners

Akzo Nobel Industrial Coatings AB, Akzo Nobel Industrial Finishes AB, Arch Timber Protection, BioVelop A/S, Byggelit AB, Capeco AB, Casco Adhesives AB, Dellencat, Dr. Wolman GmbH - BASF Group, Eastman Chemical Company, Heatwood AB, Hennes & Mauritz AB, IKEA of Sweden AB, Jeld-Wen Sverige AB, Kebony ASA, KIRAM AB, Norner Innovation AS, Ofk Plast / Polyplank AB, Osmose Denmark A/S, Perstorp AB, SSAB Tunntplåt AB, Svenska Lantmännen, Svenskt Konstsilke AB, Södra Skogsägarna, TanumsFönster AB, Vestre AB, Viance.

Centre Board

Ralph Nussbaum, Research Manager Coatings IKEA
Lars Stigsson, CEO KIRAM
Eva Hörwing, CEO Byggelit Holding
Ulf Odda, General Manager Casco Board Systems (Akzo Nobel)
Hans Thulin, (ordf.) CEO TanumsFönster
Per-Erik Petersson, CTO Chief Technology Officer/Prof SP
Pernilla Walkenström, Swerea IVF
Per Brynildsen, Research Director Kebony

Main financiers of the Centre



Knowledge Foundation >>

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and durable wood based materials and products