



Final Call Topic Proposals from the Forest-based sector ETP Towards the KBBE thematic priority (23 August 2011)

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P&P13. Cascade utilisation of fibre-based biomass by utilize recycling and optimising material loops to secure material base.

Justification:

Cascade utilisation is a well-developed process in pulp & paper industry. Working with natural substances is always in touch with separating the raw material from fractions that cannot be used for production. This segregation is necessary to achieve stable quality levels in technical and hygiene & safety reasons. As this fractioning processes are as good as techno-economically reasonable some valuable substances remain still in these fractions. Higher raw material costs caused by more and more insecurity of raw material supply and the EU-policy create the necessary of further developments. To use the potential of various substances in bio-based materials a raised differentiation enables the development of by-products. A future target is to receive a number of materials that are optimised for its further purpose (e.g.: every class of fibre its specific product). Cascade utilisation is the basis for biorefinery concepts as it focuses on the isolation and use of small scale materials and molecules components after pulp and paper processing.

Scope:

Main efforts can be done at the separation of waste material flows in the mill. Separation technology and integration in the production process have to be studied intensively:

- Mapping of available resources regarding properties relevant for more efficient production of such products. Methods for efficient characterization of such properties
- Identification of best access point to isolate by-products
- Solutions for efficient handling/processing at the mill for supply of uniform and suitable materials for production of different types of products. Process control and information support.
- Process solutions for separation/enrichment and processing of materials and chemical compounds of particularly beneficial properties for use in different types of products
- Cooperate with others sectors to develop products based on side streams

Recommended size (instrument) and duration:

Collaborative large scale project, duration 4 years, incorporation of stakeholders from engineering sector could be necessary.

Expected impact:

Increased resource efficiency, development of new qualities by better separation, higher energy efficiency because of optimised raw material properties, reduction of costs for waste treatment



P&P15. Utilization of annual fibre plants and agro-waste as fibre sources for papermaking

Justification:

Although the demand for some types of paper might stagnate or slightly decrease in Europe in the medium term many other uses for wood will effect dramatic overall increases in global wood demand according to a recent report from PwC. And it is no longer only the traditional wood based industries which make this demand grow. The climate change menace has motivated the European Union to set rules with respect to the generation of electrical power which require a 20 % share generated through renewable resources by 2020. As it is fairly unrealistic that other “alternative” energy sources will significantly contribute to meeting this challenge on such a short notice a far more intensive use of wood based fuels e.g. wood pellets is likely. This will inevitably result not only in increasing wood prices but - even worse - in shortages in wood supply, also outside Europe. Basically the same applies to the availability of recovered paper. Here it is not (yet) the energy issue but the rapidly increasing demand of the paper industries in emerging economies in particular in East-Asia which cannot be satisfied through local resources. Against this background the EU paper industry should thoroughly analyse the applicability of alternative raw materials e.g. those which had been used before wood became an accessible raw material or which are already used successfully (though with questionable environmental compatibility) elsewhere in the world.

Scope:

Annual plants and agricultural residues (straw) have been serving as raw materials for papermaking since many centuries. The main reasons why they have virtually disappeared with the advent of wood fibres – although they are available in abundance all over the world - include problems with collection and transportation, storage and handling, washing, bleaching, papermaking, and chemical recovery. Many of these problems have not been resolved until today though not because they are physically or chemically unattainable but rather because not much research effort has been put on them. This was largely due to the fact that the raw material wood was far more convenient and economical. As these advantages gradually fade away the paper industry should accept it not only as an economic obligation to take a much closer and more holistic look at the potential of alternative fibre sources. Undoubtedly a broader utilization of non-woods would constitute a fundamental change in the industry’s raw material handling and procurement infrastructures. So it is not mainly the question of the general suitability of such fibers – this has been sufficiently proved for a large number of different fibres - which should be in the focus of future research but rather the environmental compatibility of the procurement, pulping and bleaching techniques, residue handling and recycling etc.

Recommended size (instrument) and duration:

Large scale collaborative project - 3 to 4 years

Expected impact:

The results would address needs of the whole industry the true dimension of which is currently underestimated to a certain extent. Successful projects could help to pave the way for the utilization of a virtually inexhaustible renewable raw material source for the paper industry. It would further contribute to strengthen Europe’s leadership in papermaking technology in general. Further potentially positive impacts could be the development of economic small-scale pulping operations which could be instrumental in terms of job creation and the development of in particular rural communities in southern and south-eastern Europe as well as in many other parts of the world.



P&P16. Efficient use of forest biomass in novel and added-value bio refinery, pulp and paper products

Justification:

The major part of the European forest biomass has for decades been used for production of pulp and paper, boards and sawn products, followed by conversion to packaging, prints, housing, furniture, etc. Minor parts have been used as fuelwood for heating. This is now changing rapidly. Competition from countries with fast-growing plantation forests products and the expanding bio-energy sector creates an increasing need for efficiency and for novel and higher added-value products in the European forest-based industry. Many pulp mills are now also suppliers of electricity and heating. Some are diversifying into bio refineries, adding products as fuels, chemicals and/or materials for novel bio-based products, replacing existing products based on fossil resources. Compared to its most advanced competitors, the European forest-based industries are, however, dependent on a more slow-growing forest resource with other tree species, growth conditions and properties. For strengthening of the development towards green solutions and improved competitiveness of the European industries, there is a need for good knowledge about the properties of regionally available resources and how they are best used for more efficient production of products for both novel and traditional types, as well as solutions for most efficient processing of the materials to meet the target properties for the products.

Scope:

The objective is to create knowledge and process solutions for increased benefits of using existing European forest resources for more efficient production of existing and novel paper and bio refinery products from these resources, in order to reduce climate impact and use of fossil resources, secure energy supply, reduce material use and improve competitiveness. Areas encompassed of the scope are:

- Knowledge about what properties are ideal for novel and further added value bio refinery, pulp and paper products. Relationships between properties of wood and products, need for use of materials, energy, chemicals, etc, as well as the resulting costs.
- Mapping of available forest resources regarding properties relevant for more efficient production of such products. Methods for efficient characterization of such properties
- Measurement facilities for assessment of such properties on wood when delivered to the mill and at the mill. Solutions for efficient handling/processing at the mill for supply of uniform and suitable materials for production of different types of products. Process control and information support.
- Process solutions for separation/enrichment and processing of materials and chemical compounds of particularly beneficial properties for use in different types of products

For sharper focus, this topic does not include forest operations, sawmilling and bio energy. Nor are R&D for the actual production of novel or further added-value products included, but sub-projects illustrating what can be achieved are appreciated.

Recommended size (instrument) and duration:

Large scale collaborative project - 3 to 4 years

Expected impact:

The results shall significantly improve the possibilities to take advantage of the special characteristics of European forest resources for production of novel and further added value bio refinery, pulp and paper products. This will contribute to reduced climate impact and use of fossil resources, secure energy supply, reduce material use. This will in turn, result in new

and better products to the benefit of users and society, improve the competitiveness of this sector of the European industry and bring economic and social development.



P&P7+ Bridging collaboration between forest-based industry and chemical sectors aiming new breakthroughs in bio-based chemicals

- Business models
- Value networks with other industries

Justification:

Lignocelluloses will play a major role when it comes to sustainable chemistry. Some by-products from chemical pulp mills are already sold to the chemical industry. The paper industry is for the time being not very interested in this deals, as burning of the chemicals brings often more profit than selling. After identifying products and adjusting business models the chemical pulp mills and some pulp and paper mills can be upgraded to real bio refineries.

The forest-based sector is investing considerable time and resources in research for biorefinery applications considering that chemicals and polymers fractionated from wood will be used in the chemical sector as building blocks of commercial chemicals traditionally produced using oil refinery. At the same time, the chemical sector is investing considerable time and resources in research involving the utilisation of fermentation strategies to generate bio-based chemicals using different routes. The strategy of the chemical sector may result in production of bio-based chemicals without the need of forest biorefinery. The limited collaboration and synergy between the different sectors is causing delays in new commercial breakthroughs for bio-based chemicals because each sector is striving to work independently without taking the advantage of strategic collaboration.

Scope:

Research has to focus on materials which can be used for producing green chemicals. It should also show in which direction the current processes should be adapted to maximize the output of high added value products (Pulp, paper and refined chemicals). The second focus must be on business models. For the time being, the pulp and paper industry has no business models to deal with by-products. There is also no paper- or pulp-mill refining such products to such extend that it brings value to the mill.

On the other hand is the chemical industry looking for bulk volumes of cost effective raw materials. There is no place in their business models to buy limited amount of specialities which can be used as raw material to produce green high value products. The project has to identify the potential of refining in the forest-based industries which can maximize the benefits for forest-based and chemical industries to sell and buy such materials and to develop business models for implementation .

A collaboration initiative has to focus in combining experts and companies representing the forest sector and chemical industry towards systematic innovation for production of commercial bio-based chemicals and polymers. Research has to focus on utilisation of bio-based molecules and polymers fractionated by the forest sector and incorporated for replacement of current platform chemicals used in the chemical industry. Research shall result in commercial products with large application, joint ventures, small and medium scale enterprises which are able to act on the interface business between different sectors.



Recommended size (instrument) and duration: 3 to 4 years

Expected impact:

The results will meet the consumers' demands for green chemicals. It will enable forest-based industries fostering their competitiveness by creating more added value from utilizes biomass. It will reduce the dependency of Europe's industry on fossil fuels for the production of chemicals and reduce the Carbon footprint of such chemicals dramatically.



F4 Understanding motivations and decision making among forest owners in Europe as a basis for improved policy approaches

Justification:

Forests in Europe are sources of multiple public and private goods and services, like timber, wood for bio-energy, eco-tourism, biodiversity conservation and forests as carbon sinks. The provision of these goods and services depends crucially on private forest owners: Forests cover around 35 % of the EU territory, 65 % of which is privately owned by approximately 15 million forest owners, a significant part of these owning less than 2 hectares each.

However, European private forest owners form an increasingly heterogeneous group, also due to the documented fragmentation in South-Eastern Europe. In addition, growing numbers of non-agricultural ('urban') owners, owners for whom lack of forest profitability and lack of forest sector knowledge and networks may lead to sub-optimal management. This may lead to a decrease in supply of good and services and increasing risk of environmental calamities and natural hazards, e.g. fire risk in Mediterranean Europe. This hampers the ability of EU and member states to pursue core policies (e.g. EU's Forest Action Plan; Climate and Energy package; Water Framework Directive, Rural Development policies).

Scope:

This project should explore the diversity of forest owners and forest ownership structures in Europe in order to come up with policy recommendations as well as proposals for organisational designs that may enhance effective provision of public and private forest related goods and services along with adaptation to climate change.

Adopting e.g. a structured case study and quantitative analysis approach, it should address important research questions like: What are the patterns and dynamics of forest ownership throughout Europe? What are the motivations of different types of forest owners to provide goods and services, like biodiversity conservation or wood for bio-energy? What is the organisational and communication structure around different types of forest owners?

The project should elicit the information needed to design evidence based innovative policy approaches and instruments to create the link between individual owners and societal demands for products, goods and services. For effective implementation and transfer of research results, the project should include co-operation between research partners and SMEs from the extension sector enhancing the link between policy and forest owners.

Recommended size (instrument) and duration:

S/M scale collaborative project (3 million € over 4 years)

Expected impact:



The results will greatly improve our insights in the development of European forest ownership structures and the motivations and objectives of forest owners. It will develop guidelines and recommendations about how to best address segments of forest owners, so as to secure a more successful implementation of EU and national policies addressing all aspects from biodiversity conservation, over rural development to resource availability and energy policies. The project will be well-suited to the involvement of SME's in the forestry extension service sector across Europe, and hence foster innovation in this sector.

This proposal is linked to the Strategic Research Agenda of the Forest Based Sector, stressing the need for a better basis for forest policy and governance, and highlighted in the Mediterranean Forest Research Agenda. The project cover important research needs identified in the report to the European Commission "Prospects for the market supply of wood and other forest products from areas with fragmented forest-ownership structures".

Proposed Programme: KBBE Area 2.1.2, Main line: Forestry systems etc



F5. The role of urban forests and trees in delivering green infrastructure and regional identity

Justification:

Green infrastructure at different levels, and with forests and trees as major components, can help ensure efficient and sustainable land use by integrating functions or activities on the same piece of land. The spatial character of green infrastructure addresses both the issue of connectivity and the provision of ecosystem services. At the EU-level, green infrastructure has been identified as one of the main contributions to reversing the trend of biodiversity loss and to linking and strengthening diverse ecosystems in urban and rural areas. In urban and peri-urban areas, green infrastructure can help build resilience, for example in terms of adapting to climate change. Moreover, multifunctional urban and peri-urban green infrastructure also makes important socio-cultural and economic contributions. It can provide people with better access to outdoor environments, thus promoting health and wellbeing, while also helping to build regional identity and enhancing bio-cultural diversity. Green infrastructure in urban and peri-urban settings provides more attractive environments for investment and business, thus contributing to the green economy.

Scope:

Although green infrastructure is gaining prominence as a planning approach in urban and peri-urban areas, there is a need to identify state of art and good practices at the European level. Of particular interest in this respect are the study of governance and planning approaches that support the building and maintaining green infrastructure. Research also needs to assess goods and services provided by urban and peri-urban green spaces such as forests and tree plantations, with focus on addressing ways of linking environmental services with socio-cultural and economic services. Delivery mechanisms for multifunctional green infrastructure in urban and peri-urban environments, such as urban forestry and community forestry, need to be identified and studied. Research will require an interdisciplinary approach, including a socio-ecological systems perspective.

Recommended size (instrument) and duration: Large scale collaborative project - 3 to 5 years.

Expected impact:

The project should provide a sound evidence base for the further development of green infrastructure in urban and peri-urban settings, from the local to city region level. It will contribute to enhanced collaboration between disciplines and stakeholders involved with green infrastructure, particularly at the local and regional scale. Moreover, research should enhance the provision of ecosystem services by green infrastructure, and the linking of environmental services with socio-cultural aspects in particular.

F8. Integrated study of biomass energy potentials

Justification:

The forest based sector as well as the agricultural and the waste sector can contribute significantly to the EU aim for a smart, sustainable and inclusive economy (the green economy). Aspects in the forestry sector are the production of sustainable woody biomass, but there are many aspects to this: collection from many forest owners, smart use of the resource, competition with material use of biomass and possible conflicts with other ecosystem services due to nutrient loss, overexploitation and biodiversity decline. In the agricultural sector competition with food and indirect land use change is a mayor issue both considering crops with a potential dual use and specific energy crops. Further research is needed to address economic constraints to the mobilization of biomass potentials and to develop cost-supply curves for all kinds of biomass , for short rotation coppice, other energy crops and from alternative biomass production systems on other land categories. An integrated European study should tackle all these aspects in a coordinated way and shall contribute both for EU-Level and national level assessments that take into account as well global implications and global markets (import/export issues).

Scope:

The research should be of an integrated nature tackling the multiple aspects of biomass from waste , agriculture, woody biomass for bioenergy from European forests and from dedicated energy crops. Realistic implementation potentials should be evaluated that will enable a transition to an energy supply with a significant share from woody biomass from forests, specific plantations, agricultural residues and the biodegradable part of waste The evaluation should include growth and production, harvesting, economics, competition with other utilisations of the biomass, and novel (cascading) ways of using wood (incl. biorefineries etc.).

The study should look into the introduction and transition phase of introducing an increased sustainable use of biomass in the green economy, considering effectiveness of policy instruments. It should provide insights into the resources themselves, and strategic planning of land use and small to large scale biomass utilisation, and evaluate the impact on ecosystem services. Options provided by the current collection systems from the traditional forest based sector should be studied.

The study should be multi-sectoral where it involves competition aspects with other sectors, and with trade from outside Europe. Policy aspects e.g. with regards to the targets set out in the National Renewable Energy Action Plans (NREAP) are to be included.

Recommended size (instrument) and duration:

Large scale collaborative project – 3 to 4 years

F9 Implementing tools for checking sustainability of the production systems of imported timber

Justification:

All (imported) timber and timber products in the EU will need to be proven legal by 2013 onwards, in accordance to the EU Legal Timber Regulation. The responsibility for providing this information is on the one hand with the operators at the first placement on the EU market, on the other hand with the supplier in the country of origin. Products originating from countries which are in a trade agreement with the EU (Voluntary Partnership agreement VPA) will be considered legal in the context of the EU Legal Timber Regulation. Further, the legality definition developed by each country in the context of the VPA includes references to sustainability and governance aspects.

Scope:

The objective is to demonstrate and implement in (with case studies) a consistent system of tools for checking sustainability and legality of imported timber. It should cover and measure multiple aspects of sustainability and legality informing the development of due diligence and timber Chain of Custody systems. Sustainability is understood to include environmental, economic, social, governance and legality aspects. Latest certification standards and certifications under development, particularly in connection to VPAs, shall be taken into consideration. Methods may include different data sources and analysis approaches like e.g. forest inventories, GIS mapping, resource assessment, trade statistics, timber tracking systems.

The project should include the system design, implementation and maintenance plan, documentation of the system and its application in the case studies. Furthermore an assessment of the effect of improved practices (spanning the whole supply chain, at different points in time, including the country level to avoid leakage) shall be provided. The results have to be measurable and documented by a set of indicators for above mentioned aspects of sustainability. The sustainability assessment system should be applicable at field and country level, to be tailored to varying data situations.

Recommended size (instrument) and duration:

Medium scale collaborative project - 3 to 4 years

Expected impact:

The result will address concerns associated with the EU Legal Timber Regulations and develop means to respond to its requirements. It will provide a system of compatible tools to measure, compare and thus check sustainability of imported timber in a consistent and

objective manner at different stages in the production and trade process. It should support the Member States in implementing the Timber Regulation.



F11 Development of 3-D dynamic forest modelling using combined terrestrial and airborne Laser based technologies based on optical and SAR data for spatial forest resource modelling under changing environmental conditions.

Justification:

Airborne Laser Scanning (ALS), also known as LiDAR (Light Detection And Ranging) is a highly promising remote sensing technology for qualitative and quantitative description of forest resources at a very high spatial resolution. With respect to other RS techniques (optical and multispectral images from airborne or satellite platforms), Lidar data provide immediate and reliable information about the “3rd dimension” of the forest (tree height and the “thickness” of tree canopy), and on its vertical and horizontal distribution at both single tree and forest stand level. Due to fast development of laser scanning technology the opportunities for dynamic 3-D modelling of forest resources has enormously increased. A dynamic 3-D modelling of forest is of interest for many forest related eco-services, programs and conventions, like CO₂ modelling, biomass modelling, habitat condition, modelling, biodiversity modelling, water resource modelling or wood production modelling. But for innovative LiDAR based modelling in the forest sector the optimization of algorithms and processing procedures, and their implementation into commonly shared software, especially GIS is required. This issue is critical for the advancement of innovation into monitoring of forest ecosystem structure and functioning. Europe has a leading position in the development of laser technology for environmental applications and needs to use this opportunity for more and better focused forest resource and benefit assessment. At the same time optical and SAR based options to determine 3D information evolved in parallel and justify a parallel that analysis of 3D information based solutions for forest information systems from local to national scales.

Scope:

The research should be oriented to study and carry out LiDAR applications for:

1. automatic and semi-automatic discrimination of forest areas from other land uses;
 2. identification of species composition (through integration of Lidar and multispectral data);
 3. description of the vertical and horizontal structure of the forests and automatic extraction of homogenous polygons (stands);
 4. Lidar-based estimation models of timber volume and wood biomass;
- Lidar-based (ground based and/or airborne) derivation of forest condition indicators
5. spatializing data of ground sampling forest inventories;
 6. multitemporal analyses to estimate forest area changes and amount;

7. forest interventions planning and logistic (forest roads, exploitation lines, ...);
9. identifying hydrogeological sensitive situations;
10. development of ready-to-use GIS procedures to process (ground based and airborne) Lidar data, with a particular sight to mobile-GIS and augmented-reality applications to make Lidar data and analysis available in the field.

In parallel, options arising from optical and SAR technologies shall be examined aiming at applications from local to national level as well as the examination of synergies of the various scales of 3D forest information systems. The study shall include an economic analysis of the efficiency of 3D information based forest information systems (cost efficiency and markets) and shall take into account user requirements at the various scales from operational users to policy and general public.

Recommended size (instrument) and duration:

Large scale collaborative project - 3 to 4 years

Expected impact:

3-D structures of forests and the terrain below can be assessed with an accuracy which is not possible with any other measurement technology today. For the variety of forest information needs from local to national level the integration of the development of solutions both from Lidar, optical and SAR is vital. This will have impact on the utilization, valuation and projection of forest resources in respect to environmental and economical issues, e.g. nature conservation, wood production, climate impact, hazard protection, woody bio-energy volume assessment. It will also provide innovative feed-back to the laser technology industry for adaptive developments. Information system solutions from local to national scale, addressing the need for sustainable use of forests, better information on potentials (material use & energy), Natura 2000 monitoring, REDD and other forest related policies. The project will developed with stakeholders, users, and SME's.



W1. Phytosanitary treatment and control methods for imported/exported wood-based raw materials and wood products

Justification:

Free exchange of goods (raw materials as well as products) between continents and countries is an indispensable requisite of a globalized business environment. Utilisation of renewable resources will become more and more important in the near future. But, most of these renewable resources, as well as the resulting products, may carry harmful insects which when release at the place of delivery may cause serious problems to nature and environment.

Scope:

Research has to focus on ligno-cellulose raw materials such as wood, bamboo, hemp, etc. which is imported or exported to generate energy or to be processed into building materials or consumer goods. The treatment methods to be developed shall be safe, environmentally friendly, cost effective and applicable to large quantities, preferably in continuous form. The treatment methods proposed shall be capable of being integrated into certification schemes. Preferably the treated product should be distinguished from untreated or ineffectively treated material by a durable marking system or low cost measuring systems.

Recommended size (instrument) and duration:

Medium scale collaborative project - 3 to 4 years

Expected impact:

The results will lead to ready to use methods for phytosanitary treatment of large volumes of natural lingo-cellulose materials and products. After implementation the novel system will support the international trade of lingo-cellulose raw materials and products and reduce the risk of spreading harmful insects and pest.



W7. Using the potential: development of cutting edge materials for a new generation of resource efficient sustainable consumer products with specific characteristics

Justification:

Europe produces today already 35% of all forest-based products on the global scale but has only 5% of the world forest area. There is even much more potential to contribute to the sustainable development of Europe by developing and producing a new generation of resource efficient, sustainable and knowledge-based consumer goods. Large and growing parts of western, central and northern European forest area consist of hardwood with very specific features that builds a unique resource. To increase the sustainable use of the dominant species like oak, beech, birch and chestnut, their specific and unique wood characteristics should be taken into consideration in technology and product development and marketing planning.

Scope:

Consumer and industrial products based upon the specific features and new materials for indoor and outdoor applications like e.g. furniture, leisure products, building materials, functional components in vehicles etc, must include functional and aesthetic design aspects as well as enhanced end of life use. A cross-sectoral and cross-disciplinary research will lead to a new generation of knowledge-based eco- and consumer friendly consumables and building, packaging and transportation materials.

Recommended size (instrument) and duration:

4 years

Expected impact:

The project shall develop knowledge-based eco- and consumer friendly products and superior technical products for industrial users in which eco-design and aesthetic aspects are integrated in the requested functionalities and the technical-economical competence of consumer and industrial products. The competitiveness of the European hardwood species will be strengthened together with the rural areas with high potential where these species grow and that are currently underdeveloped.