European Innovation Partnership on Raw Materials

Application for a Raw Materials Commitment

Wood woRking INdustry RecycliNG

Acronym:
WRING

Abstract / executive summary:

The amount of wood waste generated in the EU27 was estimated at 70.5 Mt in 2004. Of these, 45.7 Mt were recycled directly or in energy recovery processes (+/- 65%). Sources of wood scrap mainly are the wood working industries, Construction & Demolition, packaging & bulky waste. According to other studies, the amount of post-consumer wood generated in the EU 27 in 2007 was estimated by Mantau et al. to be 55.4 Mm³. These researchers stated that these volumes were disposed of by land-filling (37%), burning with energy recovery (30%) and particleboard manufacture (30%). The implementation of several EU directives is leading to an increasing demand for waste wood and better separation of waste wood fractions from bulky waste as well as C&DW but collection of used wood for recycling is not yet very well developed and great amounts of wood waste are still being landfilled. However, the main end-uses for recovered wood are: wood-based panel manufacture; biomass energy generation; animal bedding; mulches; equine surfaces; pathways and coverings. All of these use wood in the form of particles. None of these end-uses, except panel manufacture, permit a second life-cycle and so the stored carbon is released. Taking in account this considerations, the partnership aims to improve, demonstrate and put into operation all the knowledge through a cooperation among universities, technology institutes and industries implementing a complementary actions and adopting multidisciplinary (scientific, technological, economic, societal, regulatory, etc.) and LCA approaches. Public demonstrations of innovative pilot operations, processes and technologies will take place in different regions of the EU in order to raise awareness as well as to disseminate results among policy makers, stakeholders and society. The aim of this commitment is improving, demonstrate and put into operation all the knowledge and innovation related with the wood working industry recycling potential.

Links to the Strategic Implementation Plan:

- I. Technology Pillar
  - I.B Priority Area: Technologies for primary and secondary raw materials’ production
    - Action area n° I.5: Recycling of raw materials from products
      - 1) End-of-life products recycling
      - 2) Packaging recycling
3) Construction and demolition (C&D) waste recycling

Coverage of the Action Areas referred to above:

Recycling wood at a larger commercial scale is still a relatively recent phenomenon across Europe and some countries like Germany, Italy and Great Britain are more advanced than others. Nevertheless, all countries are striving to setup the legislative framework and infra-structure necessary to ensure that the majority of wood is recycled in some way: in this sense, there is still a lot to be developed under the technical point of view with the aim to give all necessary instruments to be exploited for the implementation, at European level, of an integrated and functional wood recycling system.

More in detail the actions to be covered could be widely devided into 3 macro-areas:
1. Product design for recycling purposes
2. Improve the wood based product waste management, sorting first the wood waste VS other materials and then by wood quality (Hazardous and Non Hazardous waste). Achieving good quality recycled materials will need improving waste collection, using innovative technologies, and developing and applying quality protocols to satisfy the requirements from several industries to accept and introduce higher quantities of recovered waste as raw materials. This will also include the first step to propose considerations to the End of Waste Status for some wood waste flows in order to foster recycled products acceptance by reducing legal constraints.
3. Implement new design and recycling applications that will use these recycled materials, also providing the added economic aspect to generate new market products with a by-product approach meaning using re-generated recycled materials as raw materials.

Objectives of the commitment:

The main objective of the commitment is to implement actions for the growth of wood working industry recycling, based on the following topics:
- Optimization of waste recollection process under the technical and logistic point of view and consequent reduction of costs
- Development of contaminants detection and removal technologies, sorting and reprocessing systems
- Development of high value products from recovered wood by using enhanced recycling methods
- Demonstration, through a multicriteria analysis, the viability under the economic, social and environmental point of view of the proposed actions
- Improvement of wood based product design for better product management during all its life span and for recycling.

Description of the activities:

Waste prevention
Measures to support waste prevention according to Annex IV of the Waste Framework Directive:
Most, 51 % focus on the design, production and distribution phase; 39 % are related to the consumption and use phase; while 10 % focus on the general framework of waste generation. New product design criteria and LCA methodology will be applied for achieving waste minimization and increased product and components recyclability.

Collection
At European level, the priority is the optimization of the collection and aggregation processes of scraps, in order to have quantities of recycled wood sufficiently large to guarantee the economic viability: thus, the aim of one of the activity implemented by the consortium, will be the study for the development of an organized technical and logistic mechanism ensuring the recycling of the majority
of wood as well as the minimization of losses; this activity will be the necessary prerequisite to adopt legislative and infrastructural measures by policy makers and stakeholders in general.

Sorting and Recycling: towards zero wood waste
Moreover, considering its nature, waste wood is very heterogeneous: in fact, it's very common the utilization of a wide range of products that are made up with various wood species and non-wood components like paints adhesives, metal fixings and plastics. Therefore there is a need to develop reliable, automatic sorting and reprocessing systems to ensure that only non-preservative treated wood is recycled into new products. More in detail, it will be necessary the implementation of innovative technological solutions for the chemical and mechanical contaminants sorting and removal such as:
- Technologies for metal and non-wooden materials recovery from complex products;
- Technologies (detection and removing systems) to improve the cleanliness of recovered wood, by enhancing the purity of wood from chemical contaminants such as preservatives;
- Technologies to process and dispose contaminated removed parts and materials;
- Technology for wood product components to be sorted by wood quality;
- Technology for the introduction of the recycled component and materials in new products.

Since difficulties on controlling quality and the lack of universal versatile recycling processes hinder industrial optimisation and recycling, this will be addressed by defining the industrial input quality parameters to accept them as raw materials. In case any of the new products (being material or final product) developed does not have standards in place, actions will be started to address and propose standards for recycling.

In parallel, another activity will be the realization of a multi-criteria analysis in order to assess all the economic, social and environmental aspects of the whole recycling chain.

Description of the expected impacts:

Waste recycling reduces consumption of natural resources, landscape degradation, groundwater contamination, and GHG emissions.
One of the most significant impacts is a better collecting process increasing the quantity of recycled wood and contribute to reduce landfilled wood. The research activity will be an important instrument for stakeholders and policy makers in order to effectively implement an enhanced collecting and sorting system.

On the other hand, about quality, the development of technologies will contribute to the realization of high values and less hazardous products like nano-crystalline cellulose, xylose and lignin-based adhesives: in this regard, it will be also important the lowering of the regulatory limits.
The enhancement of recycling process under the qualitative and quantitative point of view will be useful to further encourage the utilization of recycled wood for the manufacture of high-value products: wood wastes are recycled in the form of particles and the majority of recovered wood is used to make particleboard products (e.g. furniture components); moreover, the next most widespread method is to burn the recovered wood with energy recovery. Other end-uses include animal beddings and landscape mulches, but in general, the use of recovered wood in particle form has a very little added value. In this sense, the development of alternative recycling methods will add much more value to the recovered wood and this would provide more money for the recycling processes and, in turn, encourage more recycling. Recycled wood can be also combined with other recycled materials in order to obtain new products. Consequently, it will also be possible to develop new markets and increase the competitiveness of European production.

Expected innovation outcomes:
New products to the market
New processes
New services
New technologies
New ideas to the market
Societal innovation

Comments:

Indicators:
Increase of recycled wood: 20%
Reduction of losses: 20%
CO2 saving: 20%
Energy saving: 10%

Name of the coordinating organisation:
Cosmob
Country:
Italy
Entity profile:
Other
Other:
RTD Centre
Role within the commitment:
The role of Cosmob within the commitment will be about the implementation of the following activities:
- evaluation, under a technological point of view, of performances of wood based products, in order to define the best practices and experiences of recycled wood;
- study and the research about the new products and composites made with recycled wood, in order to increase their mechanical, physical and chemical properties.

Other partners:

Name of partner:
Ecole Supérieure du Bois
Country:
France
Entity profile:
Academia
Role within the commitment:
Staff at ESB have been contributed to the knowledge on recovered wood for more than 20 years. The focus of this research has been and continues to be concerned with: 1. Measuring the cleanliness of recovered wood 2. Improving the cleanliness of recovered wood 3. Developing sorting criteria and methods for recovered wood 4. Developing alternative, high-value products based on recovered wood

Name of partner:
Technical Research Centre of Furniture and Wood of the Region of Murcia
Country:
Spain
Entity profile:
Other
Other:
Private Non Profit Business Association

**Role within the commitment:**
R&D activities are mainly focused in reducing the environmental impact by researching in new materials/technologies for the furniture and wood industry (wood plastic composites, wood recovery etc) coming from renewable sources.

**Name of partner:**
Gruppo Mauro Saviola
**Country:**
Italy
**Entity profile:**
Private sector - large company

**Role within the commitment:**
Technical support for the waste wood recycling for the panel industry

**Name of partner:**
AIDIMA
**Country:**
Spain
**Entity profile:**
Other
**Other:**
Technology Institute

**Role within the commitment:**
AIDIMA is a wood, furniture technology Institute, recycling, LCA, eco-design are aspects and key issues addressed in our daily activities and investigation. We represent more than 500 Wood based industry which are interested in this area, for the environmental and economic impact related with the improving of natural resources exploitation.

**Name of partner:**
Delft University of Technology
**Country:**
Netherlands
**Entity profile:**
NGOs

**Role within the commitment:**
Development of recycling technologies and reuse with the focus on the reclaiming of wood fibres for further use in civil engineering materials.

**Name of partner:**
European Panel Federation aisbl (EPF)
**Country:**
Europe
**Entity profile:**
NGOs
Role within the commitment:
The particleboard industry is the only sector that can effectively sort, clean and recycle waste wood on an industrial scale. Furthermore, the particleboard, MDF and fibreboard industries are also big users of wood processing residues such as wood chips, shavings and offcuts from the sawmill, plywood and furniture industries as well as of own production residues. EPF calls for more and better collection of wood waste.

Name of partner:
Innovawood
Country:
Europe
Entity profile:
Other
Role within the commitment:
InnovaWood is an umbrella organisation for RTDI activities within the wood research community. The InnovaWood network will be used to outreach to consult all European stakeholders. Due to its vast experience in this kind activities, InnovaWood will coordinate the knowledge transfer and exploitation of the results of the commitment, using the strong networks and links to all stakeholders.

Name of partner:
FCBA
Country:
France
Entity profile:
Other
Other:
Technology Insitute
Role within the commitment:
FCBA is a Technology Centre promoting technical development in industries related to the forest and wood sector

Existing EU contribution:
Yes
Source:
FP 7
Other

Period to implement the commitment:
Monday, 14 March, 2016 to Friday, 13 March, 2020

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