EIP-AGRI Focus Group

Sustainable mobilisation of forest biomass

FINAL REPORT

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List of abbreviations

DSS - DST	Decision Support Systems – Decision Support Tools
MP	Mini-paper
NIPF	non-industrial private forest owners
OG(s)	EIP-AGRI Operational Group(s)
RTDI	Research, Technological Development and Innovation
SMFB	Sustainable Mobilisation of Forest Biomass

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1 Summary

This report summarises the comprehensive work of 20 experts from all over Europe, who examined the potential to increase the sustainable mobilisation of forest biomass as a key renewable resource.

At two face-to-face meetings, the 20 experts shared their experience and carried out group work, to identify the most relevant questions in relation to sustainable mobilisation of forest biomass. This included the identification of success and fail factors that stimulate or limit the supply of forest biomass and how these factors might be addressed by exploring the role of innovation and knowledge exchange. The group identified and discussed relevant examples, best practices and tools and also barriers to their implementation in different regions. An important area identified was how to improve the cooperation of forest owners with small-scale forest areas. The report also takes into account supply and demand factors and the potential to provide a link between the two, e.g. via electronic marketing tools.

This European group work is based upon the rationale that the net annual harvest in Europe's forests corresponds to roughly 60% of the net annual increment, giving a potential to sustainably increase the mobilisation of forest biomass for a variety of uses. However, regional framework conditions across Europe are complex and diverse. The local conditions are defined by many factors such as forest ecosystem types, ownership structures, infrastructure, available harvesting technologies, transportation, logistics and transforming industries. Augmenting sustainable mobilisation consequently requires a multi-actor and multi-factor approach. Additional contributions can originate from various innovative decision support tools and incentives, which are most effective when adapted to local circumstances.

The experts' findings led to a set of **ideas for research and innovation activities** to stimulate the knowledge and use of management practices and strategies in mobilising forest biomass. These research and innovation needs are derived from practice. The experts considered the following points most important in addressing the complexity of sustainable mobilisation of forest biomass:

- Study the impact and effectiveness of incentives;
- Develop different scenarios on future demand and supply;
- Study the functioning of regional forest ownership organisations;
- Development of user-friendly information systems;
- Development of cross-regional value-chains and production systems;
- Development of novel forest management systems and new forest-based products.

Moreover, the experts provided **ideas for Operational Groups and other innovative projects** to enhance the supply of forest biomass for various uses. These included:

- Develop regional models (including Decision Support Systems) for improved forest management in small-scaled forests;
- Participation in the digitisation process by using new models for innovative virtual timber sales/marketing hubs;
- Reviewing existing awareness-raising measures for forest owners in addressing the important role of their forests in providing ecosystem services; this should include the evaluation of existing communication tools for knowledge transfer and dissemination;
- Promotion and adaptation of existing "good practice" examples, in order to transfer existing knowledge amongst practitioners and/or regions;
- Profiling regional models for the development of forest owner groups to become more self-sufficient without over-dependency on "volunteerism".

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Finally, in parallel with the barriers identified and the ideas for research and innovation outlined above, some further recommendations were made to better support the mobilisation of forest biomass and to provide more efficient approaches to innovation. These are mainly to be addressed at national or EU level:

- Exchange knowledge on the real impacts and effectiveness of current incentives across Europe for tailor-made solutions in the regions.
- Provide means to support the facilitation of forest owner associations in member countries/regions.
- Evaluate existing participatory approaches (i.e. Regional learning laboratories) to involve stakeholders, to increase synergies between available funding opportunities. Support and strengthen the stakeholder dialogue (along wood supply chains) by developing social and economic regional and cross-regional networks, including a stronger connection of, and between, stakeholders along supply chains.
- Incentives for marketing hubs (making the market more transparent, easier to evaluate/measure efficiency of incentives, enhancing contact of owners and information available, etc.)
- Collect existing and develop new practices and policies along value chains for increased and sustainable supply of wood and biomass in line with quality requirements.

Group picture of the experts during the first meeting in Tampere (Finland)

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2 Introduction

Overall demand for forest biomass is forecast to increase in the future. This is currently driven by an increasing demand for biomass for energy generation, but other new and innovative uses for wood fibres and chemicals are on the horizon. A clear potential to increase forest biomass utilisation for energy exists in most countries of the EU as only 60-70% of the annual increment of EU forests is harvested, and in some countries it is much less than this. Much of the potential for expansion can be found in small private holdings and silvicultural practices such as pruning and complementary fellings (namely first thinnings).

Questions of sustainability, competitiveness of the forest-based industries, efficiency and economic viability and fragmentation, organisation and motivation of forest owners as well as new tools and technologies represent the major challenges for forest biomass mobilisation.

In mobilising forest based biomass, economic, environmental and social functions of forests have to be safeguarded, in line with the EU Forest Strategy.

Against this background, the main question addressed by the **EIP-AGRI Focus Group on Sustainable Mobilisation of Forest Biomass** (SMFB) is: **"How to improve the sustainable mobilisation of biomass from our forests in the EU?"**. The Focus Group concentrated on innovation in mobilising different types of forest biomass for all potential markets and better link supply and demand, taking into account the currently underused potential supply of forest biomass. Process

The Focus Group on SMFB started its work in June 2016, following an open call for experts on the topic, under the guidance of a coordinating expert. It was composed of 20 experts from different European regions providing a wide range of expertise both geographically and in terms of knowledge, ranging from practice to research. The names and the country of origin of the FG members and of the coordinating expert are listed in **Annex 1**.

The following main tasks were carried out by the Focus Group:

- Identify success and fail factors that stimulate or limit the sustainable mobilisation of forest biomass, and summarise how to address these factors and explore the role of innovation and knowledge exchange in addressing these fail factors.
- Identify adequate examples and compare different means of improving the cooperation of small forest owners with regard to forest biomass. Provide examples of best practices, and also identify barriers to implementation.
- Analyse supply and demand factors, and the means to provide a link between the two – for example electronic marketing tools.
- Propose potential innovative actions to stimulate the knowledge and use of management practices and strategies in mobilising forest biomass.
- Identify remaining research and innovation needs coming from practice associated to sustainable biomass mobilisation in forests, and provide ideas for Operational Groups and other innovative projects.

The FG organised its work around 8 Mini-Papers covering the main aspects of SMFB in Europe, as agreed by FG members. The list of the Mini-Papers (MP) is provided in **Annex 2.**

All outcomes of the Focus group can be found and downloaded thorough the **EIP-AGRI Focus Group on Sustainable Mobilisation of Forest Biomass** webpage.

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Experts working during the first and the second meeting of the Focus Group

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3 The European forest-based sector

The European forest-based bio-economy is built upon a multitude of forest ecosystems, representing a huge variety of sustainable forest resources. They provide the basis for a competitive, innovative knowledge-based European forest-based sector.

The profile and role of a regional forest-based sector varies significantly across Europe and its regions. This is linked to existing forest ecosystems, ownership types, existing infrastructures and technologies for the mobilisation of biomass as well as its respective value added uses (established value chains). There are differences in species composition as well as in forests types, e.g. boreal, temperate, softwood or hardwood dominated ones, etc. [see ***Mini-paper 1*** *more information on the regional profiles of the forest based sector in Europe]*

Forest ownership in Europe is very diverse. Even within regions, ownership types and structures vary enormously. The ownership of much of the European forests is fragmented, and in the hands of individual private forest owners. There are at least 16 million individual private forest owners and around 90 000 public forest holdings in Europe. More than 50% of the total forest area in Europe is owned by private forest owners with small holdings. This highlights the great importance of individual and family owners in private forest wood harvesting, particularly in countries that have a high percentage of this kind of ownership (e.g. France, Germany). It represents a significant area of forests and potential wood volume that should contribute to the sustainable mobilisation of forest biomass in Europe. [*see **Mini-paper 2** for further discussion on forest owners mobilisation, Cooperation and forest ownership types and structures*]

Harvesting technologies and long distance transportation are among the challenges identified in several European regions where forestry is vital for the economy. The structure of harvested volumes differs significantly between European regions and countries, as well as the diameter and height of trees. Therefore, in some countries harvests may be strongly focussed on large diameter saw logs, while in other countries smaller diameter logs (the so-called industrial roundwood) dominate the current wood markets.

The degree of mechanisation in harvesting also varies significantly throughout Europe. Globally the split is about 50% mechanical and 50% manual (Viitamäki et al. 2015). In Northern Europe, e.g. Finland and Sweden, the proportion of mechanisation is almost 100%, while in other countries the share of manual harvesting is still high (southern, central and Eastern Europe). [*see **Mini-paper 5** for further discussion of harvesting technologies]*

The European forest-based sector is a main global actor and provides a significant contribution to the overall EU economy. Today, Europe produces more than 35% of value added (forest-based) products worldwide, while Europe itself is only covered by roughly 5% of the global forest area. Overall a high share of harvested EU woody biomass is processed by Europe's forest-based industries, representing about 7-8% of Europe's manufacturing GDP. It plays a vital role in rural development as it employs more than 3.5 million people in Europe, earning their living in forestry and forest-based industries, many of these in rural areas.

Forest biomass, provides opportunities to maintain or create further jobs and diversify income in a low-carbon, green circular bio-economy, especially when combined with marketing of non-wood forest products. Wood is still the main source of financial revenue from forests, and an important raw material for bio-based industries. [*see **Mini-paper 3** and **Mini-paper 8** for further information about forest biomass markets and supply chains and the European forest-based sector]*

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Piles of biomass stored for energy production (Finland)

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4 Enabling conditions for increasing SMFB in Europe

The net annual increment (NAI) of EU forests is on average about 4.4 m³ per hectare, for a total of ~775 million m³. However only~ 430 million m³ are harvested annually corresponding to less than 60% of the NAI, roughly around 2.5 m³ per hectare[1].

There is real potential for increasing the sustainable harvested volume considering that the demand for forest biomass as a key renewable and climate friendly raw material has increased strongly over the recent decades. An increased growth in the stands will result from actively managed forests.

Sustainable mobilisation of forest biomass can only be enhanced when the complexity of its framework conditions is well understood. It requires a multi-actor approach taking the latest technical and political developments into consideration.

The Focus Group identified the following key issues having an impact on the sustainable mobilisation of forest biomass:

- Changing demand and changing markets for forest-based products
- Emerging new markets on the global scale (impact of globalisation)
- Growing competition between traditional and new forest-based value chains with their increasing demand for raw material supply
- Efficient infrastructure/logistic concepts (transportation value chains) in all regions
- Long-distance transportation due to e.g. limited access to seaways and train tracks
- Roundwood and forest product prices
- Processing technologies for soft- and specifically for hardwood species
- Technologies insufficiently adapted to changing feedstocks (diameter distributions > 70 cm)
- Competition for land-use and thus a threat of decreasing roundwood production and supply
- Climate change and its impacts on the supply of forest feedstock (different expected impact in different European regions)

[1] Forest Europe: State of Europe's Forest 2015 Report available at http://foresteurope.org/state-europes-forests-2015-report/

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5 Focus Group's findings

The results of the Focus Group's work on the key issues having an impact on SMFB are summarised in the following three sections:

- **6.1 Market trends and new demand for forest biomass**.
- **6.2 Europe's toolbox for increasing SMFB, including digitisation, harvesting and transportation technologies, decision support tools and incentives**.
- **6.3 The European stakeholders profile involved in SMFB and the possible benefits for the climate and the environment**.

It should be noted that some important aspects related to the climate and environmental impacts of forest biomass' mobilisation were not tackled in detail. The Focus Group on SMFB concentrated on economic aspects while environmental and climate aspects are discussed in other fora, like for instance the **EIP-AGRI Focus Group on Forest Practices and Climate Change**.

However the Focus Group on SMFB took into account the overall sustainability forest biomass mobilisation and the analysis of economically promising new ways of mobilising biomass should always take into account their environment-climate and social sustainability.

Experts discussing at one of the meetings

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5.1 Market trends and new demand for forest biomass

An increase in demand for traditional and new forest-based products is forecast in the EU and worldwide, as indicated in **Mini-paper 3**. The need for wood-based energy and transport fuels is expected to grow both in and outside Europe. The growth will be shaped by sharp economic fluctuations, shifting policies, and changes in consumer tastes, and through developments in production and transportation technologies. These factors lead to an increase in the need for wood-based fibres.

Many factors need to be in place to realise the potential increase of wood mobilisation (harvest and supply of wood to commercial markets). A key requirement is that there is an increased demand for the wood. Since roundwood demand is derived from wood-based products, e.g. sawn timber, panels and boards, packaging, pulp and paper and others manufactured from forest-biomass, the demand for these products is a decisive factor. Other issues also have an impact on the overall development of the wood market volume. The market infrastructure has to facilitate the increase in trade and procurement of forest biomass. It must be economically feasible for both, land/forest owners (the sellers) and the forest-based industries (the buyers) to increase trade volumes.

One example of a trend that may shape the markets of sawn timber **http://foresteurope.org/state-europes-forests-2015-report** and roundwood is **constructing medium to high-rise (multi-storey) buildings in wood**. In general, one may expect the demand for sawn logs to temporarily increase more strongly, as residential construction activities in the EU and worldwide are increasing due to urbanisation processes. In several European countries including Austria, Sweden, Finland, the UK and France, there are current examples of high-rise and medium-rise buildings made in wood. Modularity, high degree of prefabrication and element-based technologies are good examples of innovative developments that may strengthen the use of wood in the construction sector specifically in multi-storey medium- and high-rise timber buildings.

Large-scale production of **heat and power from wood** is already established and is still growing, leading to an increase in the demand for forest (bulk) biomass. The EU targets to increase the proportion of renewable energy to 20% or even 30% of the total energy consumption increases the demand for biomass that is suitable for energy production.

"New products" from wood fibres, such as clothes, green chemicals, cosmetics, technical fibres, pharmaceuticals, insulation and transportation materials, liquid fuels and applications in 3-D printing processes, create new demand for wood-fibres in the context of developing the circular bio-economy. Estimates of the volumes needed are not yet established, but the potential is certain.

New possibilities offered by wood fibres: PAPTIC® as an alternative to paper or plastic bags (further info: https://paptic.com/)

From the market trend perspective, the following are key issues for the sustainable mobilisation of forest biomass:

- The demand of roundwood for sawn timber products increases but also for panel and board, pulp and paper and smaller diameter wood or wood residues.
- Creation of new demand for forest industries' residues and related impacts on their trade flows.
- Improved efficiency of operations in the roundwood markets.
- Solutions include web-based trading, advanced wood procurement and best adapted harvesting technologies.
- Efficient silviculture management models for producing roundwood and wood-fibres while safeguarding sustainability.

5.2 European toolbox for increasing SMFB

5.2.1 Digitisation as a device for SMFB along the whole value chain

The digitisation process and the developments of Information and Communication Technologies are manifold and have an impact on the efficiency and performance of the forestry-wood chains. They optimise the planning and management of forest biomass and forecast precisely its potential availability. The whole process of planning, management, harvesting and the provision of the biomass for various uses is an integrative process. Information already gathered electronically in forest inventories can be used with forest models allowing the optimisation of the management and planning of the forest operations and to provide quantitative and qualitative information for optimised allocation to the following biomass transformation processes. The production of semi-finished and final products can already take into consideration the needs of customers, clients and consumers. In its design the reuse and performance of products can be defined and realised with the use of data-based processes. This leads to a positive impact on resource and energy efficiency along the entire production chain from primary production to end-of-life of a product.

5.2.2 Harvesting and transportation technologies

There is no single solution to the challenges of developing forest harvesting and transportation technologies to make them more efficient and economically viable as well as environment and climate sustainable. This is due to widely varying forest ecosystems and soil structures, as well as the varied structure of forest industries and the effect this has on demand for forest biomass across Europe.

The sustainable increase of volumes presumes growing mechanisation of wood harvesting, although different soils, sites and other conditions will result in a range of different best adapted solutions. This requires the development of silvicultural and forest management strategies as well as novel machinery.

These improvements are not just about the efficiency of traditional technology and machinery, the modification of existing business models is essential and includes contracting harvesting and transport operations.

Digitisation of roundwood trade and information delivery between traders, forest industry operations and forest harvesting planning facilitates better performance.

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Identified key issues for the sustainable mobilisation of forest biomass from the harvesting perspective:

- Larger scale operations are needed to increase efficiency and to reduce unit costs.
- Operations on a smaller scale need to focus on efficiency.
- Reducing time and costs spent on relocation of machinery is essential.
- Training of forest workers and machine drivers is needed to achieve greater efficiencies and capacity.
- Digitisation of chain of custody and supply chains allows for better performance

See **Mini-paper 5** for further discussion about harvesting technologies for forest biomass.

Mechanized harvesting of Spruce

5.2.3 Decision support tools

The use of appropriate decision support systems and tools can be a key driver for an increased SMFB in Europe, especially if they are targeted to non-industrial private forest owners (NIPF) who represent a significant potential of currently under-used forest biomass. NIPF may become important players at local and even on the global market if they are grouped through innovative forms of cooperation.

While there are many tools and methods available to help NIPF owners put sustainable biomass mobilisation theory into practice, there are many barriers preventing their wider use, and more efforts are needed to develop and spread information on simplified tools. To ensure a more successful uptake in the use of these tools they need to be user friendly; which can only happen if they are considered credible, and have been checked and tested by forest owners and other stakeholders before implementation.

Existing data should be presented clearly and should be made easily available. The question that needs to be addressed is – what data is available; how can it best be made available and used and what is still needed. Potential users should be informed and trained when data is gathered and tools are developed.

Decision support systems and tools for owners should cover not only the economic factors of woodland management, thinning regimes, infrastructure needs, harvesting and extraction techniques, species choice, etc. but also topics of biodiversity, nature conservation and wildlife management.

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NIPF organisations and collaboration can have a significant role in marketing of wood from their forests. Sweden and Finland are examples where very strong and well-organised forest owner associations have been developed. For example, in Sweden, about 112.000 family forest owners cooperate in four regional associations organised as producer cooperatives, owned and managed by the members of each association.

Mini-paper 4 contains several examples of existing decision support tools which could provide inspiration for innovation in other European areas.

5.2.4 Incentives for SMFB

Well-functioning markets and competition are a key requirement for increasing SMFB. Many private forest owners in Europe cannot live purely on the income from their forests as their area of forest land is too small. Their engagement in terms of management and harvesting does not necessarily coincide with basic economic mechanisms. Price increases for roundwood cannot be seen as automatically motivating small private forest owners to put more forest biomass on the market. The mobilisation potential will therefore often depend on supply chain efficiencies, their profitability and strong policy support.

Successful mobilisation of wood requires the close co-operation of various actors, including forest services, forest owners, forest owner associations and other groupings, forest entrepreneurs and the wider forest-based industries. Properly functioning forest owner associations can play a major role in sustainable mobilisation from fragmented private forest holdings, but they may need support to take on this role as well as for further capacity building.

Incentives or subsidies to the landowners may help to maintain the supply of wood and biomass at a healthy level, addressing environmental concerns regarding sustainable materials and renewable energy, generating employment (particularly in less developed rural areas) and preventing re-location of the forest based sector while encouraging the development of new wood-using industries in these rural areas.

Many countries or regions offer a range of grants and other incentives to encourage the use and **development of wood for energy and bio-based materials**. But, while support schemes on the demand side are widely employed, direct support for wood and biomass mobilisation/supply is less common. In this context, and taking into account that business environments differ across European regions, it is important to implement appropriate support and enhance public-private partnerships

Direct incentives such as grants, subsidies and fiscal measures may increase mobilisation by improving the economic situation and behaviour of already active forest owners.

Subsidised loans for machinery and other ways of backing extended forest operations may have a positive indirect impact, through modernisation, in health and safety issues in a biomass-demanding scenario.

The establishment of **public-private partnerships and supporting infrastructures,** such as marketing hubs, can develop certain markets, ensuring both transparency and efficiency in the initial stages. Also facilitating cost-share agreements, joint ventures, and long-term partnerships and contracts between industrial consumers and forest owners may increase stakeholder confidence.

There may be an indirect effect from the sector **Tax policy**, or even from General Tax policy. How forest owners are taxed, in particular in relation to thinning and tending operations, could contribute to increased mobilisation or, on the contrary, to a deceleration of the activity. Also different trade regulations, trade barriers, tariffs, etc. may affect the way wood and biomass are traded, including through imports and exports.

Enabling incentives such as resource information, land tenure and silvicultural measures are particularly important to create improved ecosystems and may support innovative forms of SMFB. A comprehensive understanding and assessment of the wood resource, its ownership structure, future domestic

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demand and the potential for industry investment is fundamental to the development of a biomass mobilisation strategy. This is only possible with a sound set of data. The data protection barrier may mean the data may exist but is not available to those who would leverage and benefit from this knowledge. It is not only important to assess resources and predict availability (even at a regional scale), but also to know where it is and why it is underutilised. New technologies may offer greater opportunities in this area and public programmes offering transparent high quality information may assist investors and other stakeholders to forecast and conduct appropriate risk analysis.

Security in land tenure and use is crucial for biomass production and mobilisation as it is for any other natural resources. In highly fragmented forest areas consolidation of grouped land management units and prevention of further fragmentation of holdings would need to be supported.

Afforestation programmes and silvicultural measures to enhance forest growth represent slower supply side responses than the options to make better use of underused resources and other measures already discussed above.

Examples of different incentives and how they function can be found in **Mini-paper 7.**

5.3 The European stakeholders profile involved in SMFB and the possible benefits for the climate and the environment.

Europe's forest regions are generally determined by ecological characteristics, yet they also feature important socio-cultural and economic elements.

Initiatives within forestry involve forest owners and practitioners who are experts on technical issues such as forest biomass mobilisation or innovation in forestry operations. As indicated on **Mini-paper 1**, beyond the technical improvement of 'classical' forest management, novel wood mobilisation approaches inevitably require a wider inclusion of stakeholders in forest operations, policy and decision making.

A participatory involvement of actors within and outside the forest-based sector will guarantee that the increasing interest of various societal groups on forest management in relation to forests' multi-functions will be met. A broader understanding and acceptance of forest operations will be facilitated by involving values and demands from actors outside the sector. Interactions between relevant groups will achieve better solutions through joint learning and communication. Besides the economic and social pillars, the environmental aspects of forest biomass mobilisation need to be taken into account to ensure this process is fully sustainable. Indeed, even if forest biomass is naturally renewable, achieving environmental sustainability is not always so straightforward: it is, however, a potential asset - for example win-win-scenarios could be developed by focusing on how innovative biomass mobilisation in underused forests could be integrated with special forest programmes.

Local initiatives can function as a gatekeeper to a broader range of stakeholders and should play a multiplier role for innovative solutions within a broader region, for example tourism can serve as a "vehicle" to inform and educate on forestry related issues and provide the grounds for greater awareness of the forest-based sector's role and its contribution towards sustainable development of a region.

Numerous initiatives are emerging throughout Europe, where multi-stakeholder groups aim to promote regional identity in various areas of the economy, social well-being and conservation of their cultural and historical landscape. From the point of view of stakeholder involvement, the following elements are crucial for SMFB:

- Existing forest owners' cooperation as a strong force in many parts of Europe is realised in a variety of forms due to differences in history, culture, and political/economic framework conditions.

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- Support services to secure efficient and stable wood supply from areas with many small forest holdings with increasing urbanisation of owners
- Transferring best practices and technologies from more experienced and advanced regions while accounting for regional differences and local conditions and making use of existing infrastructure that can be effective in getting supply chains moving.

As explained on **Mini-paper 6**, sustainable management and mobilisation of forest biomass also contributes to a series of important climate and environmental targets, such as climate change adaptation and mitigation, forest fire prevention and habitat restoration.

Forests affected by a heavy ice-break episode followed by a bark beetle attack in Hotedršica (Slovenia)

One of the strongest arguments for the use of wood is its function as carbon sink when used as solid material for long-term uses, e.g. wood products for daily life, but specifically wood in construction and other mid-to-long term applications. The substitution effect is evident. Climate strategies involving forest biomass can achieve better performance by enhancing

- The use of wood to substitute other non-renewable materials, such as concrete, steel and plastics to reduce the high environmental impact of different sectors.
- The energetic use of forest biomass at the end of life of a product. Bioenergy production of forest biomass is viewed as carbon neutral since growing wood has been sequestering CO2 from the atmosphere, and emissions after harvesting are sequestered again in regrowth.
- The higher mitigation potential through prolonging the carbon storage period and the energetic use of forest or industry residues and other woody biomass at the end of their life.

SMFB can combat forest wildfires in areas prone to severe wildfires, where forest managers and civil protection services cooperate to foster all types of forest biomass mobilisation to reduce the forest fire hazard.

SMFB could be planned taking into account prevention strategies and needs, such as the creation and maintenance of firebreaks/fuel breaks or the peripheral protection of urban areas.

Tailor-made sustainable forest management systems have the potential to substantially contribute to reshape the fire regime towards a more desirable scenario by decreasing the number of larger fires. Land managers should consider this type of extraction as a cost-effective strategy to reduce forest fuel. This approach will be

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strongly determined by the spatial allocation of the extraction and how fire fighters might use the opportunities created by biomass extraction as part of a fire-suppression strategy.

Rural Europe is composed of cultural landscapes, shaped by farming over the centuries. Open farmed habitats are considered to be of high environmental value, and there are increasing efforts to restore them, as well as to restore the management (typically grazing) that maintains them. SMFB could be instrumental in such operations. Restoration of grassland habitats have involved extracting woody biomass.

Finding new uses for the biomass mobilised in habitat restoration actions could potentially reduce costs significantly, contributing to their viability and extension. This could also be the case for Mediterranean forests which are suffering greater water stress due to the combined effect of higher temperatures and (depending on the area) reduced rainfall. Only a very small proportion of Mediterranean forestland is actively managed due to the lack of economic viability of forest operations.

In this context, researchers and practitioners argue that forest thinning and diversification are key adaptive measures to improve the state of conservation of such forests and increase their resilience. The thinning of pine and oak forest stands is particularly important as it is likely to concern areas that would otherwise be mostly unmanaged.

In certain areas (Mediterranean as an example) provision of key ecosystem services (such as primary products, soil retention, pollination, temperature regulation, water provision and prevention of desertification) could be enhanced by extracting part of the standing tree biomass. High costs of operations mean that if such adaptive management is to be applied at a larger scale, better biomass market opportunities would be needed.

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6 Future perspectives

This part of the report summarises the recommendations of the Focus Group to promote the development of sustainable mobilisation of forest biomass. It includes the main needs for research coming from practice and ideas for EIP AGRI Operational Groups[2] identified by the experts.

6.1 Research and Innovation Needs

The identified barriers to increasing the sustainable mobilisation of forest biomass require an all-encompassing portfolio of innovation and research activities to overcome them. There will be no "one solution fits all" answer. Therefore, innovation and research needs coming from practice have been defined and listed. Many involve multi-disciplinary and multi-actor approaches to address and respect regional differences and needs. Out of 28 suggested important Research, Technological Development and Innovation (RTDI) themes, the expert group prioritised six as pioneering research activities that should lead to cross-regional exchanges and follow-up actions.

1. Analysing the impact and effectiveness of incentives for sustainable mobilisation of forest biomass including predictions and scenarios of tailor-made measures.
2. Examining the functioning of various existing regional forest ownership organisations. How do long-established and well performing associations operate? Are there lessons to be learned?
3. Market analysis of future demand and supply (long-and short term perspectives) of forest biomass including potential new and traditional value chains.
4. Developing user-friendly information platforms and new tools (map based) to exchange knowledge on forest management planning in the long term (multi-objective approach) across European regions.
5. Analysing the potential of new forest-based cross-regional value chains and production systems for enhancing Europe's competitiveness.
6. Options and incentives for carbon sequestration through forest management: Identify and analyse incentives for carbon sequestration through active forest management and the use of timber and other forest-based products

Find the full list of identified research needs coming from practice in Annex 3

6.2 Operational Groups – a call for innovations / innovators

Innovations are a prerequisite to boost the use of forest biomass in a sustainable way across Europe in its regions. They can be any type of action targeted to overcome barriers in local or regional conditions, e.g. investment in new harvesting or logistic technologies; regrouping of forest owners; facilitating access to roundwood markets; creation of new value chains; and many more. Taking the intricacies in the regional differences for mobilising forest biomass into consideration, the expert group defined a set of ideas that could be developed through EIP AGRI Operational Groups[3] to test or put into practice innovative solutions and actions.

These are:

- Developing regional models (including Decision Support Systems) for improved forest management in small-scale forests (land consolidation, establishment of land registers, cooperatives).
- Participating in the digitisation process by using new models for innovative virtual timber sales/marketing hubs.
- Reviewing existing awareness-raising measures for forest owners addressing the important of their forests in providing ecosystem services. This should include the evaluation of existing communication tools for knowledge transfer and dissemination.

[2-3] For more information see the EIP-AGRI brochure on **Operational Groups**.

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- Promotion and adaptation of existing “good practice” examples in order to transfer existing knowledge amongst practitioners and/or regions.
- Profiling regional models for the development of forest owner groups to become more self-sufficient without over-dependency on “volunteerism”.

6.3 Other recommendations and innovative ideas

Finally, in line with the identified barriers and the ideas for research and innovation listed above, some further recommendations have been made to better support the mobilisation of the forest biomass and innovate more efficiently. They are mainly to be addressed at national or EU level. These are:

- Exchanging knowledge on the real impacts and effectiveness of current incentives across Europe for tailor-made solutions in the regions.
- Provide means to support the facilitation of forest owner associations in member countries/regions.
- Evaluate existing participatory approaches (i.e. Regional learning laboratories) to involve stakeholders, to increase synergies between available funding opportunities.
- Support and strengthen the stakeholder dialogue (along wood supply chains) by developing social and economic regional and cross-regional networks including a stronger connection of stakeholders along supply chains.
- Incentives for marketing hubs (making the market more transparent, easier to evaluate/measure efficiency of incentives, enhancing contact of owners and information available, etc.)
- Collect existing and develop new practices and policies along value chains for increased and sustainable supply of wood and biomass according to the quality requirements.

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7 Annexes

Annex 1. List of members of the Focus Group

Expert (surname, name)	Profession	Country
Borz, Stelian Alexandru	Scientist	Romania
Gaworska. Marta	adviser	Poland
Husson, Henri		France
Höbarth, Martin		Austria
Krajnc, Nike	Scientist	Slovenia
Marinho, Ricardo		Portugal
Martínez Benz, Jesús	adviser	Spain
Mota, Dulce		Portugal
Ní Fhlatharta, Nuala	Expert from agricultural organisation, industry or manufacturing	Ireland
Niemi, Karoliina	Expert from agricultural organisation, industry or manufacturing	Finland
Nordfjell, Tomas	Scientist	Sweden
Picos, Juan	Expert from agricultural organisation, industry or manufacturing; Farm advisor; Scientist	Spain
Prior, Mark	Forester	United Kingdom
Ruiz, Jabier	Expert from NGO; Scientist	Belgium
Schreiber, Roland	Scientist	Germany
Sullivan, Kieran	Farmer	Ireland
Šilininkas, Mindaugas	Farmer; Forester; Expert from NGO	Lithuania
Thoma, Franz	adviser	Belgium
Toivonen, Ritva	Scientist	Finland
Weiss, Gerhard	Scientist	Austria
Facilitation team		
Kleinschmit von Lengefeld, Andreas	Coordinating expert	France
Guimarey Fernández, Beatriz	Task manager	Spain

You can contact Focus Group members through the online EIP-AGRI Network.
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Annex 2. List of mini-papers

The following table compiles the list of mini-papers developed by the experts of the focus group. All the mini-papers of the Focus group can be downloaded thorough the webpage of the **EIP-AGRI Focus Group on Sustainable Mobilisation of Forest Biomass**.

No.	Title	Authors
MP1	Involvement of actors / stakeholders in regional initiatives for forest biomass mobilisation	Roland Schreiber (Coord.), Henri Husson, Nike Krajnc, Jesús Martínez Benz, Nuala Ní Fhlatharta, Tomas Nordfjell, Mark Prior, Franz Thoma,Gerhard Weiss
MP2	Forest ownership types	Kieran Sullivan (Coord.), Martin Höbarth, Dulce Mota, Nuala Ni Fhlatharta, Tomas Nordfjell, Juan Picos, Mark Prior, Mindaugas Silininkas, Franz Toma, Gerhard Weiss
MP3	Forest biomass markets	Ritva Toivonen (Coord.), Henri Husson, Tomas Nordfjell
MP4	Decision support tools	Nike Krajnc (Coord.), Henri Husson, Tomas Nordfjell, Mark Prior, Kieran Sullivan
MP5	Harvesting and transportation technologies	Tomas Nordfjell (Coord.), Stelian Alexandru Borz, Nike Krajnc, Ritva Toivonen
MP6	Contribution to environmental issues	Jabier Ruíz (Coord.), Karoliina Niemi, Kieran Sullivan, Gerhard Weiss
MP7	Incentives for mobilisation of forest biomass	Juan Picos (Coord.), Martin Höbarth, Henri Husson, Jesus Martínez Benz, Nuala Ni Fhlatharta, Tomas Nordfjell, Jabier Ruíz, Mindaugas Silininkas
MP8	European map of the regional forest-based sector	Franz Thoma (Coord.), Henri Husson, Nike Krajnc, Nuala Ni Fhlatharta, Tomas Nordfiell, Juan Picos, Mark Prior

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Annex 3: Full list of identified research and innovation needs

This is the complete list of the 28 identified research and innovation needs to enhance and further develop sustainable mobilisation of forest biomass in Europe and its regions.

1. Analysing the involvement of concerned stakeholders in forest operations across European and in its regions.
2. Investigating and promoting potential for new forest products and services
3. Identifying and analysing best options for tailor-made initiatives to strengthen regional forest-based value chains to overcome the miss-match of supply and demand of forest biomass.
4. Investigating under which conditions cooperation among forest owners enhances the sustainable mobilisation of forest biomass
5. Analysing and understanding the development of forest ownership since the beginning of forest research (300 years) and forecasting and modelling scenarios for the next 50 years.
6. Examining the functioning of various existing regional forest ownership organisations. How do long-established and well performing associations operate? Are there lessons to be learned?
7. Developing measures to reach and integrate non-traditional forest owners (e.g. absentee land owners)
8. What is the impact of external policies on sustainable mobilisation of forest biomass in European regions?
9. Market analysis of future demand and supply (long-and short term perspectives) of forest biomass including potential new and traditional value chains.
10. What is the impact of globalisation on sustainable mobilisation of forest biomass in Europe and its regions?
11. What is the impact of consumer, societal, regulatory shifts in regard to innovative technologies for the demand and supply of forest biomass?
12. Analysing and identifying future supply and operational structures for forest biomass on regional level in Europe including shifts of land-use, land mobilisation.
13. Developing information platforms and new tools (map based) to exchange knowledge in user-friendly forest management long term planning (multi-objective approach) across European regions.
14. Developing novel decision support tools in a participatory approach for traditional and non-traditional forest owners for long-term sustainable management of forests, including small-scale woodlots owners.
15. Integration and application of machine learning algorithms in forest-based operations.
16. Developing a user-friendly ICT platform for smart optimisation of wood supply chains to support low GHG emissions and optimisation of the forestry-wood chain from tree harvest to primary wood consumers (DSS that facilitate low carbon and low cost wood supply chains).
17. Novel generation of decision support tools for economically feasible wood harvesting while taking into account all forest functions (social, economic and environmental).
18. Developing combined new forest harvesting business models including smart organisation, infrastructure (long distance transportation) and regulatory framework conditions, for optimising sustainable mobilisation of forest biomass.
19. Development of efficient machinery and optimised business concepts (timing, relocation of equipment) for forest harvesting operations adapted to the needs within European regions.
20. Developing a new generation of efficient, smart forest harvesting machines with low environmental impacts for handling large diameter trees (hardwood species) in all terrains.
21. Optimising and integrating best IT-based machine functions into forest harvesting technologies along the whole the forestry-wood chain.
22. New integrated forest management for wood, biodiversity and other ecosystem functions; analysing and developing models of integrated forest management systems, including wood production, biodiversity, conservation and/or other ecosystem services.
23. Sustainable forest operation systems: developing new sustainable solutions for forest harvesting and transporting systems.
24. Options and incentives for carbon sequestration through forest management: Identifying and analysing incentives for carbon sequestration through active forest management and the use of timber and other forest-based products.

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25. Analysing the impact and effectiveness of incentives for sustainable mobilisation of forest biomass including predictions and scenarios of tailor-made designed measures.
26. Analysing the potential of new forest-based cross-regional value chains and production systems for enhancing Europe's competitiveness.
27. Analysing and identifying the potential of digitalisation and e-commerce for the forest-based sector to enhance employment and creation of added value in European regions.
28. Development of a general extension framework supporting national and regional initiatives.

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AGRICULTURE & INNOVATION

The European Innovation Partnership 'Agricultural Productivity and Sustainability' (EIP-AGRI) is one of five EIPs launched by the European Commission to promote rapid modernisation by stepping up innovation efforts.

The **EIP-AGRI** aims to catalyse the innovation process in the **agricultural and forestry sectors** by bringing **research and practice closer together** – in research and innovation projects as well as *through* the EIP-AGRI network.

EIPs aim to streamline, simplify and better coordinate existing instruments and initiatives and complement them with actions where necessary. Two specific funding sources are particularly important for the EIP-AGRI:

- ✓ the EU Research and Innovation framework, Horizon 2020,
- ✓ the EU Rural Development Policy.

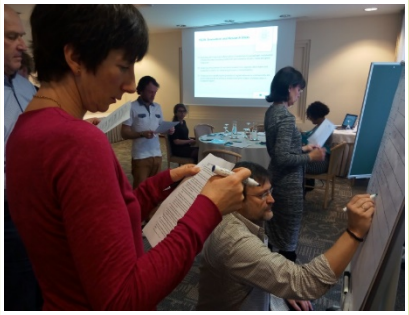
An EIP AGRI Focus Group* is one of several different building blocks of the EIP-AGRI network, which is funded under the EU Rural Development policy. Working on a narrowly defined issue, Focus Groups temporarily bring together around 20 experts (such as farmers, advisers, researchers, up- and downstream businesses and NGOs) to map and develop solutions within their field.

The concrete objectives of a Focus Group are:

- ✓ to take stock of the state of art of practice and research in its field, listing problems and opportunities;
- ✓ to identify needs from practice and propose directions for further research;
- ✓ to propose priorities for innovative actions by suggesting potential projects for Operational Groups working under Rural Development or other project formats to test solutions and opportunities, including ways to disseminate the practical knowledge gathered.

Results are normally published in a report within 12-18 months of the launch of a given Focus Group.

Experts are selected based on an open call for interest. Each expert is appointed based on his or her personal knowledge and experience in the particular field and therefore does not represent an organisation or a Member State.



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www.eip-agri.eu | +32 2 543 73 48 | servicepoint@eip-agri.eu | Avenue de la Toison d'Or 72 | 1060 Brussels | Belgium