

Good practice guidance on the sustainable mobilisation of wood in Europe

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Abbreviations

ADEME	Agence de l'Environnement et de la Maîtrise de l'Energie / French Environment and Energy Management Agency
CBD	Convention on Biological Diversity
CEMAGREF	L'institut de recherche finalisée de référence pour la gestion durable des eaux et des territoires / Research institute for sustainable land and water management
CEPF	Confederation of European Forest Owners
CEPI	Confederation of European Paper Industries
CHP	Combined Heat and Power
COPA-COGECA	Committee of Professional Agricultural Organisations and General Committee for Agricultural Co-operation in the European Union
EC	European Commission
EEA	European Environment Agency
EFI	European Forest Institute
EFSOS	European Forest Sector Outlook Study
ENFE	European Network of Forest Entrepreneurs
EU	European Union
EUSTAFOR	European State Forest Association
FAO	Food and Agriculture Organization of the United Nations
IEA	International Energy Agency

MCPFE ¹	Ministerial Conference on the Protection of Forests in Europe
ONF	Office National des Forêts
OWL	Other wooded land
PEBLDS	Pan-European Biological and Landscape Diversity Strategy
PEOLG	Pan European Operational Level Guidelines
PPP	Public-Private Partnership
PSWS	Potential Sustainable Wood Supply
RES	Renewable Energy Sources
R&D	Research and Development
SFC	Standing Forestry Committee
SFM	Sustainable forest management
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change

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¹ The Ministerial Conference for the Protection of Forests has changed its brand name from MCPFE to FOREST EUROPE

1. Introduction

Objectives of the document

This document is intended to provide guidance for sustainable mobilisation of wood in Europe. The guidance will refer to good practice examples of successful and sustainable mobilisation of wood, to assist policy-makers and practitioners alike in taking and supporting similar measures. As such, this document aims to give clear, concise and operational guidance, and to add value to existing and other ongoing work on the subject, including work conducted by FOREST EUROPE, the European Commission and UNECE/FAO, i.e. related to the implementation of the EU Forest Action Plan, the EU Renewable Energy Policy objectives and action plans, and MCPFE Warsaw Resolution 1 "Forests, Wood and Energy".

The guidance aims to:

- identify concrete measures for wood mobilisation and explain their applicability in different conditions;
- present "good-practice examples" of wood mobilisation, linked to each measure, and explaining determinant factors and possible constraints, ease of implementation, time scales, and potential scale of mobilisation;
- help decision-makers from administrations and industry, as well as forestry practitioners, make sound choices and implement appropriate actions with respect to all aspects of sustainable wood mobilisation, whilst ensuring sustainable forest management (SFM);





- provide a practical contribution at country level to the preparation of national energy plans and strategies, including the National Renewable Energy Action Plans (NREAPs) of the EU, and to help EU and other European countries to achieve their climate change and energy commitments.

In the context of this document, a “good practice” is defined as a measure which enables or promotes wood mobilisation in conditions which might otherwise impede or constrain it, whilst maintaining or enhancing SFM, and which is transferable to other situations².

Policy background

The increased utilisation of wood as raw material and for energy generation offers – along with other renewable energy sources – opportunities for Europe to contribute to a more renewable energy future and thus to reduce its greenhouse gas emissions, to secure its energy supply and maintain competitiveness, inter alia through enhancing sustainable regional and rural development. The EU Climate and Energy Package, first announced in January 2007,

was endorsed by EU Ministers in March that year. Amongst its provisions was the raising of the indicative EU target for renewable energy sources (RES) from 12% by 2010 to an obligatory target of 20% of overall energy consumption by 2020, with modulated but binding minimum contributions by all Member States. The ensuing EU legislation (Directive 28/2009/EC) further requires Member States to include in their National Renewable Energy Action Plans “specific measures on the promotion of the use of energy from biomass, especially for new biomass mobilisation taking into account:

- biomass availability: both domestic potential and import;
- measures to increase biomass availability, taking into account other biomass users (agriculture and forest-based sectors);”³

3 <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0028:EN:NOT>

Other relevant activities by the European Commission comprise:

- the EU Forest Action Plan⁴, which inter alia promotes the increased use of forest biomass for energy generation;
- the EC communication on “Innovative and sustainable forest-based industries in the EU”⁵, which promotes more wood growth and mobilisation (see “Actions 1-4”);

Under the work programme implementing the EU Forest Action Plan, has been the EU “Standing Forestry Committee (SFC) ad hoc Working Group on mobilisation and efficient use of wood for energy generation”. The SFC working group collected information on experiences and good practices on wood mobilisation from all EU member states and identified eight focus areas for action which relate to an increase of supply of wood for energy and for industrial raw material⁶. The conclusions and recommendations of the SFC working group have been taken into account in this guidance document.

In November 2007, the signatory states of the Ministerial Conference on the Protection of Forests in Europe committed themselves to the mobilisation of wood from sustainable sources in “Warsaw Resolution 1: Forests, Wood and Energy” (MCPFE 2007)⁷. The signatory countries agreed inter alia to increase wood production and mobilisation as a contribution to climate change mitigation and energy supply. Other international meetings, such as the workshops organised by UNECE/FAO together with partners in Geneva and Grenoble⁸, and earlier working groups organised under the Advisory Committee on Forestry Policy and Forest-based Industries⁹, have also addressed

4 Available online: http://ec.europa.eu/agriculture/fore/action_plan/index_en.htm

5 <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0113:FIN:en:PDF>

6 Available online: http://ec.europa.eu/agriculture/fore/publi/sfc_wgii_final_report_072008_en.pdf

7 http://mcpfe.org/filestore/mcpfe/Conferences/Warsaw/warsaw_resolution_1.pdf

8 Workshop on Mobilising Wood Resources in January 2007: <http://www.unece.org/timber/workshops/2007/wmw/mobilisingwood.htm>; Workshop on Potential Sustainable Wood Supply in March 2009: <http://timber.unece.org/index.php?id=128>; Workshop on Strategies for increased wood mobilisation in June 2009: <http://timber.unece.org/index.php?id=158>

9 97/837/EC: Commission Decision of 9th December 1997, amending Decision 83/247/EEC setting up a Committee on Community Policy regarding Forestry and Forestry-based Industries (Official Journal L 346 , 17/12/1997 P. 0095 – 0096)

wood mobilisation and wood supply potential to increase awareness on the subject and increase knowledge.

Increasing the consumption of sustainably produced wood products and bio-energy in countries all over Europe could have economic, environmental and geopolitical gains. Moreover, the successful implementation of the identified “good practice” mobilisation measures would be an opportunity for the forest-based sector to generate income, and to play a leading role in sustainable development by promoting competitiveness through innovation. For this, the principles of sustainable forest management and sound bio-energy production need to be respected, i.e. attaining balance between society’s increasing demands for wood products and benefits, and the protection and promotion of forest health, biodiversity and regenerative capacity. Conservation and management practices need to be environmentally, socially and economically sustainable, thus generating and maintaining benefits for both present and future generations¹⁰.

Note: This document is based on good-practice examples which have been identified during and after the workshop on “Strategies for increased wood mobilisation from sustainable sources”, held in Grenoble in June 2009, following a process of consultation with the partners who organised the workshop and stakeholders from the environmental community and the forest-based industries. The workshop was co-organised by the French Ministry of Food, Agriculture, and Fisheries, FOREST EUROPE, UNECE/FAO, EFI, COPA-COGECA, CEPF, CEPI, ENFE, EUSTAFOR and CEMAGREF. The document is published jointly by the European Commission, FOREST EUROPE and UNECE/FAO.

10 Convention on Biological Diversity (Decision VII/11 of COP7): <http://www.cbd.int/decision/cop/?id=7748>, and the definition of SFM under FOREST EUROPE: http://www.mcpfe.org/eng/What_we_work_for/Sustainable_Forest_Management/

2 A good practice is not necessarily a “best practice” since it may not be directly comparable with others. Also “good practice” serves better the fact that what represents a good practice depends on the situation and may change with altering circumstances

2. Wood resources and their mobilisation potential

According to the study on wood availability and demand¹¹, developed by UNECE/FAO, the University of Hamburg and partners in 2007, the increasing demands for woody biomass will intensify competition for wood supply, in view of the growing requirements from both bio-energy and the forest products industries. The study projected, based on recent rates of increase, that for the years 2010 and 2020 more wood (respectively 185 million (M) m³ and 448 M m³) would be required to meet the estimated wood demands (Table 1). A further estimation was made for 2020, based on a lower (75%) projection, allowing for more rapid interim growth of the contribution from other biomass sources, such as agricultural crops and residues, and municipal waste.



11 Mantau, U., Steierer F., Hetsch S., Prins Ch. (2008): Wood resources availability and demands

Year	Total wood supply (million (M) m ³ u.b.)	Wood demand (M m ³ u.b.)	Difference (M m ³ u.b.)
2010	791	976	185
2020	825	1,274	448
2020 (75%)*	825	1,156	321

Table 1: Wood supply and demand required to fulfil European Forest Sector Outlook Study (EFSOS) product demand projections and wood energy policy objectives in 2010 and 2020. See study for information on methods and assumptions.
*Assumes share of wood in renewable energies declines to 75% of the present biomass share, as the contributions from other biomass sources, such as agricultural crops and residues, as well as municipal wastes, grow faster than that from wood

Due to the current financial and economic crises, most European countries have experienced sharp falls in demand of wood-based products and the above projections might be too high in the short to medium terms¹². In the long run, however, the issue of increased wood demands is of importance as the sector must be prepared for supplying wood for energy as well as raw materials for processing, and to face long-term structural challenges, such as that of developing a less carbon-intensive life-style.

Despite the economic recession, wood-based energy production and consumption have continued to increase over the past two years. The Joint Wood Energy Enquiries (JWEES)¹³ by UNECE/FAO and IEA have confirmed the high importance of woody biomass for energy generation. Wood fibres at present account for 42% of renewable energy sources in the EU 27. Wood-based energy demand is expected to be maintained if not further increased, at least until other sources of biomass come on stream in a significant way. Meanwhile, other MCPFE signatory countries besides the EU seem to follow similar trends to those in the EU.

12 UNECE/FAO Forest Products Annual Market Review (FPAMR 2008-2009), available online under: http://timber.unece.org/fileadmin/DAM/publications/Final_FPAMR2009.pdf
13 Available online under: <http://www.unece.org/timber/mis/energy/JWEE.htm>

In autumn 2008, UNECE/FAO prepared a study called: “Potential Sustainable Wood Supply”¹⁴, in order to answer the questions: how much of the annual wood growth in Europe is still unused?; How much of this could be mobilised sustainably? The preliminary results revealed that, according to the assumptions made, an additional 233 M m³ of roundwood equivalent could be supplied from various sources in Europe (EU 27), inside and outside the forest, if vigorous action were to be taken by governments and all stakeholders (Table 2). According to the study, the largest potential increase of wood supply can be found in:

- harvesting more stemwood in forests available for wood supply (an extra 80 M m³ could be mobilised, with sufficient policy support according to the study);
- harvesting a greater part of the forest biomass, such as branches and tops on trees which are already harvested (an extra 50 M. m³ according to the study);
- mobilising more post-consumer wood (an extra 39 M m³ according to the study).

To mobilise more wood from the above-mentioned sources, efficient and effective measures need to be developed and applied. This is the objective of the present guidance, taking account of the applicability of measures in different social, environmental and economic circumstances.

It should be noted that concerns have been expressed that current wood use is underestimated (e.g. through excluding that used for “own consumption” of fuel wood from private forests). Current wood use may thus be considerably more than expected, hence on the one hand reducing the remaining additional amount available. On the other hand this raises the share of renewable energy from biomass already achieved. Further research is needed to improve the knowledge of current consumption and future production.

14 Hetsch, S. (2008): Potential Sustainable Wood Supply in Europe, UNECE/FAO Timber Section, Geneva, 2008

Source of wood supply	Current use (2005)		Additional bio-technical potential*		Additional socio-economic potential**	
Stemwood (Forest area available for wood supply (FAWS))	355.2	68%	232	31%	81.2	35%
Above-ground biomass (FAWS)						
- from current harvest	11.2	2%	148.8	20%	52.1	22%
- from additional harvest		0%	28.8	4%	10.1	4%
Below-ground biomass (FAWS)	2.6	1%	176.2	23%	0	0%
Other wooded land	1.1	0%	18.7	2%	6.5	3%
Trees outside forest	7.1	1%	3.6	0%	1.3	1%
Forest Expansion	0	0%	65.1	9%	22.8	10%
Wood fibre from agriculture	0	0%	25	3%	18.7	8%
Co-products and residues from wood-processing industry	113.8	22%	2	0%	2	1%
Post-consumer recovered wood	28.6	6%	52.5	7%	39	17%
SUM	519.6	100%	752.7	100%	233.7	100%

Table 2: Importance of wood supply sources (million (M) m³ round wood equivalent) according to UNECE/FAO study on Potential Sustainable Wood Supply in Europe
*Describes how much wood could be physically removed from the forest on a sustainable level in addition to the current harvest, based on the biological increment, and subtracting harvest losses, and accounting for bark, if the wood was harvested. Number is influenced by site conditions, forest management and harvesting efficiency.
**Describes how much wood could be cut and brought to formal and informal markets in addition to what is already used and marketed. Figure is mainly driven by harvesting cost, wood prices and related profit margins.

3. General principles to be applied in sustainable mobilisation of wood

The following principles should apply to the sustainable mobilisation of wood:

1. **The sustainability of forests and other wood resources, as well as of operations**, needs to be assured at all stages of planning and execution of wood mobilisation, both in policies and measures.

2. **Agreed principles and criteria and indicators of sustainability** also need to be applied, i.e. the criteria and indicators for sustainable forest management, agreed and improved under the framework of the MCPFE¹⁵ and the Pan-European Operational Level Guidelines (PEOLG)¹⁶.

3. In particular, wood mobilisation measures need to **avoid the loss of biodiversity and ecosystem services**. Biodiversity conservation and enhancement need be respected in line with commitments under the Convention on Biological Diversity (CBD)¹⁷, the Pan-European Biological and Landscape Diversity Strategy (PEBLDS)¹⁸ and the MCPFE commitments¹⁹ and respective action plans to stop and reverse the degradation of biological diversity.

4. As far as is practicable, **free-market forces should apply** and, in any case, measures taken should not impose undue distortions of competition and cost-effectiveness should be encouraged.

5. Except in cases where business secrecy is necessary, a **maximum of market information** should be available to all relevant actors in a timely and transparent manner.

6. Specific measures should be **proportional** to their intended objectives and projected scale of mobilisation.

7. All approaches should be in line with **high standards for energy and resource efficiency and environmental performance**.

8. **Regional and local conditions**, including forest and other wood resources, markets, infrastructures, equipment availability, etc. need to be taken into account and relevant adaptations made as appropriate.

9. Mobilising more wood is a task for the whole forest-based sector. **All relevant actors should be fully committed and involved** and their needs should be taken into account, especially as regards their motivation, training, skills and resources. Targeted and steered participation by specific groups needs to be assured in order to achieve set purposes.

10. **Measures** should be taken **which are easy to implement** in the short and medium terms, whilst making provisions to overcome barriers in the medium and long terms.

11. **Afforestation and reforestation** projects to enhance woody biomass production should be in line with the “Pan-European Guidelines for Afforestation and Reforestation”, with a special focus on the provisions of the UNFCCC elaborated under the framework of the MCPFE and PEBLDS.

12. A **“cascade” use** of wood products (i.e. firstly for wood-based products, secondly recovered and reused or recycled and finally



used for energy) may be encouraged in situations where life cycle analysis (LCA), logistical and cost factors indicate its efficiency. This is in order to utilise resources most efficiently and to maximise climate change mitigation potential.

13. **The flow of research and technological development information and the exchange of knowledge and “good practices”** within and between sets of actors and countries should be encouraged, especially as regards new technologies for harvesting woody biomass for energy use from different

sources. Research results on the motivation and/or constraints of market partners should also be gathered and exchanged.

14. Mobilisation measures should also be directed to forests having a high risk of forest fires, storms, insect infestations, etc., in order to **reduce their level vulnerability to such hazards**.

¹⁵ http://www.mcpfe.org/filestore/mcpfe/Conferences/Vienna/Vienna_Improved_Indicators.pdf

¹⁶ http://www.mcpfe.org/filestore/mcpfe/Conferences/Lisbon/lisbon_resolution_12a2.pdf

¹⁷ <http://www.cbd.int/convention/about.shtml>

¹⁸ <http://www.pebls.org/index.php?do=20514351&lang=eng>

¹⁹ MCPFE Helsinki resolution 2 “General Guidelines for the Conservation of the Biodiversity of European Forests” (http://www.mcpfe.org/filestore/mcpfe/Conferences/Helsinki/helsinki_resolution_h2.pdf) and other biodiversity related commitments under the MCPFE declarations and resolutions

4. Overview of wood mobilisation measures

In this section, eight groups of activities, having promising mobilisation potentials, are presented and for each group specific measures are proposed.

A. A. Land tenure, management, co-ordination and planning

Effective forest ownership and land tenure, management, co-ordination and planning are prerequisites for sustainable wood mobilisation. About 60% of the European forest (EU 27) is owned privately and, according to national inventories, a large share of the unused biomass can be found in small-scale or fragmented private forests. Hence, a less fragmented forest holding structure would make forest management more feasible. Thus, efforts to rationalise unfavourable ownership structures can be applied to scattered parcels of forest land and facilitate forest management and improve profitability. To overcome such constraints, the voluntary formation of forest owner groupings and better collaboration between forest-based sector actors are key factors for increasing wood supply whilst maintaining SFM. A large amount of woody biomass also exists outside forests, e.g. in roadside and hedgerow trees as well as in urban parks and gardens. This can be mobilised through similar co-operation between other groups of relevant actors.

Measures proposed: improve organisation of forest owners; enhance co-operation between forest management units; consolidate land management units; utilise woody biomass from other wooded land, roadside and hedgerow trees, trees in urban parks and gardens as well as from agriculture, horticulture and viticulture, including fruit-tree and vine clippings.

B. Infrastructures and logistics

The presence of an adequate forest access network and other infrastructures is one crucial precondition for increased wood mobilisation, in order to allow the entry, working and passage of harvesting and transport vehicles. A sufficiently dense and efficiently laid out forest access network facilitates a well-functioning wood supply chain and helps keep costs and environmental impacts at low levels. Undeveloped or inadequate forest infrastructures can often be found in mountain areas and in small-scale or fragmented private holdings. In such areas, the establishment of an efficient access network and other infrastructures is complicated and costly but without them more intensive management, including wood mobilisation, is hindered. Nonetheless, when infrastructures are installed, negative impacts, e.g. from road building and/or intensified logging, need to be prevented during all stages.

Measures proposed: raise axle weight limits; improve accessibility to the forest, in particular in mountain areas; optimise logistical planning so as to maximise loads and minimise haulage distances; improve technology and transport systems for new energy-wood assortments.

C. Markets and marketing: organisation and transparency

Higher wood prices generally bring about increased harvesting, whereas insufficient infrastructures and fragmented holdings impede it. Small amounts of harvested wood typically lead to less profitable harvesting operations, thus further constraining the scope for harvesting additional potential supply. The lack of suitable market structures and transparency can also hinder wood

supply. However, as small-scale private forest owners often do not act as profit maximisers, another key lever towards additional wood supply is an enhanced awareness about the benefits of sustainable forestry other than economic ones.

Measures proposed: Establish public-private partnerships to jointly develop markets; improve market transparency; establish long-term partnerships; facilitate access to basic information on forest ownership; establish sustainable wood-energy supply chains; improve the information about sustainable forest management, its environmental functions and the services it can provide to the public.

D. Improved recovery channels

Post-consumer wood is a secondary raw material which should be collected, sorted and re-utilised or recycled, including as biomass for energy production. Despite a considerable rise in the collection and utilisation rates – particularly recycling, post-consumer wood is a resource which is still underutilised in many European countries. As a first step towards increased recovery and re-utilisation, more information is necessary about the potential quantities of recoverable wood as well as to what extent these sources can be sustainably re-utilised or recycled at national and European levels. An improved knowledge base could be achieved through standardising the classification categories of post-consumer wood, including contamination limits, on a European basis and applying them in post-consumer wood inventories. Such measures could further contribute to increased collection and utilisation.

Measures proposed: standardise the classification categories of post-consumer wood, including contamination limits as a basis for carrying out inventories and utilise sources of post-consumer wood.



E. Education, training

The lack of a sufficiently numerous and adequately trained workforce is one major barrier to additional wood mobilisation. For example, in the Nordic countries, the shortage of skilled entrepreneurs, harvester operators and harvesters is a bottleneck for increased wood mobilisation. More widely in Europe, quality issues have been identified, e.g. in the selection of trees to be harvested, their safe and efficient felling and removal as well as their breakdown and assortment for end uses. The efficient allocation of wood and residues from logging (final felling and st thinnings) both between and within the outlets for wood-energy purposes and those for wood-processing industries is vital to the success and viability of wood mobilisation.

Therefore, workforce training and subsequent skills development need to cover a minimum of scope in each of at least the following areas:

- health and safety;
- sustainability;
- machinery and logistics;
- wood quality and assortments.

Such capacity-building is also necessary throughout the other links in the forest management and wood-marketing chain. Education and training of forest owners and entrepreneurs are essential to optimise their awareness of suitable forestry options, markets (e.g. economies of scale derived from two or more forest owners marketing their wood in co-ordination) and end uses. Timber buyers, hauliers and other actors can likewise benefit from access to information and instruction to help optimise their own operations, together with those indicated above.

Measures proposed: Programmes and courses by public forest and other relevant services (e.g. rural development agencies, health and safety boards, extension services, etc.) and, as appropriate, together with the forest-based and energy industries, to provide relevant and sustained information, education and training so as to improve and sustain safety, efficiency and sustainability in wood mobilisation and marketing. If such efforts were also linked to targeted measures to improve forest working conditions and remuneration, as well as to image campaigns, the attractiveness of forest-related jobs could be enhanced, thus encouraging more recruitment and workforce stability.



F. Sources of and mechanisms for financing

Raising finance to carry out forest harvesting operations can often be problematic, especially for individual forest owners whose engagement is only part-time and not as a commercial entity. In this context, groupings of such owners into registered co-operatives or similar structures can prove a useful first step in being recognised by financial institutions such as banks. One useful model would be to use existing structures, such as agricultural co-operatives, as a guarantor for such new bodies.

Commercial banks are the main classic source of finance for investments and working capital. Some are specialised in services to the agricultural community and offer favourable terms for loans and other financial instruments. Knowledge of these could be collected and shared between actors in the forest-based sector.

Though such market-based mechanisms are preferred solutions, public incentives can also benefit increased wood mobilisation. Incentives, such as grants, interest subsidies and loan guarantees, can be addressed to forest owners, industry, contractors and entrepreneurs or partnerships between one or more of these groups. Such incentives, particularly, subsidies, however, need to be efficient and fixed for a short time period. Moreover, they need to be provided in a way that market conditions are not unduly distorted. Advantage should be taken of existing support schemes, e.g. the European Agricultural Fund for Rural Development (EAFRD) and forest-related measures in respectively national and regional rural development programmes (RDPs). Revisions and amendments could be used to put emphasis on measures related to wood mobilisation.

Measures proposed: creating legal entities which will be recognised by financial institutions, identifying financial institutions which offer favourable terms for loans and other mechanisms,

Research, technological development and knowledge transfer

One of the key actions proposed by the EU Forest Action Plan is to encourage research and technological progress to support wood mobilisation and enhance the competitiveness of the forest-based sector. Knowledge development and exchange of “good practices” are cross-cutting measures which facilitate the effectiveness and sustainability of wood mobilisation efforts. Thus, continued funding for forestry research and technological development, with special regard to wood mobilisation questions, would be conducive to this end. The SFC ad hoc Working Group II considered the following research topics of major importance to be supported, either through national or EU research funds: the influence of energy-wood use on overall raw material supply; sustainable harvesting techniques; technologies using forest biomass for efficient energy production; carbon balances, SFM and wood utilisation; as well as work-force related projects. The Grenoble workshop further recommended to commission research into the wood supply chain to better understand motivations and constraints of market partners.

Knowledge platforms such as the Forest-based Sector Technology Platform (<https://www.forestplatform.org>), a European partnership for research and development, or Forest Knowledge (<https://www.forestknowledge.net>), a platform providing information on sustainable forest management, are examples for successful exchange of information.



supporting investment; providing grants and other incentives from existing EU, national and regional programmes as well as from other sources.

G. Legal and fiscal measures

Governments and state forest services need to provide the legal framework necessary to enable increased mobilisation by removing legal constraints, e.g. to restructuring and optimising forest ownerships (memberships, physical structures, etc.) which do not enable desired forest management objectives to be achieved, and by developing and implementing regulations and policies conducive to the development of wood mobilisation. In some

cases, fiscal measures may also help stimulate increased mobilisation, e.g. tax relief for forest owners who actively engage in wood mobilisation and utilisation.

Measures proposed: stimulate wood mobilisation through fiscal measures; prevent further fragmentation of holdings and stimulate the rationalisation of those which are fragmented.

H. Silvicultural measures

In Europe, there are still unused wood reserves, even in well run state or private forests which could be released through intensified forest management. Wood harvest and mechanisation of harvesting can be intensified in many forests, i.e. in deciduous stands,

via early thinnings, shorter rotation cycles and the utilisation of forest residues. In the long run, silvicultural management can be intensified through the utilisation of higher-growth species, forest breeding and plant material refinement as well as varying spacing and thinning intensities.

Measures proposed: Improve forest reproductive material and its application to given site types, enhance silvicultural management; improve existing afforestation programmes.

Assessment of good practice examples

Successful good practice examples (case studies), which relate to the measures proposed above, are introduced and described below. When setting priorities, a number of factors should be taken into account, including time-scale, potential scale of mobilisation and ease of implementation. Table 3 presents the scales to assess “Ease of implementation” and “Potential scale” of wood mobilisation.

Dimension	Wording	Abbreviation
Potential scale of mobilisation	Very low	+
	Low	++
	Medium	+++
	High	++++
	Very high	+++++
Ease of implementation	Very difficult	+
	Difficult	++
	Normal	+++
	Easy	++++
	Very Easy	+++++

Table 3: Methodology to assess ease of implementation and potential scale of mobilisation

The identified case studies are presented in table 4, along with an estimation of time-scale, mobilisation potential and ease of implementation. Policy-makers and practitioners may consider these good-practice examples when developing wood mobilisation strategies and practices within their region. To facilitate their judgement on the applicability of such good practices, the reader

may further wish to refer to information presented on specific circumstances, drivers and constraints, results and lessons learned, as well as to the contact details of experts who may be consulted (see chapter 5). For information on the range of costs for each measure, the experts may be consulted directly.

It is stressed that the results of the qualitative assessment presented in table 4 exclusively relate to the case studies’ specific circumstances and have been estimated from information provided by the contact persons indicated for each case study. The evaluation of the case studies was conducted by comparing the examples presented in this document. The ease of implementation and potential scale of a good-practice example can vary considerably under different conditions. It should be noted that the data provided for “time-scale” refer to the time needed for the implementation of a good-practice measure, whereas the resulting wood mobilisation may occur later, sometimes much later, such as in the case of a silvicultural measure.

Mobilisation area	Measure	Ref.	Page	Good practice example	Time scale (years)	Potential scale	Ease of implementation
Land tenure, management, co-ordination and planning	Improve the organisation of forest owners	A.1	20	Enhanced economic co-operation of forest owners (Estonia)	3	+++++	+++
	Enhance co-operation between forest management units	A.2	22	EWB Management GmbH (Germany)	1-2	+++++	+++
	Consolidation of land management units	A.3	24	Land swapping in Galicia (Spain)	5-10	++++	++
	Utilise woody biomass outside the forest	A.4	26	Profitable landscape management (Netherlands)	1	++	+++++
Infrastructures and logistics	Raise axle weight limits, when appropriate	B.1	28	Decree on roundwood transport (France)	1	+++	++++
	Improve accessibility to the forest, in particular in mountain areas	B.2	30	Mapping of logging units with GIS (France)	3-5	++	++++
	Optimise transport distances	B.3	32	NavLog (Germany)	3-5	++++	++
	Improve technology and transport systems of new energy-wood assortments	B.4	34	NWHP (Finland, Iceland, Scotland), CHP Vienna Simmering (Austria)	2-3	+++	+++
Market and marketing: organisation and transparency	Establish public-private partnerships to develop markets jointly	C.1	38	Integrated approach in the Navarra region (Spain)	2-3	+++	+++
	Improve market transparency	C.2	40	Virtual marketplace (Germany)	< 1	++	+++++
	Establish long-term partnerships	C.3	42	“Wald-Wird-Mobil” (Germany)	2	++++	+++
	Facilitate access to basic information on forest ownership	C.4	44	Access to the Land Register (Sweden)	1-2	++++	+++

Mobilisation area	Measure	Ref.	Page	Good practice example	Time scale (years)	Potential scale	Ease of implementation
Market and marketing: organisation and transparency (continued)	Establish sustainable wood-energy supply chains	C.5	46	Wood-energy supply chain (Spain), Biomass Trading Centre (Austria)	2-3	+++	+++
	Improve the information about sustainable forestry	C.6	50	Wood promotion campaign “Holz 21” (Switzerland)	1-2	+++	++++
Improved recovery channels	Carry out inventories on and utilise sources of post-consumer wood	D.1	52	Improved collection and recycling of post-consumer wood (Italy)	2-3	++++	+++
	Standardise classification of post-consumer wood and contamination limits	D.2	54	Guidebook on wood biofuels (France)	1-2	++++	++++
Education, training & skills	Provide relevant information and training	E.1	56	Training of contractors and operators (France)	1	+++	++++
	Provide adequate working conditions and remuneration	E.2	58	Kraftsamling skog (Sweden)	3-5	+++++	+++
Sources of and mechanisms for finance	Supporting investment	F.1	60	Investment support for small sawmills (France)	1	+++	++++
	Providing grants and incentives	F.2	62	Biomass Support Scheme (Scotland)	1	+++	++++
Legal and fiscal measures	Stimulate wood mobilisation through fiscal measures	G.1	64	Tax reduction for active forest owners (France)	1	+++	++++
	Prevent further fragmentation of holdings	G.2	66	Adjusting inheritance tax regulations (Belgium)	1	+++	++++
Silvicultural measures	Enhance silvicultural management	H.1	68	Genetic improvement, Intensive forestry (Sweden), Pre-commercial thinnings (Finland),	3-5	+++++	+++
	Improve existing afforestation programmes	H.2	72	National afforestation programme (Ireland)	3-5	+++++	+++

Table 4: Overview of wood mobilisation measures (evaluation figures are estimated and exclusively refer to case studies)

5. Sustainable mobilisation of wood: good practices

A. Land tenure, management, co-ordination and planning

A.1 Improve the organisation of forest owners

Description	The voluntary formation of forest owner groupings is seen as the major instrument to increase mobilisation of wood from underutilised, small-scale, private forests. Well functioning forest owner associations provide a variety of services to their members, e.g. owners of small and fragmented holdings can profit from scale effects such as improved efficiency, decreased costs and increased profitability. Owners can also profit from enhanced co-operation with forest industries, energy suppliers and public authorities.
Applicability	Applicable in regions with a high proportion of small, private forest holdings.
Main challenges	The low profitability of forestry particularly in small holdings is a considerable challenge. In addition, the forest management goals of owners are diverse and many owners do not act in a market-driven way. Customised approaches are needed to motivate each owner. However, this requires a considerable amount of effort.
Main actors	Lead: forest owners associations; others: public forest services



Good practice example:

Name	Enhanced economic co-operation of forest owners
Location	Estonia, Lääne-Viru County
Description	Situation: Estonian private forest is characterised by a large number of owners having small forest holdings. Sustainable and profitable harvesting activities are not always common practice and the low level in organisation constitutes a considerable challenge for wood supply. Approach: A project was initiated to establish joint selling procedures and sales contracts of forest owners. Accredited advisors inform forest owners on different management options, on economic opportunities and on support for the establishment of joint timber marketing procedures. Results: Sales of timber cutting rights from private forests by forest owners’ co-operatives in the form of public auctions have begun. Joint sales of roundwood to the industry and of logging residues for bio-energy production have been established, and the establishment of an exemplary “bio-energy village” has been started. Private owners profit from better supervision of logging operations and higher prices through the mobilisation of larger volumes. 6,000 m³ of roundwood were sold in one year through the local forest owners’ association. In the Jõgeva region, forest owners have formed a private limited company to produce wood-based heat for the local community.
Lessons learned	Initial wood mobilisation needs extensive consultation of forest owners. Furthermore, the start of such a project should fit with the market needs. The development of joint sales activities can be complex.
Contact point	Jaanus Aun Member of the Board, Foundation Private Forest Centre Address: Tartu mnt 63, 10115 Tallinn, Estonia Phone: +372 683 6056 E-mail: jaanus.aun@eramets.ee
Reference	http://www.eramets.ee



A.2 Improve the organisation of forest owners

Description	Mobilising wood requires the collaboration of all supply chain actors. Forest owners’ associations (FOAs) can facilitate the initiation and co-ordination of wood harvesting and marketing. Public services are often viewed by owners as neutral bodies, thus they can play a crucial role in establishing first contacts with owners, in providing information on forest management and in motivating owners to manage their forests. Good contacts between FOAs and market partners, e.g. contractors, forest industries and wood energy producers are also important to secure wood mobilisation.
Applicability	This measure can be applied in any region or country.
Main challenges	Low profitability of forestry in small holdings, motivation and knowledge of forest owners, conservative positions of owners as regards closer co-operation with the public forest service and/or the wood-processing industries and a low degree of organisation in co-operatives.
Main actors	Lead: Forest owners’ associations; others: public forest services

Good practice example:

Name	Eifel Wald und Holz Management GmbH (EWH)
Location	Germany/ Eifel, Rhineland-Palatinate
Description	Situation: The forest area in the rural area of Bitburg, Germany comprises 27,300 ha. About 13,000 ha belong to 26,000 private forest owners, of which 20,000 each own less than 10 ha of forest. Approach: The marketing and service organisation EWH was founded in 2006 by a private forest owners’ association to concentrate and sell the timber from over 10,000 private forest owners, and to provide joint marketing and forest management services. Timber from private forests used to be brought to the market by the state forest administration, now the forest owners benefit directly from the profits of timber marketing. EWH co-operates with the public state forest administration which is in charge of consulting forest owners and of harvesting preparations, whereas EWH is responsible for the harvesting procedure itself and for selling timber selling. Finance of the company consists of payment by the forest owners for timber harvesting , public aid and a mobilisation premium from sawmills. Results: The annual supply of wood could be increased from 12,000 m³ before 2005 to 20,000 m³ in 2005 and to 36,000 m³ in 2006. In the long run, EHW aims to mobilise a sustainable annual harvest of 75,000 m³. Prior to wood harvesting, blocks are designed across ownerships in order to minimise logistical costs. Timber harvesting is mostly carried out by forestry contractors; timber selling is carried out in the name of the forest owner, who has mandated EWH. Charging is based on the measurement carried out on delivery at the mill, in order to decrease logistic costs.
Lessons learned	The practice could be effective in all areas where wood from private forests is presently sold by public entities.
Contact point	Elmar Franzen General Manager, Eifel Wald und Holz Management GmbH Address: Moetscher Straße 14b, 54634 Bitburg, Germany Phone: +49 6561-964315 E-mail: info@ewh-bitburg.de
Reference	https://www.ewh-bitburg.de

A.3 Consolidation of land management units, for instance through land swapping

Description	Land consolidation programmes can be applied to help counter ownership and management unit fragmentation. Land swapping has proved to being an efficient means for moving towards more efficient and hence less costly forest management whilst increasing wood supply.
Applicability	Given an appropriate legal framework, the measure would be applicable in any regions having fragmented ownership of forest lands. Forest land can be swapped between forest owners or with owners of agricultural or urban properties.
Main challenges	The legal framework needs to be adapted to facilitate the measure. Moreover, forest owners often exhibit emotional feelings for their holdings and fears of financial or personal loss.
Main actors	Lead: legal authorities, forest owners; others: forest industries, other land owners.



Good practice example:

Name	Land swapping
Location	Spain/Galicia
Description	Situation: 98% of the Galician forest is in private hands. Many forest holdings are each less than 2 ha in size and split into two or three plots which are often located far away from each other. 80% of the private properties are less than 0.5 ha in size. In addition, forest owners are often old. Approach: Land swapping was encouraged for economic and social reasons, with the active support of the forest industries and more recently also that of the Galician authorities. Results: Consolidation of management units through land swapping is an important tool to help strengthen sustainable forest management in Galicia. Successful land swapping leads to a concentration of efforts and provides several opportunities, e.g. higher profitability of forestry, increased wood supply and a decrease in risk of forest fires.
Lessons learned	An active support by government authorities can ease the implementation of land consolidation.
Contact point	Miguel Angel Cogolludo ENCE Pontevedra Address: Lourizán, s/n Apartado 157. Post Code: 36153 – Pontevedra. Pontevedra, Spain Phone: +34 986 85 6 000 E-mail: macogolludo@norfor.es
Reference	http://timber.unece.org/fileadmin/DAM/meetings/COGOLLUDO_Land_swapping_SpanishexampleENG.pdf

A.4 Utilise woody biomass on urban/roadside green, tree parks as well as from agriculture, fruit trees and other wooded land

Description	A considerable amount of woody biomass exists outside the forest (urban garden trees, roadside trees and bushes, park trees, wood fibre from agriculture, fruit trees, OWL, etc.) Though they can be uneven in quality, quantity, structure and species composition, these resources are often harvested on a periodic basis, e.g. through road and railway maintenance and tending in parks, urban and rural areas, including farms. Currently, little knowledge exists to what extent these sources are available and can be utilised for wood raw material production. Thus, methods need to be developed to assess and utilise an increased share of these sources in a sustainable way.
Applicability	Applicable in any region or country, especially if non-forest biomass is already harvested for landscape management reasons (e.g. maintenance of roadside trees and bushes).
Main challenges	Regional differences may exist concerning the extent to which these sources are utilisable in physical, legal, technical and economic terms.
Main actors	Lead: Policy-makers, local authorities, research institutions



Good practice example:

Name	Profitable landscape management
Location	Netherlands - Friesland/Beesterzwaag
Description	Situation: In the south-east of the Dutch province Friesland, there is a large amount of unused landscape management by-products. The characteristic landscape elements, e.g. hedges, need to be tended periodically for cultural and ecological reasons. Previously, the harvested biomass was left on site, as the landscape maintenance was cost-intensive. However, now an alternative way to manage these sources had to be found. Approach: The Government Service for Land and Water Management (Dienst Landelijk Gebied, DLG) initiated a project to utilise landscape management by-products for energy generation. To process the biomass, a combined heat-and-power production plant (1 MW) and a wood chip storage hall were built. The total investment costs amounted to approximately 800,000 €. Results: The energy generated is transferred to a local rehabilitation centre and a large policlinic with a former natural gas consumption of up to 400,000 m³ per year. The CHP plant can supply up to 80% of the total energy demand, thus saving up to 320,000 m³/yr of fossil fuel.
Lessons learned	The market price of biomass is currently lower than the price that is negotiated with the farmers. For economic reasons it would be better to buy the biomass on the market. However, the aim was not to gain the highest profit but to develop a sustainable regional project.
Contact point	Dirk de Boer Dienst Landelijk Gebied Address: Trompsingel 17, 9794 CZ Groningen, Netherlands Phone: +31 50 317 85 50 E-mail: d.de.boer@minInv.nl
Reference	https://www.dienstlandelijkgebied.nl

B. Infrastructures and logistics

B.1 Raise axle weight limits, when appropriate

Description	The European Union has set weight limits within the EU (EC Directive EC/96/53), but national governments can set their own limits for domestic journeys. Calculations show that, for example, permitting 44 tonnes on six axles can be less damaging to roads than the 40 tonnes on five axles authorised under EC/96/53. Besides lower road damage, raising axle weight limits can result in lower road congestion and thus safer roads, reduced environmental impact and higher profitability for both forest owners and hauliers.
Applicability	The measure is applicable in any region or country which strives for an enhancement of transport logistics, but moreover to large rural countries.
Main challenges	It is indispensable to assess, according to regional conditions, the potential effects on road preservation and capacity, and to consider environmental (i.e. soil properties and air pollution) impact and constraints.
Main actors	Lead: Governments; others: legal authorities



Good practice example:

Name	Decree on roundwood transport (<i>Décret du 26 juin 2009 et Arrêté du 29 juin 2009 relatif au transport de bois ronds</i>)
Location	France
Description	Situation: In France, extensive efforts to strengthen the forest-based sector and to increase wood mobilisation have recently been initiated. Amongst the measures was a decree to improve transport logistics in the forest-based sector. Approach: In June 2009, a decree on round wood transport was enacted. In case of absence of economic alternatives, the decree allows a total transport weight for roundwood of up to 48 tonnes or up to 57 tonnes, depending on the number of axles. The new decree was developed following, inter alia, a sustainability analysis, as well as an assessment of national transport needs and of alternative possibilities offered by non-road transport systems. Results: The measure has recently been implemented, thus results are not yet available.
Lessons learned	Consultation with stakeholders and especially lorry manufacturers is important to define operational configuration of the vehicles.
Contact point	Arnaud Brizay Ministère de l’Alimentation, de l’Agriculture et de la Pêche Sous direction de la forêt et du bois Address: 19, avenue du Maine, 75732 PARIS Cedex 15, France Phone : +33 1 49 55 51 42 E-mail : arnaud.brizay@agriculture.gouv.fr
Reference	http://www.legifrance.gouv.fr/ Décret du 26 juin 2009 : NOR: DEVT0907450D Arrêté du 29 juin 2009 : NOR: DEVT0913333A

B.2 Improve accessibility to the forest, in particular in mountainous areas

Description	A proper forest access network is a prerequisite for effective wood harvesting and transport. Especially in mountainous areas and on small-scale private forest properties, such infrastructure is often underdeveloped and thus increases the costs of forestry operations. Improving accessibility is an efficient measure to mobilise more wood from forests. This is achieved by providing technology and financial support.
Applicability	Specifically applicable in remote, mountainous and small-scale private forests having underdeveloped forest access networks.
Main challenges	As building forest roads and other infrastructures is often complex and expensive, the availability of financial resources is a key challenge. Montane forests are often of specific ecological and social value, so sustainability needs to be assured at all stages.
Main actors	Lead: policy-makers; others: forest industries



Good practice example:

Name	CARTUVI (<i>Cartographie des unités de vidange</i> , Mapping of logging units)
Location	France: Vercors region
Description	Situation: In the northern French Alps, skidders with winches have been the predominating harvesting vehicle. However, with this practice, up to 50% of the forest area and a large amount of wood remain inaccessible. Approach: CEMAGREF and ONF co-developed CARTUVI, a computer software (ArcGIS) application which makes it possible to determine suitable logging techniques according to mountain topography. The application is accomplished through a DEM (digital elevation model), as well as forest cover and road network data (differentiating between tracks for tractors and roads for lorries). Results: The result of CARTUVI is a map which describes the accessibility of the forest. The system makes it possible to assess the suitability of different harvesting techniques, to identify areas where trees cannot be harvested with skidders and to list problematic areas where an enhancement of the access network is necessary. The system distinguishes between zones by their slope and distance from logging roads: accessibility before and after the construction of new roads or tracks can be assessed (in hectares and in %).
Lessons learned	As the model does not yet take account of wood supply potential, the next step in the evolution of CARTUVI will aim at analysing wood availability according to the (zones (i.e. types of harvesting area) and also their accessibility with e.g. a mast and cable harvesting system. The quality of the resulting map is directly linked to the quality of the initial data.
Contact point	Nicolas Clouet (CEMAGREF) Forest engineer - GIS Address: Cemagref Grenoble 2 rue de la papeterie BP 76, 38402 Saint martin d'hères, France Phone: +33 476762806 E-mail: nicolas.clouet@cemagref.fr

Reference	Clouet, Nicolas (2008): Cartographie automatique des modes de débardage en zone de montagne avec l'aide de l'outil S.I.G. 134p.
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B.3 Optimise transport distances

Description	Forest biomass is most efficiently produced and processed at the local level. Long transport distances and resulting costs can limit the economic feasibility of wood production and hence impede the mobilisation of additional wood. Local networks of production and usage, as well as improved transport systems enable reducing the financial and environmental costs related to transport.
Applicability	This measure can be applied in any region or country.
Main challenges	The measure is somewhat complex as it requires the collaboration of different actors along the wood supply chain.
Main actors	Lead: all wood supply chain actors; others: research institutions

Good practice example:

Name	NavLog
Location	Germany
Description	Situation: In Germany, there are considerable rationalisation potentials within existing logistic chains. The potentials particularly relate to a lack of knowledge about overall forest access and other road networks and their quality. This has often resulted in under- or over-utilisation of forest infrastructures and also in long transport distances. Approach: The leading representative of the wood-procesing industries (Deutscher Holzwirtschaftsrat), the umbrella organisation of the German forest owners’ association (Arbeitsgemeinschaft Deutscher Waldbesitzerverbaende), public forest administrations and the German forest industry have jointly established Navlog, a project which aims to provide the wood industry and related companies (e.g. contractors, transport companies) with a digital forest access network and navigation system which seeks to optimise wood transport systems along the whole wood supply chain. Access to this dataset is limited to those wood-consuming enterprises, including wood-energy companies, which pay an annual fee for using the system. The dataset is due to be updated periodically. Results: A complete picture of the country’s road network is being established. The system, if used by all partners, would make wood transport easier and cheaper by saving time (approximately 20% less time needed to drive to wood depots) and money (10-40 Euro cents/m³), as well as reducing emissions (300 - 480 t CO₂/a). The system will contribute to mobilising up to 600,000 m³ per year of additional wood.
Lessons learned	N/A
Contact point	Sonja Schnitzler NavLog GmbH Address: Sprenberger Straße 1, 64820 Groß-Umstadt, Germany Phone.: +49 6078/785-66 E-mail: schnitzler@navlog.de
Reference	https://www.navlog.de

B.4 Improve the technology and transport systems for new energy-wood assortments

Description	Adequate technology and transport systems for new energy-wood assortments are important in order to ensure the economic viability of wood-energy efforts. Improved techniques (bundling, compacting, etc.) and transport systems for new energy-wood assortments can reduce overall operational costs and thus facilitate the mobilisation of additional woody biomass.
Applicability	The measure is particularly applicable to intensively managed production forests having a high supply of forest residues.
Main challenges	Users need to become familiar with innovative technologies. Applied techniques and systems need to fit to local conditions.
Main actors	Lead: public authorities, forest industries; others: research institutions



Good practice example:

Name	Northern Wood Heat Project (NWHP)
Location	Scotland, Finland, Iceland
Description	Situation: In recent years, the use of wood as fuel has been increasing significantly in Europe and demand is expected to increase further in the future. NWHP was initiated by project partners from Scotland, Iceland and Finland to set up small- and medium-scale wood fuel supply chains. Approach: NWHP facilitated development of sustainable local supply chains by researching and demonstrating wood fuel production techniques that integrate with and complement existing natural resource management goals and methods so as to meet local needs. In particular, NWHP examined potential wood-energy resources in selected regions in Finland, Scotland and Iceland, identified the most suitable solutions to harvest, process and transport the fuel, analysed the prospects for sustainable supply chains and identified suitable locations for wood-fired heating schemes. Training programmes were designed and literature for energy users and forest owners was developed to raise awareness about the benefits of wood heating. Feasibility studies were compiled and cost estimates were made. Results: The project played a key role in the establishment of viable wood-supply chains and entrepreneurship for supplying heat. For example, in the Scottish Highlands the efforts led to an increase from 40 to 80 heating plants using wood chips.
Lessons learned	The key constraints on wood-fuel market development were that users lacked confidence in existing supply chains and that potential supply chain entrepreneurs lacked confidence in the demand base. The public involvement will play a key role in stimulating both supply and demand. Without the commitment of local forest owners to supply their wood resources, a forest-based energy business is impossible to set up. It is further essential to choose technology that is familiar to local forest harvesting entrepreneurs and the technology needs to produce the necessary fuel quality.
Contact point	The NWHP Project Manager Highland Birchwoods Address: Littleburn Road, Munloch IV8 8NN, Scotland Phone: +44 1463 811 606 Email: info@highlandbirchwoods.co.uk
Reference	https://www.northernwoodheat.net

Name	CHP Vienna Simmering
Location	Austria
Description	Situation: The introduction of the Green Electricity Act galvanised the development of renewable energy businesses in Austria. Approach: In 2004, the municipal energy utility of Vienna and the Austrian Federal Forest Corporation (Oebf), signed a contract to develop jointly a large CHP plant, to be fired almost exclusively with wood chips made from forest residues. Results: The plant incorporates state-of-the-art wood-fired CHP combustion and flue gas cleaning technology and is considered useful for demonstrating know-how, which could be exported, e.g. to Central and Eastern European countries. Most of the biomass (around 600,000 m³ loose volume p.a.) will be obtained from the surrounding area (less than 100 km radius). To keep costs and environmental impact low, the roundwood will be delivered to a transshipment centre near the plant, where a stationary chipper produces the wood chips needed. The plant has a thermal heat capacity of 65.7 MW and an electrical capacity of 23.5 MW during summertime. In winter, the respective capacities would be 15.1 MW of electricity and 37 MW of thermal energy during winter. The energy generated is sufficient to meet the electricity needs of about 48,000 urban households and the heat requirements of nearly 12,000 dwellings.
Lessons learned	Given the urban location and large biomass input requirements, fuel delivery logistics are important. Among the key success factors are: a critical mass of players, broad-based political support, actively engaged partners and the conduct of public study tours that help to reduce uncertainties and to build up confidence in the project's overall feasibility and acceptability.
Contact point	Roland Kautz International Affairs, Oesterreichische Bundesforste AG Address: A-3002 Purkersdorf, Pummergasse 10-12, Austria Phone: +43 2231 600-5580 E-mail: roland.kautz@bundesforste.at
Reference	http://www.oebf.at/index.php?id=54&tx_ttnews[backPid]=1&tx_ttnews[tt_news]=364&cHash=43de7fb4e5



C. Markets and marketing: organisation and transparency

C.1 Establish public-private partnerships to jointly develop markets

Description	Public-private partnerships (PPPs) can, if adapted to local business environments, facilitate sustainable wood supply chain structures and thus support wood mobilisation. PPPs are business ventures which are financed and managed by a partnership between the government and a private company or entity. Such partnerships can help mobilise private investments for public projects, raise efficiency and profitability, and combine public sector risk-buffering capacity with private-sector efficiency.
Applicability	The measure could be applicable in any region or country.
Main challenges	Such projects require strong collaboration, negotiation and exchange of information between partners.
Main actors	Lead: public authorities, private sector actors



Good practice example:

Name	Integrated approach in the Navarra region
Location	Spain, Navarra
Description	Situation: The Navarra region is characterised by a small-scale private forest holding structure and by low incidence of wood as a construction material or renewable energy source. Approach: An integrated approach was launched in the Navarra region in Spain, involving multiple partners. A “Timber Forum”, a negotiating round consisting of private and public forest owners, industry and government representatives, was initiated. The Timber Forum established joint timber-selling structures, developed a sales catalogue and elaborated sub-regional wood mobilisation plans in close co-operation with forest owners. The use of forest biomass was promoted by providing information on biomass availability to market partners, negotiating with the forest industries, furthering the use of forest biomass in public buildings and supporting the involvement of forest owners in biomass enterprises. Results: Government and the public forest service contributed to wood mobilisation through co-ordination, increasing the knowledge of forest owners and by adjusting timber-sales legislation. A local market for wood pellets and chips production for district heating was also developed. Around 400,000 m³ of wood biomass are mobilised in Navarra every year. Despite the current downturn, the same amount of timber could still be mobilised in the region, due to the biomass projects. It is expected that the annual amount of mobilised timber will increase by up to an additional 150,000 m³/a.
Lessons learned	Considerable information exchange was necessary to implement the project. An integral forest policy facilitates comprehension of the sector by society. It is further vital to have flexible regulations for timber selling and to allow long-term contracts between owners and industry.
Contact point	Mr. Fermin Olabe Department of Environment, Government of Navarra Address: Avda del Ejército 2, 31002 Pamplona (España), Spain Phone: +34848426681 E-mail: folabeve@cfnavarra.es
Reference	http://www.navarra.es/NR/rdonlyres/716FBB6B-9C7A-40C1-85A2-71CD69D9FB16/141213/MTYFACULTADDEFORRESTALES.pdf

C.2 Improve market transparency

Description	Information about both forest resources and private owners is often hard to obtain but is crucial for people in charge of mobilisation in order to communicate with forest owners on a customised basis. The establishment of a regional virtual marketplace can be a useful option, combining information about the forest area with basic forest owner information, facilitating market transparency and strengthening cooperation between involved actors. Furthermore, the system can serve as a platform to sell or buy timber or forest land and to promote services, e.g. forestry contracting.
Applicability	The measure could be developed and applied in any region or country.
Main challenges	The main challenge is to persuade forest owners of the efficiency and reliability of such a system. Therefore, the availability of ownership data must be in line with legal restrictions and controlled by forest owner representatives. Individuals' rights to privacy and to the protection of personal information must be respected. Information which can be associated with a specific individual must not be accessible without their permission.
Main actors	Lead: public forest service, forest owner associations; others: private forest owners



Good practice example:

Name	Virtual marketplace “Waldboerse”
Location	Germany, Thuringia
Description	Situation: The German province Thuringia exhibits a large number of unmanaged private forest holdings. Approach: “Privatwaldfoerderung Thueringen”, a Public Private Partnership consisting of partners from the forest industry, state forest agency and forest owner associations, founded “Waldboerse”, a virtual marketplace to sell and buy private forest holdings through an internet web-site. Forest owners who wish to sell their property can publish information on their forest holding according to size, tree species composition and location. The owners also have the possibility to specify their personal contact details on-line. Users can search for properties and may directly contact the owner. If the owner agrees and if more specific data on the forest area are available, more forestry data can be specified (e.g. growing stock and annual increment). Note: Information on ownership must not be published without the permission of the owner. Privatwaldfoerderung Thueringen only acts as the neutral intermediary for the forest sales. Results: The system makes it possible to transfer forests to people who are really interested in forest management. Since 2008 the project has transacted the sales of eight forest properties, which together comprise 31 ha.
Lessons learned	It is indispensable to respect privacy legislation. The system needs to be independent, without industrial advertisement, and free of charge.
Contact point	Privatwaldfoerderung Thueringen Address: Possenallee 54, 99706 Sondershausen, Germany Phone: +49 36 32 54200-05 E-mail: info@privatwald.org
Reference	http://www.privatwald.org/web/sites/waldboerse.php

C.3 Establish long-term partnerships between owners, public forest services and industries

Description	Strong co-operation between market partners is crucial to help ensure sustainable supply and demand. Market mechanisms such as long-term contracts contribute to a steady wood supply and can be used to strengthen the co-operation between forest owners, entrepreneurs, forest owner groupings and forest industries. Long-term relationships, including contracts, between private owners and the wood-processing industries help to ensure reliable planning and predictable implementation on both sides.
Applicability	Applicable in any country or region.
Main challenges	Conservative attitudes of private owners towards co-operation with public forest services or industries may constrain the initiation of partnerships.
Main actors	Lead: forest owners, public forest services and industries’ representatives

Good practice example:

Name	Wald-wird-mobil (“Wood becomes mobile”)	
Location	Germany, Thuringia	
Description	Situation: Regional private forest management was faced with the challenge of administering a large amount of data on forest owners and at the same time to ensure high-quality in forest management services, despite a decrease in the number of forest service personnel. Approach: The internet platform Wald-Wird-Mobil (WWM) was developed with the aim of improving the efficiency of communication, as well as the quality and sustainability of relationships between forest service personnel, private forest consultants and private forest owners. WWM offers several cost-free services to those in charge of the mobilisation, e.g. support to project management or support in fixing unclear property boundaries and in surveying holdings using GPS. Furthermore, an on-line forum serves as a networking platform. A computer-based customer-relationship-management-system (CRM) facilitates communication with owners and the administration of forest owner data. WWM further co-operates with forest industries. This also supports mobilisation efforts with know-how, financial means and consulting personnel. Equally, the forest industries benefit from a strengthened relationship with wood suppliers. Results: The project helped to establish trusting and lasting relationships between partners. The project has already organised 20,000 owners on an overall area of 15,000 ha, of which 8,000 ha are managed under a permanent forest management plan. Despite an average holding size of only 0.8 ha, 6.6 m³/ha could be mobilised annually in recent years.	
Lessons learned	A precondition is the absolute safety of ownership data which are cryptographically secured. Moreover, transparency needs to be ensured regarding the amount and depth of data given to involved actors.	
Contact point	Mr. Ives Ludwig Wald-Wird-Mobil gGmbH Address: Pferdsdorfer Weg 6, 99831 Creuzburg, Germany E-mail: info@wald-wird-mobil.de	Mr. Steffen Eisfeld Privatwaldfoerderung Thueringen Address: Possenallee 54, 99706 Sondershausen, Germany Phone.: +49 36325420005 E-mail: steffen.eisfeld@privatwald.org
Reference	https://www.wald-wird-mobil.de	

C.4 Facilitate access to basic information on forest ownership whilst respecting privacy rights

Description	Mobilising wood from private forests means contacting and convincing forest owners to harvest trees. Consequently, customised communication with owners, according to individual needs, is indispensable. This requires the availability of basic information about private ownership. Sustainable wood mobilisation from these forests is only possible if knowledge exists about: ownership, the concise legal framework and secure property rights.. To overcome prevailing data shortcomings as a spur to increasing wood mobilisation, access to basic owner related data could be provided by the state (regional or national) authority responsible, while respecting laws on privacy protection.
Applicability	Applicable in any country or region, particularly feasible for regions which exhibit a high share of inactive forest owners or fragmented land.
Main challenges	Measure has to fulfil requirements of privacy legislation.
Main actors	Lead: national forest policy makers, legal authorities

Good practice example:

Name	Access to the Land Registry
Location	Sweden
Description	Situation: In Sweden, about 80% of the forest area is owned privately. An active private forest sector and a good co-operation between private owners and forest industry are indispensable for sufficient wood supply. Approach: Access to the Land Registry is given to the forest-based sector to help the companies better organise purchase activities in private forests. The database inter alia contains basic information on owner, type of ownership and forest area. Results: Giving access to the database entails several advantages for the forest-based sector: If there has been a change in ownership, companies can up-date their database, contact the new owner and, if desired by the owner, provide support in forest management. When a forest operation is planned, neighbouring forest owners can be asked if activities may be co-ordinated. Using a GIS application, more precise forest maps can be drawn which allow e.g. better guiding of contractors during harvest activities. Similarly, through aerial pictures, information on areas having harvesting or thinning potential can be combined with information on the relevant forest owners.
Lessons learned	N/A
Contact point	Jan Eriksson Swedish Forest Agency, GIS/IT Unit Address: Infanterigatn 14, 831 32 Östersund, Sweden Phone: +46 63 194573 E-mail: jan.eriksson@skogsstyrelsen.se
Reference	http://www.lantmateriet.se/templates/LMV_Entrance.aspx?id=50&lang=EN

C.5 Establish sustainable energy wood supply chains

Description	In Europe, energy wood production and consumption have been continuously increasing in the last years. Close co-operation between forest services, forest owner associations, contractors, entrepreneurs and the wood-energy sector are important to secure a high-quality wood supply and keep costs at a low level. Improved communication and collaboration, as well as shared infrastructures between primary production and the processing side can be solutions to operate profitably.
Applicability	Applicable in any country in regions having a high level of fuelwood supply.
Main challenges	Customers need to be convinced that fuelwood can be supplied in sufficient quantity and quality.
Main actors	Lead: regional and local governments, public authorities; others: private-sector actors, entrepreneurs



Good practice example:

Name	Development of a sustainable energy-wood supply chain
Location	Spain, Galicia, Pontevedra
Description	Situation: In the Pontevedra region, forest expansion and an increase in growing stock have entailed a high risk of forest fires. Enhanced utilisation of forest is thus viewed as a solution to combat forest fires. Energy wood production is especially favourable in the region due to high forest productivity and a high level of large-scale communal forest ownerships. Approach: A joint project was initiated by the Galician Forest Association, the Energy Institute of Galicia and the regional forest service administration to mobilise unused biomass sources and to produce energy sustainably from logging residues. The project partners developed a strategy for increased biomass utilisation, founded Enerxil, an institution which groups 30,000 ha of communal forest, and installed a local biomass energy plant. Results: The project partners developed a sustainable business plan as well as suitable processes for biomass collection, transport and processing. The initiative further provided the community with the necessary equipment, created a company to manage and market biomass for energy and forest machinery, built a storehouse for wood chips, and installed a wood-based heat production plant. Annually, more than 10,000 m³ of biomass are harvested. The project lead to: a risk diminution of forest fires (- 30%); an increase in local employment (up to 500 jobs created); a higher utilisation of forests and a decrease in fossil fuel consumption.
Lessons learned	The support of public institutions and security of supply for forest residues are crucial. A principal problem was to convince forest owners of the opportunities of biomass energy use.
Contact point	Francisco Dans del Valle Asociación Forestal de Galicia Address: Rúa do Vilar, nº 33, 1º -15705 Santiago de Compostela, Spain Phone: +34 981 56 40 11 E-mail: asforgal@iies.es
Reference	https://www.enersilva.org https://www.asociacionforestal.org

Name	Biomass trading centres
Location	Austria, Styria
Description	Situation: In Austria, there has frequently been a lack of large-scale, professional and consumer-oriented biomass production systems, as well as in marketing and trading of fuelwood throughout Europe. Approach: The Chamber of Agriculture and Forestry of Styria built three biomass trading centres to better organise the regional fuelwood supply chain. This has been done by creating depots with optimised logistics and trading structures where different types of woody biomass assortments (e.g. logs, pulpwood, chips, pellets) can be marketed. These assortments each have guaranteed quality, thus further facilitating the establishment a local spot market for fuelwood, where the demand and supply side can meet. This also increases confidence in regional woody biomass supply. The vision is to establish biomass trade centres all over Austria as reliable fuelwood suppliers and to operate as contact points in biomass businesses for the rural population. The supply of fuelwood is ensured by long-term contracts with forest owners. Results: The biomass trading centres have helped to optimise the acceptance, processing, refining and sale of local energy-wood assortments. The three biomass trading centres have been establishing wood supply contracts with more than 120 suppliers, servicing more than 5,000 ha of forest. The traded fuelwood is comprised of 35,000 m³ (stacked) of wood and 2,000 m³ of split logs per year. All together, these equate to up to 2 M litres of fossil fuel for heating, with a related saving of 9,300 t CO₂. Other countries (e.g. Italy, Slovenia and Poland) followed the Styrian approach.
Lessons learned	N.A.
Contact point	Mr. Christian Metschina Chamber of Agriculture and Forestry of Styria (AT) Address: Hamerlinggasse 3, 8010 Graz, Austria Phone: +43 31680501410 E-mail: office@biomassehof-stmk.at
Reference	http://www.biomassehof-stmk.at https://www.biomasstradecentres.eu



C.6 Improve the information and communication on sustainable forest management and the services it provides to the public

Description	The knowledge held by society or small-scale forest owners about forestry and its benefits is often at a low level. For example, citizens of urban agglomerations can be critical about logging activities. Informing them about the multiple benefits of sustainable forest management and increased wood mobilisation is thus crucial. This can comprise information campaigns on television and internet, articles in newspapers, journals or books, person-to-person contacts - like individualised advisory services, and person-to-group exchanges - like workshops, meetings and excursions.
Applicability	Applicable in any country or region.
Main challenges	The measure can involve a considerable number of forest personnel (e.g. for the organisation of workshops or distribution and marketing of brochures).
Main actors	Lead: public authorities, public forest service



Good practice example:

Name	Wood promotion campaign “holz 21”
Location	Switzerland
Description	Situation: In Switzerland, small-scale forest owners often view their forest as a “romantic” legacy, passed on by their ancestors and do not associate it with any kind of commercial interest. Moreover, society’s knowledge the multiple benefits of forests is often at a low level. Approach: The Swiss Federal Department for the Environment commissioned a targeted awareness-raising campaign to persuade “inactive” private forest owners to utilise their forests. Moreover, the cantons were encouraged to intensify their dialogue with the public. Free public relations lectures were given to cantonal forest authorities and a brochure was produced which provided citizens with information about forest functions and promoted understanding of sustainable forestry. Results: The impulses provided by the programme fostered a dynamic trend in wood-based construction and an increase in domestic wood consumption. It was possible to increase the media presence for the topic in the newspapers. 16 out of 26 cantons became involved in the awareness-raising campaign. With over 100,000 direct and indirect contacts, awareness of forest owners has been raised.
Lessons learned	The intensity of the mobilisation activities depended on the availability of human resources and in the motivation of individuals in the forestry services and forest-based sector associations. The cost of the wood mobilisation campaign in Bern was approximately EUR 4/m³ and was accompanied by a 7% increase in the volume of wood utilised.
Contact point	Michael GAUTSCHI Forestry scientist, Project Manager holz21 Address: Swiss Federal Department of the Environment, CH-3003 Bern, Switzerland Phone: +41 31 324 77 85 E-mail: michael.gautschi@bafu.admin.ch
Reference	https://www.holz21.ch https://www.bois21.ch

D. Improved recovery channels

D.1 Carry out inventories and utilise sources of post-consumer wood

Description	Post-consumer wood is a secondary raw material which can be collected and reused or recycled before being used as biomass for energy, so long as logistical and economic considerations merit this. However, in many European countries post-consumer wood is still not collected for reuse or recycling as widely as it could be. Improved wood collection logistics and sustainable recycling of post-consumer wood are important.
Applicability	The measure is applicable in any region or country.
Main challenges	Limits in the use of recovered wood specifically derive from logistical and environmental considerations (e.g. contamination limits), as well as from national collection structures and policies.
Main actors	Lead: governments, forest-based industries; other: research institutions

Good practice example:

Name	Improved collection and recycling of post-consumer wood
Location	Italy
Description	Situation: In Italy, a high proportion of post-consumer wood was unused and dumped in landfills. There was thus a large potential to increase the collection rate. Approach: Different actors from the industry and policy sectors, e.g. RILEGNO (national consortium for the collection, recovery and recycling of wooden packaging), set up a collection system for post-consumer wood. The law “Testo Unico Ambientale” was enacted which governs wood collection and recycling, and which states that provinces and municipalities are responsible for post-consumer wood sorting and collection. To facilitate co-operation between the actors involved, the law requires companies which produce, sell or use packaging to belong to the national packaging body CONAI (Il Consorzio Nazionale Imballaggi) which manages the wood collection and recycling. At so-called waste platforms, the wood is reduced in volume, transported to recycling centres, cleaned of all impurities and shredded. An “environmental contribution” tax forms the basis for financing the system. Results: The amount of post-consumer wood recovered in Italy is growing constantly. In 2007, 1.8 M tons were collected (increase of 12.4% compared with 2006). Packaging constitutes the main source of recovered wood, (in 2007, 53% of wood waste was packaging waste). The Italian particleboard industry uses a high percentage of post-consumer recycled wood (the average is around 70%) in its panels.
Lessons learned	Post-consumer wood is a secondary raw material which can be turned into various products. One preferable end use is the chipboard industry, which relies on supplies of recycled wood. Post-consumer wood may also be used to produce moulded pulp, compost and blocks of wood cement for the building industry or for thermal recovery. Cost sharing between the actors involved is a key factor for the success of the Italian recycling system.
Contact point	Marco Fossi Federlegno Arredo (Italian federation of woodworking and furniture industries) Address: Foro Buonaparte 65, I - 20121 Milano, Italy Phone: +39 02 80604 353 E-mail: marco.fossi@federlegnoarredo.it
Reference	https://www.rilegno.it https://www.federlegnoarredo.it

D.2 Standardised classification of post-consumer wood and its contamination limits

Description	The reuse of post-consumer recovered wood is limited by logistical and contaminants considerations. Standardising the classification of post-consumer wood and its contamination limits at European level is thus viewed as an important means to achieve an increased wood supply.
Applicability	Applicable in any European country.
Main challenges	A new standard has to fulfil all dimensions of sustainability and must not lead to increased contamination of the environment.
Main actors	Lead: policy makers; others: research institutions

Good practice example:

Name	Wood bio-fuels guidebook (“Référentiel combustibles bois énergie”)	
Location	France	
Description	Situation: In France, there was unused potential of post-consumer wood (more than 50% of the total amount) and uncertainties concerning its usability for heat and power units, particularly as regards their emissions limits. Thus the standardisation of post-consumer wood classifications and contamination limits was viewed as a crucial measure. Approach: FCBA and ADEME, together with high-level government representatives, developed a wood bio-fuels guidebook, defined three products groups (forest chips, by-products of wood industries and post-consumer wood) and proposed criteria and emission limits for each, based on a European standard (CEN/TC335). The group assessed all wood input materials, economic and environmental life cycles and their associated risks. Results: Overall, the project helped to establish better knowledge on the sources and availability of post-consumer recovered wood. Through this project, up to 2 M tons of additional post-consumer wood have been re-utilised each year in France. A “quality wood-products map” was developed to reduce the risk of over-rating contamination limits and to analyse sorting needs. Additional acceptable contamination limits were integrated into the guidebook.	
Lessons learned	Determination of precise contamination limits and utilisable products was difficult. For example, a problem exists for products at the end of their life cycle. A survey among users revealed that the guidebook can be complex to use.	
Contact point	Elisabeth Le Net FCBA – Institut Technologique Forêt Cellulose Bois-construction Ameublement Address : 10, Avenue de Saint-Mandé, 75012 Paris, France E-mail: elisabeth.lenet@fcba.fr	ADEME (French Environment and Energy Management Agency) E-mail: boisenergie@ademe.fr
Reference	http://www.fcba.fr/etudes_phares/resultat.php?id_fich=2630 http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=13462	

E. Education, training and skills:

E.1 Provide relevant information and training

Description	Capacity-building, education and training of forest owners and entrepreneurs help to ensure sustainable wood mobilisation. Adequate training of forestry personnel is an efficient tool to assist providing consistent and high-quality timber supplies to the timber-processing and bio-mass energy sectors. Forest personnel and private forest owners who lack forestry skills cannot meet industry demands sufficiently and also underuse their resource, such as fully benefitting from harvesting operations. Moreover, due to the hazards involved in forestry operations, from both safety and environmental damage viewpoints, the provision of training is crucial to ensure compliance with safety and environmental regulations.
Applicability	Applicable in any country or region.
Main challenges	Conviction of involved actors (contractors, entrepreneurs, other forest personnel) that improved quality of their work is necessary and beneficial.
Main actors	Lead: public forest services, public and private training centres, forest industries



Good practice example:

Name	Training of forest contractors and operators
Location	France
Description	Situation: For wood chips, there is a key process - harvesting and processing the resource. Chipping equipment exists, but a key point is the qualification of companies that harvest wood and process chips. The quickly growing wood-chip market spurs more and more companies to branch out into this area. As there is no “prescribed method” for energy-wood harvesting and wood chip production, the quality and efficiency of operations vary widely. Approach: An adequate qualification for all who wish to set up a forestry enterprise is now mandatory in France. The Centre Forestier (forestry training centre) has established a training programme for contractors and operators in wood chip production. The programme aims to enable contractors and operators to provide high-quality products and thus ensure long-term customer satisfaction and economic profitability. The programme offers the following training: certificate course for forestry operators on wood; certificate course for forestry entrepreneurs; qualifying training for forestry entrepreneurs and their employees; qualifying training for installers of wood-chip heating systems, and introductory courses for forest owners, elected officials and opinion leaders. Results: Not yet available.
Lessons learned	Lack of qualification can lead to costly errors and substandard performance which can be fatal for a company and detrimental to the wood energy sector as a whole.
Contact point	Christian Salvignol Director, Centre Forestier de la Région Provence Alpes Côte d’Azur Address: Pié de Gâche, F 84240 La Bastide des Jourdans, France Phone : + 33 490 77 80 01 E-mail : salvignol@centre-forestier.org
Reference	http://www.centre-forestier.org

E.2 Provide adequate working conditions and remuneration

Description	Forestry jobs are often less well-paid than jobs in other sectors since profits for forest owners are often low. Migration and the increasing age of forest owners reduce the available the labour force in many parts of Europe. Thus, there is need to improve the working conditions, as well as the number and attractiveness of forestry jobs, and to enhance remuneration in order to make long-term careers in the forestry sector worthwhile.
Applicability	Applicable in any country or region, especially in regions with a high share in private, family forestry.
Main challenges	Economic attractiveness of forest-related jobs can be a major constraint.
Main actors	Lead: public authorities, entrepreneurs, forest owners



Good practice example:

Name	“Kraftsamling skog” (Focus on Forestry)		
Location	Sweden		
Description	Situation: A scientific inquiry has shown that it is possible to increase the growth in Swedish family forestry with as much as 50%. A 20% goal is a quite realistic level to reach through modest efforts. Approach: The knowledge campaign “Kraftsamling Skog” was initiated by the Federation of the Swedish Forest Owners, LRF, to increase forest yield from private forests and to achieve higher profitability of forestry. The campaign is being implemented during the years 2007–2010. It addresses family forest owners through various optional training courses, study groups, excursions and individual guidance, as well as through web-based and distance education. One national and four project managers run the project, together with 150 local organisers. Results: Up to today, 48,000 persons, mostly forest owners, have participated in the programme. 140 model farms were established to demonstrate the opportunities for increasing growth. Overall, Kraftsamling Skog aims to achieve a growth increase of 20 % in private forests within the next 50 years. The objective of the programme is to have 50,000 participants in various training courses for increasing their competence and activity in forestry. Forest owners are already increasing their areas of soil preparation, clearing and planting, they use plants derived from seed orchards, fertilise their forests and intensify the cleaning of ditches.		
Lessons learned	Sufficient resources, both human and economic, should be allocated. Priority should be given to the implementation in the organisation, everyone should know what is being done and why. Positive language, pictures, models and pedagogy should be applied. The forest is the best pedagogical tool. Follow up with individual guidance is necessary to ensure real effects.		
Contact point	Federation of Swedish Forest Owners LRF Address: LRF S-105 33 Stockholm, Sweden Phone: +46 707 884178	Lennart Ackzell Senior Advisor International Affairs E-mail: lennart.ackzell@lrf.se	Marianne Eriksson Project General E-mail: marianne.eriksson@lrf.se
Reference	http://www.kraftsamlingaskog.lrf.se (in January 2010 there will be information in English)		

F. Sources of and mechanisms for financing

Please note that the following examples are specific to the regions and countries concerned and the support mentioned is not available on a generalised basis, such as for the EU. Public support schemes in EU member states have to be in compliance with the rules for state aid.

F.1 Supporting investment

Description	Financial support for companies of the forest-based or wood-energy sectors may come from both private and public institutions. For example, public support via loans or subsidies may be useful to stimulate forest road construction and maintenance, especially in remote or mountainous regions where such activities are very expensive. Moreover, support could be given to companies for the modernisation of their processes and machinery. Subsidies could be further provided to forest contractors, entrepreneurs or owners if there is a lack of sufficient forestry equipment and technological know-how. The forest industry can also give loans or capital to support specific mobilisation measures.
Applicability	Applicable in any country or region
Main challenges	Financial means need to be fixed to a short time period and targeted to a specific group taking account of all dimensions of sustainability.
Main actors	Lead: public authorities; other: forest industries

Good practice example:

Name	Investment support for small harvesting companies and sawmills
Location	France
Description	Situation: The forestry and sawmill sectors have an essential role to play in wood mobilisation. For the French forestry sector it is necessary to fulfil the publicly planned wood supply objectives, whereas for the sawmill sector it is essential to ensure the processing of the supplementary mobilised wood volumes. Approach: The French State has been encouraging investment in small harvesting companies and in the sawmill sector in order to modernise the companies and improve efficiency and profitability. The investments in harvesting machines are reserved for companies with fewer than 10 employees and are co-financed by the EU. Between 2007 and 2009, the state subsidies for sawmills increased by 60%. From 2009 on, these companies benefit from an accelerated depreciation of investments. Results: There has been a good take-up of the subsidies for sawmills (68 companies and 46 M€ in 2006, respectively 111 companies and 114 M€ in 2008), partly thanks to the favourable economic trend.
Lessons learned	Supporting heavy investments in sawmills is difficult without the co-financing of local authorities (regions, departments) or others funds.
Contact point	Arnaud Brizay Ministère de l’Alimentation, de l’Agriculture et de la Pêche Sous direction de la forêt et du bois Address: 19, avenue du Maine, 75732 PARIS Cedex 15, France Phone : +33 1 49 55 51 42 E-mail : arnaud.brizay@agriculture.gouv.fr
Reference	N/A

F.2 Providing grants and incentives

Description	Many countries or regions offer a range of grants and other incentives to encourage use and development of wood for energy and raw material use. Support schemes, e.g. for biomass energy can be an efficient means to help establishing new markets, e.g. by stimulating the early deployment of biomass fuelled heat and biomass combined heat and power projects.
Applicability	Applicable in any country or region.
Main challenges	Grants have to be provided in a way such that market distortion is minimised.
Main actors	Lead: governments, private companies



Good practice example:

Name	Scottish Biomass support scheme (SBSS)
Location	Scotland
Description	Situation: In the UK, fuelwood is a new and emerging industry. So, sustainable biomass energy structures needed to be developed. Approach: Devolved administrations within the UK have been implementing a range of measures designed to encourage greater mobilisation of woody biomass for energy use. The Scottish Biomass Support Scheme (SBSS) has facilitated the use of renewable heating. The SBSS has had a total funding of £7 million over the financial year 2007/08. The scheme has provided grants to support both supply-chain and downstream (heat and CHP) installations. It has been open to a range of organisations, including businesses, communities and producer groups. Results: The increasing demand has lead to 77 projects, encompassing not only plants but also supply-chain and training initiatives (55 boiler projects, 19 supply chain projects and three other projects). The second round of the Scottish Biomass Heat Scheme will cover a total funding of £3.3 million over 2009/10 and 2009/11, focussed on heat-only installations for small- and medium-sized enterprises.
Lessons learned	The overriding requirement is to stimulate demand for woody biomass through appropriate bio-energy installations over a range of scales. However, available supply must be able to meet this demand, and care needs to be taken to avoid raising unrealistic expectations. The use of biomass energy for heating is the most efficient way of utilising the resource, and this needs to be done in a strategic way through the use of heat-mapping requirements, linked to supply-catchment mapping. Woody biomass from forests is only one source of raw material, and it is important to work closely with other sectors, such as the waste industry, the agricultural industry (e.g. for anaerobic digestion), and the construction sector.
Contact point	Rebecca Carr, Forestry Commission Scotland Address: Silvan House, 231 Corstorphine Road, Edinburgh EH12 7AT, Scotland Phone: +44 131 314 6398 E-mail: rebecca.carr@forestry.gsi.gov.uk
Reference	https://www.forestry.gov.uk https://www.usewoodfuel.co.uk

G. Legal and fiscal measures

G.1 Stimulate wood mobilisation through fiscal measures

Description	Fiscal measures may be direct (e.g. tax reduction for formerly inactive forest owners when conducting timber harvest) or indirect (e.g. lower value added tax for forest machinery). As for financial mechanisms, fiscal methods need to be in line with all aspects of sustainability and thus need to apply to regional conditions and should be limited in time. In any case, unfair consequences for other actors need to be prevented.
Applicability	Applicable in any country or region.
Main challenges	Implementing new fiscal measures can be a long and complex process as negotiations between different stakeholders need to be conducted
Main actors	Lead: governments, legal authorities

Good practice example:

Name	Income tax reduction for active private forest owners
Location	France
Description	Situation: The French private forest represents M 3.5 forest owners and a surface of M 11 ha. Encouraging a maximum number of forest owners to manage their forest is a major step towards an increase in wood supply. The French private forest is extremely split, and small forest properties are often not managed sustainably. Approach: In order to encourage forest owners to manage their forest, the French state set up two tax devices, <i>DEFI-travaux</i> and <i>DEFI-contrats</i>²⁰. <i>DEFI-travaux</i> is aimed at owners who conduct forestry on management units which are larger than 10 hectares and are contiguous. The reduction of tax is calculated on the basis of the forestry expenses of the taxpayer. A single owner may receive up to 25% of tax reduction from 6,250 € of eligible expenses (12,500 € for a couple). <i>DEFI-contrats</i> was developed to reinforce the link with the downstream part of the wood-supply chain by forest contracting. In particular, <i>DEFI-contrats</i> is aimed at forest owners who establish forest management contracts for units with less than 25 hectares. The contract must be concluded with a forest expert, a forest co-operative, a producer organisation or with the national forestry service (ONF). A single owner may receive up to 25% of tax reduction from 2,000 € of eligible expenses (4,000 € for a couple). Results: The measure is ongoing, thus no results are available yet (first impact of the 2009 expenses on the income tax in 2010).
Lessons learned	Ceilings for eligible expenses have to be well adjusted as regards operation costs, otherwise the tax incentive is not used by forest owners (the first generation of <i>DEFI-Travaux</i> thus was not very successful).
Contact point	Arnaud Brizay Ministère de l’Alimentation, de l’Agriculture et de la Pêche Sous direction de la forêt et du bois Address: 19, avenue du Maine, 75732 PARIS Cedex 15, France Phone: +33 1 49 55 51 42 E-mail: arnaud.brizay@agriculture.gouv.fr
Reference	http://agriculture.gouv.fr/sections/mediatheque/autres-editions/nouveau-defi-pour-foret/downloadFile/FichierAttache_1_f0/nouveau_defi_.pdf

20 DEFI: « Dispositif d’encouragement fiscal à l’investissement en forêt », Mechanism providing fiscal incentives for investments in forestry.

G.2 Prevent further fragmentation of forest holdings

Description	Fragmentation of ownership negatively influences forest management intensity. If the high level of holding fragmentation is the result of unfavourable inheritance systems, such laws need to be reviewed and adjusted to prevent continued disintegration of holdings. The topic is of specific importance for some east European countries where a further increase in the number of private owners is expected due to the ongoing restitution and privatisation processes.
Applicability	Particularly applicable in countries or regions having small-scale forest holdings and with fragmented ownership structures.
Main challenges	Adjusting inheritance regulations can be a long and complex process. Often, the administrative burden of such a measure can be high.
Main actors	Lead: governments, public authorities



Good practice example:

Name	Adjusting inheritance tax regulations
Location	Belgium
Description	Situation: In Belgium, the mean size of holdings has been decreasing as the number of owners is increasing after inheritance. It is estimated that the number of individual owners augments by 10% every ten years. About half of the private forest area consists of holdings smaller than 20 ha. Approach: Since a 1999 federal law (“Loi visant a` promouvoir la création de sociétés civiles de groupements forestiers”), a few “forest groups” with special tax status have been created. These groups are societies only taxed on the basis of land tax, and not on the basis of income taxes like other societies. Results: 13 groups of this kind exist in Wallonia, possessing over 3,700 ha. 11 groups for 1,612 ha are in the approval process. This grouping allows the management of an area more suitable for profitable management, facilitates the wood sales and forest operations. In Flanders, 19 mixed groups of private and public owners have been created.

Lessons learned	The administrative burden and the cost for the owners have to be minimised. Information on the owners is also very important, so a good co-ordination with forest owner organisations is a must. Furthermore, the organisation of taxes in Belgium is complex, between federal, regional and local level: this gives a long process before adopting new laws. For the same reasons, the approval of new “forest groups” takes a long time.
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Contact point	Mr. Christian LAURENT Attaché, Département de la Nature et des Forêts, Direction des Ressources Forestières Ministère de la Région Wallonne Address: Avenue Prince de Liège, 15, 5100 Jambes (Namur), Belgium Phone: + 32 81 33 58 42 E-mail: christian.laurent@spw.wallonie.be
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Reference	http://environnement.wallonie.be/publi/dnf/forets/guides/brochure_GF_net.pdf , http://www.foretwallonne.be/031pdf.folder/fw54_27-32[groupement].pdf http://www.srfb.be/internet/fr/page.asp?SM=362&SM2=361&AI=105&niv=2&Sid=GP&doss=DOSS
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H. Silvicultural measures

H.1 Silvicultural improvement

Description	Harvest operations can be intensified in many forests and silvicultural improvement comprises a variety of measures. Amongst them are choice of improved species or seed sources, fast-growing trees, more intensive thinning and prevention of forest damage.
Applicability	Applicable in any country or region.
Main challenges	All measures need to fulfil the prescriptions of sustainable forest management. There is often a long interval between implementing the silvicultural measure and the arrival of more wood on the market.
Main actors	Lead: public and private forest owners; others: all forest sector actors



Good practice example:

Name	Genetic improvement
Location	Sweden
Description	Situation: During one forest generation, a considerable lever to increase wood supply is seen in the use of genetically improved production forests with seeds or seedlings originating from seed orchards. Approach: In a long-term study on potential future wood supply, the Swedish Forest Agency has answered the question to what extent genetic refinement can contribute to increased forest productivity. The Swedish Forest Agency has made comprehensive calculations, built on research, covering different effects on Swedish forests. Results: The total effect of utilising improved genetic material leads to an increased growth rate of 7 – 8.5 % for all forests over an 80-year period, which is somewhat less than the average length of the rotation period in Sweden. The direct effect of the use of improved material on all forests leads to a growth increase of approximately 3 M m³/a (2050-2060) and approximately 10-12 Mio. m³ /p.a. after 100 years. The above-mentioned gain is an average where separate calculations were made for each species. It was taken into account that some of the genetically improved seedlings planted will die and be replaced by naturally regenerated seedlings. Due consideration was also given to the fact that natural regeneration is used on one fifth of the annual regeneration area.
Lessons learned	Effects of genetic refinement vary, depending on: site conditions, tree species, regeneration method, tree spacing and access to improved material.
Contact point	Sven A Svensson Senior Advisor, Swedish Forest Agency, Analysis Division 551 83 Joenköeping, Sweden Phone: +46 36 35 93 70 E-mail: sven.a.svensson@skogsstyrelsen.se
Reference	http://www.skogsstyrelsen.se/episerver4/dokument/sks/aktuellt/press/2008/rapport%20SKA.pdf



Name	More productive forests through intensive forest management
Location	Sweden
Description	Situation: The long-term goal is to increase wood supply in Sweden via intensified forest management from 85 to 105 M m³ per year. Approach: The potential for increased growth through the intensified forest management approach is estimated as follows: better regeneration (+ 4-10%), best available seedlings (+ 8-20%), fast growing tree species (+ 1%), restoring ditches (+ 1-2%), cleaning (+ 1%), fertilising (+ 1-2%), preventing forest damage (+ 1-10%); total: + 17-46%. Afforestation of arable land with fast growing trees can have further positive effects. Support comes from the Rural Development Programme. Results: As this is an ongoing activity, there are no results available yet.
Lessons learned	Negative impacts, such as a reduction of bio-diversity, overuse of forests or nutrient imbalances, need to be prevented.
Contact point	Christer Segersteen Confederation of European Forest Owners CEPF E-mail: christer.segersteen@lrf.se
Reference	http://timber.unece.org/fileadmin/DAM/meetings/SEGERSTEEN_More_productive_forests_through_intensive_CEPF.pdf

Name	Pre-commercial thinnings
Location	Finland
Description	Situation: Additional wood supply potential even exists in intensively managed forests, also on a large scale. Young forests in particular exhibit unutilised sources of energy wood. Approach: Pre-commercial thinnings can be applied for stands of any softwood or hardwood species and result in stronger diameter development in crop trees. MTK, the Union of Agricultural Producers and Forest Owners, has been conducting comprehensive pre-commercial thinning campaigns in order to increase wood supply from Finnish family owned forests. Results: Through early thinnings, around 1 M m³ p.a. of fuelwood are harvested in Finnish, family-owned forests. There is potential to further increase harvesting. However, the price for the harvested wood is the limiting factor. In order to make pre-commercial thinnings economically feasible on a large scale, harvesting costs would need to be decreased and higher prices would need to be achieved.
Lessons learned	Felling costs are relatively high, the remaining trees constrain the productivity and wood harvest per hectare is small, usually from 25-60 m³/ha. State subsidies can facilitate wood supply from early thinnings. In any case, treatments must be in line with site conditions and other sustainability constraints. The role of skilled and responsible operators stands out, since the working conditions on pre-commercial thinnings are more demanding than on clear cuttings or commercial thinnings.
Contact point	Anssi Kainulainen, Forestry specialist Address: Central Union of Agricultural Producers and Forest Owners (MTK), PO Box 510 (Simonkatu 6), FI-00101 Helsinki, Finland Phone: +358 50 596 1541 E-mail: anssi.kainulainen@mtk.fi
Reference	https://www.mtk.fi

H.2 Improve existing afforestation programmes

Description	Afforestation and reforestation are efficient tools to increase wood supply potential on the long run. In 2008, MCPFE and PEBLDS published “Pan-European Guidelines for Afforestation and Reforestation with a special focus on the provisions of the UNFCCC” (AR guidelines). The Guidelines can be used as a set of recommendations for consideration in afforestation and reforestation programmes that aim inter alia at carbon sequestration and reduction of CO ₂ emissions, including woody biomass production. The document includes 29 guidelines for afforestation and reforestation, divided into three chapters: general guidelines, ecological guidelines, as well as socio-economic and cultural guidelines.
Applicability	Applicable in any region or country.
Main challenges	Balancing multiple considerations related to land use and land use change.
Main actors	Lead: governments; others: public and private forest owners
Reference	http://www.foresteurope.org/filestore/mcpfe/Meetings/2008/Geneva/Guidelines_Aff_Ref_ADOPTED.pdf



Good practice example:

Name	Irish afforestation programme and grant scheme
Location	Ireland
Description	Situation: Ireland currently exhibits a forest cover of 10%. An increase in domestic wood supply is desired. Approach: The Irish government implemented a strategic plan for the forestry sector with the ambition of planting 17% of the land area with forest. Most of this afforestation is expected to come from the farm sector and attractive grants and annual premium payments have been made available to landowners as incentives. Grant levels are available up to a maximum of € 7,604/ha depending on the tree species planted. The afforestation programmes and funding schemes are in line with the AR guidelines by MCPFE/PEBLDS, thus, sustainable forest management is ensured. Results: Not yet available.
Lessons learned	Despite the incentives, many farmers are opting not to afforest and this is primarily due to the lack of a forestry tradition or culture and the preference that farmers have to continue with traditional farming practices. In addition, the current legislation prevents forests, once established and 10 years old, from being removed and therefore it is an irreversible, permanent land-use change. A second issue in relation to timber mobilisation is that farm-forest owners (average size 8 ha) have difficulty in developing linkages in relation to the harvesting and marketing of timber. Again this is due to the lack of infrastructure in place as this is a ‘new’ crop. (Most farm-forests are less than 20 years old).
Contact point	Peter Cafferkey Forestry Division, Department of Agriculture Fisheries and Food Address: Johnstown Castle Estate, County Wexford, Ireland E-mail: peter.cafferkey@agriculture.gov.ie
Reference	http://www.agriculture.gov.ie/forestry/grantschemes/

6. Concluding remarks

There is a potential to enhance wood supply in a sustainable manner, for energy and raw materials for industry. In line with the policy commitments all over Europe and in particular in light of the EU renewable energy targets, wood mobilisation should be further encouraged in countries all over Europe.

The sound mobilisation of unused or underused wood resources will be crucial for meeting the needs of the wood energy sector along with those of the forest-based industries, whilst keeping in mind a sustainable management of the resource and development of societies.



Though strategies for increased wood mobilisation are often complex and comprise various options and dimensions, a variety of successful local practices exists. This guidance document presents a selection of concrete wood mobilisation measures and explains their applicability in different regional and national contexts. For each of the identified eight mobilisation areas, a

set of concrete measures has been proposed and examples of good practice presented, which policy-makers and practitioners can take into account when developing wood mobilisation strategies and practices for their own region.

Taking up and further developing such mobilisation practices can contribute to adaptation and mitigation efforts mostly needed in the context of climate change and help to achieve renewable energy targets as well as provide additional jobs and income in rural areas. The sustainable mobilisation of wood for all purposes therefore forms an important step towards a green and competitive economy.

The sponsors of the guidance urge those interested in wood mobilisation to build on the ideas and knowledge presented here, and, in their turn to **share their experience**. Comments and **new case studies** are welcome and should be **transmitted to** info.timber@unece.org.

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This book aims to give clear, concise and operational guidance for sustainable mobilisation of wood in Europe. It gives concrete measures and it refers to good practice examples of successful and sustainable mobilisation of wood. It is a useful tool to assist policy-makers and practitioners alike in taking and supporting similar measures.

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