



**European Cooperation
in the field of Scientific
and Technical Research
- COST -**

Secretariat

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COST 223/09

MEMORANDUM OF UNDERSTANDING

Subject : Memorandum of Understanding for the implementation of a European Concerted Research Action designated as COST Action FP0902: Development and harmonisation of new operational research and assessment procedures for sustainable forest biomass supply

Delegations will find attached the Memorandum of Understanding for COST Action FP0902 as approved by the COST Committee of Senior Officials (CSO) at its 174th meeting on 26-27 May 2009.

MEMORANDUM OF UNDERSTANDING

For the implementation of a European Concerted Research Action designated as

COST Action FP0902

DEVELOPMENT AND HARMONISATION OF NEW OPERATIONAL RESEARCH AND ASSESSMENT PROCEDURES FOR SUSTAINABLE FOREST BIOMASS SUPPLY

The Parties to this Memorandum of Understanding, declaring their common intention to participate in the concerted Action referred to above and described in the technical Annex to the Memorandum, have reached the following understanding:

1. The Action will be carried out in accordance with the provisions of document COST 270/07 “Rules and Procedures for Implementing COST Actions”, or in any new document amending or replacing it, the contents of which the Parties are fully aware of.
2. The main objective is to harmonise forest energy terminology and methodologies of forest operations research and biomass availability calculations thereby building the scientific capacity within forest energy research and supporting the technology transfer of the forest biomass procurement chain and sustainable forest management.
3. The economic dimension of the activities carried out under the Action has been estimated, on the basis of information available during the planning of the Action, at EUR 92 million in 2009 prices.
4. The Memorandum of Understanding will take effect on being accepted by at least five Parties.
5. The Memorandum of Understanding will remain in force for a period of 4 years, calculated from the date of the first meeting of the Management Committee, unless the duration of the Action is modified according to the provisions of Chapter V of the document referred to in Point 1 above.

A. ABSTRACT AND KEYWORDS

At present the use of forest biomass for energy is an increasingly important topic particularly in light of the debate on climate change. Forest biomass offers the largest potential as a renewable fuel. In order to ensure the reliable and sustainable supply of forest fuel new technological solutions to procure forest biomass are needed.

By harmonising research methodologies in forest biomass operations research it is anticipated that more solid conclusions can be drawn from research results since the Action enables more comparable repetitions of the same studies across Europe. Furthermore, research results will be more comparable and the generalisation of research results will be improved.

The Action will provide an original synthesis of multidisciplinary research efforts and an innovative European wide reference for forest biomass for energy terminology, sampling methods, standard measurements, and research methodologies. This synthesis will promote the increase in the use of forest biomass for energy as laid out in the EU strategies.

Through the possibilities of the networking concept, the most suitable research methods can be identified, harmonised and standardised throughout the EU. The Action contributes to provide a more solid basis for the decision making on national and EU levels on biomass supply.

Keywords: forest biomass for energy, forest operations research, bioenergy, system analysis, modelling

B. BACKGROUND

B.1 General background

At present the use of forest and agricultural biomass for energy is an increasingly important topic particularly in light of the recent debate on climate change and of employment in rural areas.

In order to combat climate change, the EU commission, as well as other countries outside the EU, has set ambitious targets to increase the share of renewable energy sources, the so called 20/20/20 targets.

Furthermore, the "Directive for renewable energy" also promotes the use of forest biomass for energy. In order to meet these objectives, a large share of this increase has to come from forest biomass. In the European context, forest biomass offers the largest and most economic potential as a renewable fuel when managed on a sustainable basis. Moreover, forest biomass has clear advantages in comparison to agricultural crops since it does not compete with food production. At the current state of the forest biomass development, the targets set by the EU Commission are a great challenge for the sector. In order to ensure the reliable and sustainable supply of forest fuel new technological solutions to procure and process forest biomass are needed. The COST Action addresses this challenge and will contribute to the harmonisation and implementation of forest biomass supply and utilisation technology.

Forest biomass is also a central tool in the decentralisation of energy systems and contributes to the development of rural areas, another objective of the EU strategy. In addition, forest biomass for energy contributes to the security of energy supply and promotes the energy independence of fossil fuels. The forest biomass procurement chain from the forest site to the power plant or biofuel refinery promotes new and innovative enterprise solutions, jobs in the procurement chain and also earning possibilities for forest owners in rural areas.

However, one of the biggest challenges to increase the use of forest biomass is the availability and proper use of suitable harvesting technology to meet the growing demand for raw material and at the same time ensure the sustainable use of the forest ecosystems. Currently, forest biomass technology and supply systems are still under rapid development and in some countries experimental trials have only started recently. On the contrary, research on this topic has a long tradition in several countries that lead development in the sector and have produced a large corpus of specific knowledge. However, there is a wide variability in the terminology, the organisation of the experimental design, the data collection methods and the data processing techniques used by different research groups in different countries: this makes it difficult not only to transfer experience where this is lacking, but especially to compare data when more studies are already available on a given aspect. As a result, information about the biomass supply systems is fragmented and often contrasting: a great international synergy could be developed if all could agree on a common study method, or a set of common methods among which to choose

To date, the fragmentation, variability and - at times - inconsistency of study methods has prevented both practitioners and the international academic community to fully profit from the already large amount of information about the supply systems in place. For example, forest machine cost calculations (cost/hour) are carried out in each country but vary significantly and results are therefore often not comparable. In order to built trust and confidence in the wood biomass markets the supply systems in place have to function properly and have to be economically viable both in the short and long term.

Work and method studies are an essential component in increasing the efficiency of such systems and contribute to a large extent to successful promotion and implementation of existing as well as new and innovative technologies.

Research organisations dealing with wood supply topics have developed a wide variety of modelling tools to examine and forecast the impacts of changing wood flows from local to global levels of woody biomass harvesting and supply. The structured platform for comparison of methods, exchange of information and further joint development of modelling methodology is, however, lacking. As a result, existing human resources are not used effectively to support the information need of the sector's industry in the rapidly changing situation.

The above mentioned problems are causing a serious fragmentation of research efforts and problems, in Europe, in terms of communication and exchange of research results among researchers but also among other players in the field such as forest industries, machine manufacturers, forest owners and finally small and medium enterprises working the field of forest biomass for energy. Since the forest energy technology development and associated time studies are a recent phenomenon it provides the opportunity to develop a joint work study methodology right from the beginning.

COST is the best mechanism for support since it allows building on the already existing scientific knowledge of each partner country. Furthermore, through the possibilities of the networking concept, the most suitable research methods can be identified, harmonised and then standardised throughout the European Union. This would also contribute greatly to capacity building with the EU and strengthen the entire sector.

The term forest biomass operations research includes work studies, measurements of inputs and outputs and logistics research of the whole supply chain.

B.2 Current state of knowledge

Research into forest biomass for energy is booming across Europe and many other countries outside the EU. Most countries have their own nationally funded research programs i.e. Skogforsk in Sweden or Metla in Finland. However, there has also been a number of EU funded projects to deal with this issue. There is a substantial amount of knowledge already existing upon which this Action is building. Publications such as "Sustainable Use of Forest Biomass for Energy" by Röser et al. 2008 or "Bioenergy from Sustainable Forestry" by Richardson et al. 2002 illustrate the large amount of research that is being carried out by numerous scientists in Europe and the rest of the world. Forest biomass for energy is also becoming an increasingly important topic in organisations such as IUFRO and the European Forest Institute (EFI).

The current focus of forest operations research can be divided into 5 main categories which are:

- estimation of availability of woody biomass (cost/supply analysis),
- development of new technological solutions to harvest and process forest biomass,
- adaptation of existing technical solution to harvest and process forest biomass,
- technology transfer of established and working forest biomass procurement solutions,
- optimisation of existing procurement systems and logistics.

The estimation of resource availability is the most crucial variable in the biomass field. When planning investments it is of utmost importance to have exact figures on the availability of fuel in a given area since the availability will finally determine the size of the conversion plant and transportation distance, which is the greatest cost factor. Resource availability is usually investigated using forest data from forest management plans or inventory data and geographical information systems (GIS). Cost/supply curves then indicate how much material is available in a given area and the associated costs to bring the material to the end user.

The development of new technological solutions to harvest and process forest biomass are also an important aspect of the ongoing research into biomass for energy. New technological developments such as i.e. multitree felling heads or the bundling machine have had a significant positive effect on operations in Scandinavian as well as Central and Eastern European countries. The development of these machines has happened in close cooperation with forest industries and research organisations.

The adaptation of existing technical solutions to improve operations in the forest and to meet increasingly important sustainability criteria is another important aspect of current research efforts. Traditionally, forest operations have been fully mechanised in Scandinavian countries. In Central Europe the mechanisation has been much slower; however, mechanisation of forest operations is becoming increasingly important in order to make forest operations economically and environmentally sustainable. The adaptation of existing harvesting systems to facilitate the recovery of energy biomass is an ongoing process. Research efforts are playing a very important part by investigating the preconditions, strengths and weaknesses of current technology thereby increasing the economic and environmental sustainability of silviculture.

As established and working forest biomass procurement systems have been established particularly in Scandinavian countries interest in other parts of Europe has been increasing. As a result, technology and know-how transfer has become increasingly important and a substantial amount of research is being carried out to transfer and adapt know-how and proven technological solutions to other parts of Europe that are not yet as developed. This research is contributing to the successful implementation of new technologies and furthermore ensures that previous mistakes are avoided in new countries where the biomass sector is still being developed.

Finally, system optimisation and logistics have become an important aspect of the research efforts in regards to forest biomass for energy. Since forest biomass is a local resource located outside urban area transportation and logistics are some of the greatest obstacles to the successful implementation of forest energy systems. Therefore, systems analysis and logistic research have become essential in finding new solutions regarding the transportation and handling of fuel in the forest, on the road and at the plant.

The innovative approach of the Action is that it is aiming to develop new terminology, measurement methods and methodologies in the field of forest biomass for energy from the beginning of the development process taking into account the great variations in different countries. This will contribute to capacity building in the entire forest energy sector by promoting understanding, communication and research in the field.

B.3 Reasons for the Action

The most immediate benefit of the Action is that a common understanding in regards to forest biomass for energy will be produced. This will be obtained first of all by agreeing on a common terminology that will be adopted as a reference by research organisations, the industry and the entire forest cluster. As a result in the long run the Action will contribute significantly to the developed of the biomass sector and improve its competitiveness, through better communication.

The security of fuel supply becomes an increasingly important topic particularly in light of fluctuation oil prices and severe disturbances of natural gas supplies. Forest biomass for energy can contribute to the security of supply by providing a locally available fuel. However, also the security of the forest fuel has to be ensured. The Action contributes to provide a more solid basis for the decision making on national and EU levels on biomass supply in the future.

The Action is mainly aimed at European scientific/technological advance however; some economic and societal benefits can also be an outcome of the Action.

The anticipated deliverables of the Action are a clear indication of the immediate need of more networking in the field of forest biomass for energy. The common terminology will be the first deliverable and a catalyst of improved understanding and communication across Europe. In addition, the best practice guidelines will be the foundation for future research in the field. The Action ensures that researchers across Europe - and in the longer run across the world - will speak, measure, sample and research in comparable ways. In this respect the Action is a unique trailblazer.

Finally the Action will provide input to ongoing processes on the EU level such as the “open ended ad-hoc working group on “sustainability criteria” for forest biomass production, including bioenergy” of the MCPFE or the development of CEN standards or on an international level to the Task 31 “Biomass production for energy from sustainable forestry” of IEA Bioenergy.

B.4 Complementarity with other research programmes

The Action has some links with the European Committee for Standardisation and upon approval of the Action possible cooperation with the CEN will be further investigated. The Action will also benchmark the work done for CEN standards (CEN/TC 335 biomass standards) of solid biofuels in order to support the harmonisation of the biofuel business.

At the moment, both Finland and Sweden have large biomass research programs that are aimed to increase the use of forest biomass for energy, to ensure sustainability of the forest ecosystem and to make forest operations more competitive. In November 2008 the University of Joensuu and the Finnish Forest Research Institute started a program called Metsäenergia (Forest Energy). There are many interlinkages between the Action and Metsäenergia program and they will most definitely benefit from each other. Although of minor magnitude, similar programmes are going on in other EU countries such as Italy, France, Slovak Republic, Germany and Austria - only to mention a few. The Action will build on the collective expertise in these ongoing research programs and at the same time the Action will form a common basis for discussion and promote communication.

The Biomass Energy Europe (BEE) project funded under the FP 7 programme also has interlinkages with the Action. There have been a number of EU funded project dealing with the use of forest biomass for energy:

- Wood-En-Man - A contribution to the development of sustainable forest management
- Harvesting, drying and storage of energy biomass from short rotation forest
- Development of a protocol for ecoefficient wood harvesting on sensitive sites
- Forest Energy - A solution for the Future Power Needs
- EFORWOOD - sustainability impact assessment of the forest-wood supply chain

In addition, there are a number of projects that have been or are funded under the Interreg funds. Some examples are:

- PelleTime - solutions for competitive pellet in medium sized enterprises
- Northern WoodHeat - developing small and medium woodfuel supply chains.
- Baltic Forest
- Short rotation forestry (SRF) on agricultural land and its possibilities for sustainable energy production in a Nordic perspective

These projects highlighted the need of joint methodologies of forest operations research to produce better results. The Action will make use of results produced during these project and build on the already established knowledge and networks.

C. OBJECTIVES AND BENEFITS

C.1 Main/primary objectives

The objective of the Action is to harmonise forest energy terminology and methodologies of forest operations research and biomass availability calculations thereby building the scientific capacity within forest energy research and supporting the technology transfer of the forest biomass procurement chain and sustainable forest management.

C.2 Secondary objectives

1. Capacity building to strengthen the scientific body of forest operations research in the European Union through improved communication by using jointly developed terminology and methodologies
2. The COST Action will harmonise standard measurements, sampling methods and estimation of the different biomass components and produce a handbook
3. The COST Action will establish a common standard terminology and units in regards to forest biomass supply for energy which will be published in a forest biomass glossary
4. The COST Action will develop best practice guidelines for a work study protocol in regards to the forest biomass procurement chain.
5. The COST Action will establish a simple format for cost calculations (costs/hour) of machines in the forest biomass procurement chain
6. The COST Action will harmonise commonly used methodologies in forest operations research
7. The COST Action will carry out a system analysis to analyse the different operational biomass procurement chain systems that are available at the moment
8. The COST Action will initiate an electronic peer reviewed online journal
9. The COST Action will support effective technology and know-how transfer inside EU

C.3 How will the objectives be achieved?

The objectives of the Action will be achieved through the use of three principal mechanisms. Firstly, the scientific programme provides the basis of the Action and is built on three basic elements which are:

- Review and synthesise the current scientific knowledge in participating countries
- Analysis and harmonisation of the results among Action participants
- Dissemination of the knowledge and results

Moreover, the scientific program includes a precise timeframe and major milestones that have to be achieved. It was designed in a matter that it will meet the needs of researchers, forest industries and other stakeholders in the forest sector thereby ensuring their active participation since they will directly benefit from the Action.

Secondly, the large amount of ongoing research and political pressure to increase the use of biomass for energy across Europe strengthens the Action by ensuring that it is based on substantial scientific activity.

Thirdly, the collected expertise involved in the Action guarantees both linkages to ongoing research and development work as well as to dissemination channels for results of the Action.

C.4 Benefits of the Action

The Action will provide an original synthesis of multidisciplinary research efforts and an innovative European wide reference for forest biomass for energy terminology, sampling methods, standard measurements, and research methodologies. This synthesis will promote the anticipated increase in the use of forest biomass for energy as laid out in the EU strategies and policies. The Action will also provide valuable input to the ongoing development of the CEN/TC 383 standard "Sustainably produced biomass for energy applications". Furthermore, other ongoing processes within and outside the EU such as the "MCPFE open-ended ad-hoc working group on "sustainability criteria" for forest biomass production, including bioenergy" will be supported by the Action by providing input, exchanging of achieved result and active discussions.

The key advantage of the Action is that the research has been ongoing but now the Action offers the possibility to find the best solutions and ensures that scientists across Europe use the best available methods and speak the same language when communicating with each other thereby strengthening Europe's scientific networking capacity. Moreover, research into existing and new innovative technologies is ongoing in all participating member countries as well as in many other countries. With the growing demand for energy, research in the field of forest biomass for energy will increase considerably in the future. The Action provides an important tool to coordinate these ongoing activities and look at studies that have been done in the past and studies that are ongoing and then suggest the best possible way to do them in the future. This is the perfect opportunity to create new methods standards and terminology in an evolving industry thereby increasing the competitiveness of the sector and the importance of scientific research in the EU as such.

By harmonising the research methodologies in forest biomass operations research it is anticipated that more solid conclusions can be drawn from the research results since the Action enables more comparable repetitions of the same studies across Europe. This will significantly improve the quality of the research and its results in the future. The Action will ensure that research results will be more comparable in the future and the generalisation of research results will be improved.

Today, the forest machine market is a global market; however, the science dealing with all aspects of forest machines has remained more of a national phenomenon. Extensive testing of existing machinery and new evolving technologies is a constant process ongoing in most European countries. As a result, methodologies vary significantly between different countries. These differences are most prevalent in used methodology, approach, analysis of results as well as technology and equipment used to carry out time studies. However, when dealing with a new issue like forest biomass for energy the exchange of information is of utmost importance which emphasises the need for harmonised scientific terminology, measurement methods, and study methodologies

The scientific implications of the achieved objectives would be extensive since future research activities would be carried out according to the developed best practice guidelines or anyway they will use methods that are clearly described and understood so that research results would be understandable and applicable across Europe by the participants of the Action. It is also to be expected that other member countries will adopt the best practice guidelines in the future thereby improving the competitiveness of the entire sector in the EU. Since the forest energy technology development and the associated science are a recent phenomenon it provides the opportunity to develop a joint forest operations methodology right from the beginning. Through the Action the entire research methodologies as well as sampling methods and standard measurements will be prioritised and harmonised and therefore the entire research community will be much more competitive in the future by improving the results about resource availability, appropriate technologies and cost of delivered fuel.

The Action will support the decision making in regards to the use of forest biomass for energy on national and EU levels by providing decision makers with improved research results that are not only applicable to national circumstances but that will be applicable across Europe. This in return will strengthen the forest and energy sector and rural development efforts. In addition, the environmental consequences of forest biomass harvesting are being more and more discussed as the pressure to harvest more biomass is increasing. The Action will provide useful input for that debate and will contribute to the sustainable and secure supply of forest biomass for energy generation. Moreover, the Action will support the development of new, innovative and more environmental friendly harvesting systems of forest biomass.

Furthermore, the current process to publish peer reviewed scientific results, an essential part of the entire science field, is taking too long and is outdated. Today research results are needed instantly and the long delay of up to two years of peer reviewed articles is causing serious delays in the implementation of research results. Therefore, the Action anticipates establishing an electronic peer reviewed online journal which meets the demands of today's fast pace data society. The peer reviewed online journal will significantly speed up the process of peer reviewed publishing. The benefit of the Action is that it will unite most of the scientist in the field and therefore the implementation of the online journal will have a great support both in regards to the organisational setup as well as the delivery of research articles. The anticipated results of the Action will therefore have a long lasting lifetime and will not be limited to the time-span of the Action.

This work will certainly draw upon the previous initiative on the harmonisation of work study protocols funded by the EU several years ago within the scope of a Concerted Action: however, the work conducted then did not specifically address the harvesting of biomass, which involves the determination of specific parameters with their own (often complex) measurement methods. Moreover, completely new study methods of forest operations have been made available in the latest year by the development of ICT technology, which can be deployed with much benefit in this sector. Finally, this Action will not only consider the development of a data collection protocol, but it will make available a terminology for forest biomass operations and other close fields (then offered by IUFRO, and now unavailable as the validity of the IUFRO reference has long expired) and a complete set of alternative best practice methods comprehensive of study design, sampling, data collection and data processing, to promote common understanding, even beyond the practical limits of harmonisation. In addition, the COST Action will also address the topics of system analysis and modelling, of growing importance as the sector advances.

C.5 Target groups/end users

The immediate end users of the achieved results are primarily the scientific community. Moreover, the Action also targets the energy industry (biofuel users, heat and electricity producers), forest industry (harvesting entrepreneurs, sawmilling, pulp and paper industries), the forestry and energy cluster as a whole and forest owners.

The decision makers on the national and EU levels are another very important target group of the Action.

Secondary users as researchers from other fields, such as ecology, economics and marketing who will find reliable and easily accessible information clarifying how technologies will perform and how to interpret research results. Furthermore, the COST Action will also benefit the end-users such as forest SME's by providing new entrepreneurial opportunities and the general public.

D. SCIENTIFIC PROGRAMME

D.1 Scientific focus

To achieve the objectives of the Action presented in section C the Action has to collect and harmonise the research efforts done in the different member countries in regards to operations research on forest biomass supply for energy. The activities of the Action can be divided into three major tasks.

The first task is the production of a joint terminology related to forest biomass for energy and its associated research.

The second task, which is divided into two stages, is related to the work study methodologies, system analysis and modelling approaches in forest operations. Forest biomass procurement chains are going through major changes in terms of improving technology, harvested volumes, raw material flows and varying costs. To predict the changes in the raw material supply for the forest and energy industry calls for a variety of modelling approaches and tools.

- Stage 1 consists of the synthesis and analysis of existing forest operations research methodologies, system analysis and modelling approaches in forest operations by literature reviews and
- Stage 2 consists of the analysis, identification and harmonisation of the most suitable operations research methods among Action participants.

Finally in task 3 of the COST Action, sampling methods and standard measurements of forest biomass will be investigated, described and summarised in order to produce best practice guidelines which then lead to harmonisation.

The overall results will be analysed and information is synthesised and shared with the scientific community in the handbook, best practice guidelines and the forest energy glossary.

All the instruments available through the COST Action such as meetings and STSM will be used to the largest extent possible in order to promote the highest level of information exchange and new knowledge building among partners.

The innovative aspect in this Actionosal is the holistic approach to tackle current and very prevalent problems and create outputs that will be applicable for the scientific sector the forestry and energy industries as well as for small and medium enterprises. Finally, the Action anticipates establishing a joint peer reviewed scientific online journal. This will provide an example of the fruits yielded by EU networking and research method harmonisation.

D.2 Scientific work plan - methods and means

The scientific work is divided into 4 different working groups each with its own specific workplan and outcomes. The working groups are as follows:

WG 1 Forest biomass terminology and units

WG 1 will establish a database of commonly used terms and units related to the use of forest biomass for energy and create a unified terminology. Furthermore, standard measurement and biomass units are described, classified and harmonised within participating countries. The purpose is to develop a common and official terminology for forest biomass for energy operations. The most recent official terminology issued by IUFRO in 1995 expired 8 years ago and has never been replaced.

Workplan:

1. Survey of commonly used terminology and units related to the use of forest biomass for energy in national languages and in English
2. Establishment of a database for terminology and units related to forest biomass for energy
3. Production of a glossary of most commonly used terms and units in relation to forest biomass for energy in participating countries
4. ID and harmonisation of terminology and units related to forest biomass for energy

Output: Forest biomass glossary including terminology and units in national languages and English

WG 2 Operations research and measurement methodologies

In this Working Group participating member countries will summarise their current operations research methodologies and procedures in regards to work studies, sampling methods and standard measurements related to forest biomass for energy for different types of forest energy material. The purpose is to a) survey; b) analyse, c) categorise and b) compare the different and numerous work study methodology, sampling methods and standard measurement approaches in participating countries. Eventually this will lead to a comprehensive list of best suggested approaches, conducive to a common understanding of past and future studies. Whenever possible, equivalence and/or replacement capacity between alternative methods will be established. The final goal is not to produce one standard procedure valid for all situations (which is unrealistic, unwieldy and contrary to methodological progress and academic freedom), but rather to identify when two studies are indeed comparable, how to make them comparable even when different methods must be used (for instance, due to contingencies) and how the outcome can be affected when different and non-equivalent methods are used, due to a number of reasons.

Workplan:

1. Synthesis of existing operations research methods (work study sampling methods and standard measurements) in participating countries
2. Analysis of the current problems and challenges as well as knowledge gaps
3. Review of existing and potential work study equipments
4. Organisation of an international conference dealing with the WG topic
5. Compilation of report summarising the most commonly used methods in each participating country and a SWOT analysis
6. Production of best practice guidelines on work study methodologies, sampling methods and standard measurements

Output: Best practice guidelines on work study methodologies, sampling methods and standard measurements

WG 3 Machine cost calculation and data analysis methodologies

In this working group the Action will investigate the current forest biomass research methodologies including machine costing assumptions as well as data analysis methods in participating countries. The purpose is to a) survey; b) analyse, c) categorise and b) compare the different and numerous methods to determine machine costs and data analysis methodology approaches. The work package aims to develop a simple format for cost calculation (cost/hour) of forest machinery. Furthermore, based on the results of the national reports the working group will ID the most suitable methodologies in forest operations research.

Workplan:

1. Synthesis of existing forest machine cost calculation and data analysis methods in participating countries
2. Analysis of the most promising forest machine cost calculation and data analysis methods
3. Organisation of an international conference dealing with the WG topic
4. Identification of forest machine cost calculation and data analysis methods to be harmonised within the Action participants

Output: Best practice guidelines on forest machine cost calculation and data analysis methods

WG 4 System Analysis and modelling in forest operations

In this working group the Action will investigate the current state of the art in regards to system analysis and modelling in forest operations in participating countries.

The purpose is to a) survey; b)analyse, c) categorise and b) compare the different and numerous system analysis approaches and models (from simple deterministic to more complex stochastic and discrete-event) developing recently in all of Europe as a result of the rapid change of harvesting methods under the pressure of increased mechanisation and forest energy harvesting. Furthermore, the WG will investigate new approaches to design supply chains and their associated costs and how to study resource availability in terms of cost and supply.

Workplan:

1. Synthesis of the different system analysis approaches and models
2. Compilation of national summary reports identifying the most commonly used system analysis approaches and models
3. Analysis and synthesis of the most promising system analysis approaches and models
4. Organisation of an international conference dealing with the WG topic

Output: Report on models, modelling and system analysis approaches applied in forest-industry/energy production supply chains and recommendations on how resource availability studies should be carried out.

E. ORGANISATION

E.1 Coordination and organisation

The Action is lead by a Management Committee (MC). A Steering Group (SG) will support the MC. The SG is consisting of the chair and vice chair of the Action, working group leaders (WGL) as well as one member of the editorial board. The Action will establish an editorial board (EB), which will oversee the establishment and implementation of the electronic online journal as well as the publication of all promised milestones.

The SG prepares MC meetings and monitors the activities of the Working Groups (WGs) and the editorial board between MC meetings. The SG will, if endorsed by the MC, also act as assessment panel for Short-Term-Scientific Missions (STSMs).

The Action is divided into 4 different working groups (WGs) and each of them will be lead by a different WG leader. The WG leader's task is to ensure the implementation of the task and delivery of milestones. Each working group has two main deliverables called milestones. Below are the milestones of the 4 WGs and the respective expected delivery time. Moreover, each WG will organise an international conference dealing with the general topic of the WG to promote the exchange of research, facilitate communication among Action participants and disseminate information.

The coordination of national research is the responsibility of the national MC members. The national MC members' role is to establish consensus among national researchers and to coordinate their activities. This will be achieved through regular workshops either in conjunction with ongoing COST activities or separate workshops. Furthermore, the creation of common research teams will be supported. In addition, the ongoing cooperation in regards to joint courses for Ph.D. students will further contribute to the successful coordination of both national and international research. National team leaders are encouraged to organise training schools for Ph.D. students that support both the Ph.D. works of the students and the Action.

The editorial board will consist of Action participants and elect an editor- in-chief. The task of the editorial board is to initialise the electronic peer reviewed journal and oversee all other publications to be completed in the Action. Furthermore, the editorial board will ensure the scientific quality of the Action results.

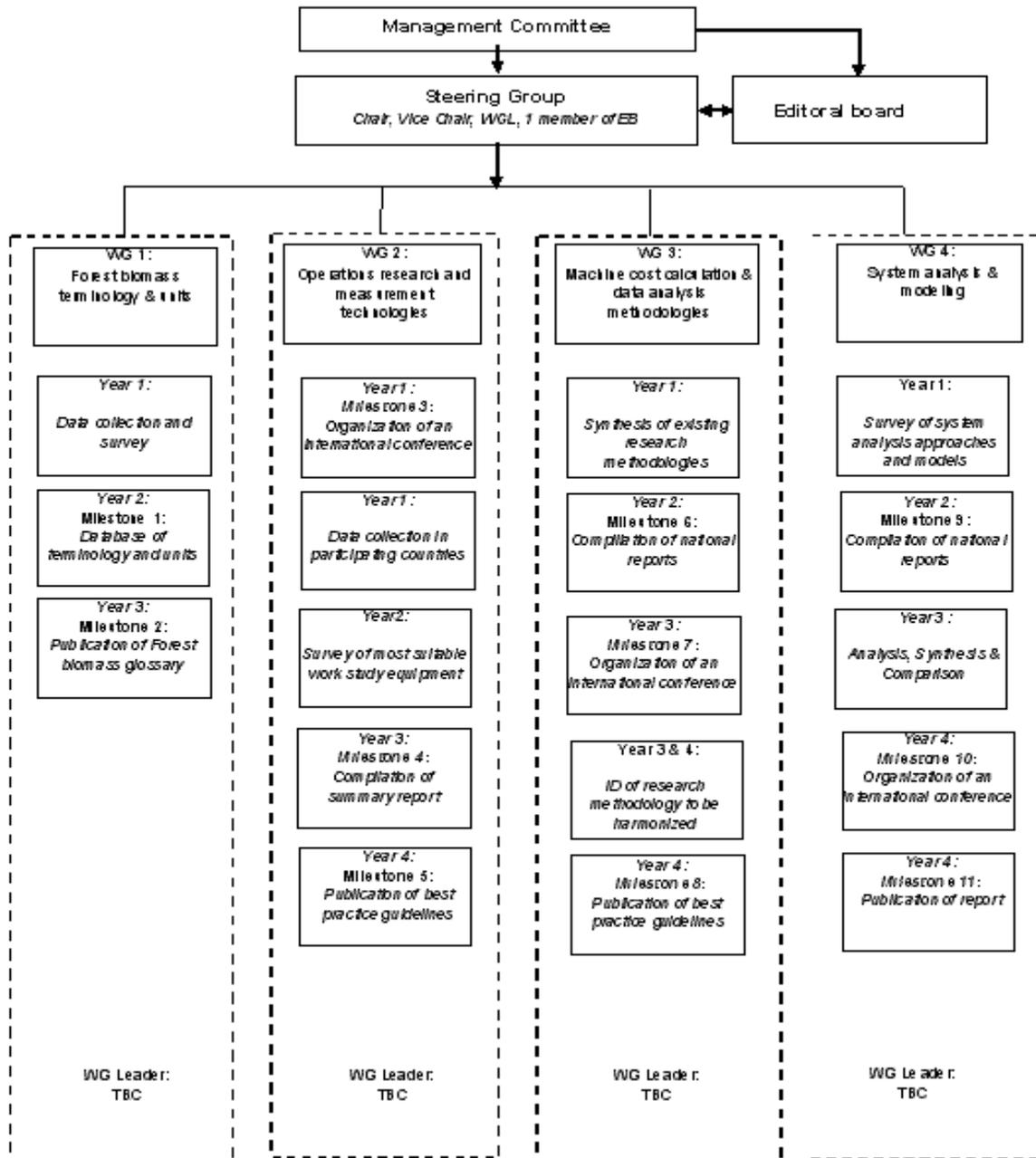


Fig. 1

Organisational chart of the Action

Milestones:

Major milestones to be achieved during the Action are (please also see the organisation chart for clarification:

Milestone 1: Database of terminology and units WG1

Milestone 2: Publication of Forest biomass glossary WG1

Milestone 3: Organisation of an international conference WG2

- Milestone 4: Compilation of summary report WG2
- Milestone 5: Publication of best practice guidelines WG 2
- Milestone 6: Compilation of national reports WG 3
- Milestone 7: Organisation of an international conference WG 3
- Milestone 8: Publication of best practice guidelines WG 3
- Milestone 9: Compilation of national reports WG 4
- Milestone 10: Organisation of an international conference WG 4
- Milestone 11: Publication of report WG 4

E.2 Working Groups

Scientific activities of the Action will take place in Working groups (WG) covering the five tasks to be carried out within the Action. Each working group has a clear workplan, objectives and outputs. Each WG will nominate a WG leader which also has a seat on the Steering Group of the Action. It is the task of the WG leaders to ensure the implementation of the workplan and to achieve the objectives and outputs.

The following WGs are planned for the Action

WG 1 WG 1 will establish a database of commonly used terms and units related to the use of forest biomass for energy and create a unified terminology. Furthermore, standard measurement and biomass units are harmonised within participating countries. The purpose is to develop a common and official terminology for forest biomass for energy operations. The most recent official terminology issued by IUFRO in 1995 expired 8 years ago and has never been replaced.

WG 2 In this working group participating member countries will summarise their current methodologies and procedures in regards to work studies, the current sampling methods and standard measurements for different types of forest energy material. The purpose is to a) survey; b) analyse, c) categorise and b) compare the different and numerous work study methodology, sampling methods and standard measurement approaches in participating countries. Furthermore, based on the results of the national reports the working group will ID the most suitable methods and measurements

WG 3 In this working group the Action will investigate the current forest biomass research methodologies including machine costing assumptions as well as data analysis methods in participating countries. The purpose is to a) survey; b) analyse, c) categorise and b) compare the different and numerous methods to determine machine costs and data analysis methodology approaches. The work package aims to develop a simple format for cost calculation (cost/hour) of forest machinery. Furthermore, based on the results of the national reports the working group will ID the most suitable methodologies in forest operations research.

WG 4 In this working group the Action will investigate the current state of the art in regards to system analysis and modeling in forest operations in participating countries. The purpose is to a) survey; b) analyse, c) categorise and b) compare the different and numerous system analysis approaches and models (from simple deterministic to more complex stochastic and discrete-event) developing recently in all of Europe as a result of the rapid change of harvesting methods under the pressure of increased mechanisation and forest energy harvesting. Furthermore, the WG will investigate new approaches to design supply chains and their associated costs and how to study resource availability in terms of cost and supply.

In order to ensure efficiency of the work carried out by the WGs and the best possible results the following steps will be taken by each of the WGs:

1. Regular meetings (2 per year) of the WG participants in order to prepare the reports
2. Use of STSMs to exchange information and promote communication among participants
3. Monitoring of the WG activities by the SG
4. Establishing Web 2.0 services to support the internal communication
5. Organisation of an international conference by each WG to promote the ongoing work, initiate cooperation and disseminate results

E.3 Liaison and interaction with other research programmes

Liaisons will be developed with key people involved in other research programmes in a number of ways, depending on the liaison.

The link with existing research activities going on in the different member Countries will be simply achieved by inviting researchers involved in these projects to join the Action.

Important links must also be established with the Forest Technology Platform and the Liquid Biofuel Platform, which have an important role in drafting the priorities of EU research on these topics – of direct interest to forest biomass recovery. Such links will be established preferably through to the official participation of a COST Action representative to the official meetings of both platforms.

Further official links will be established with IUFRO, with an official Action representative establishing a liaison and possibly participating to the activities of this global network.

Task 31 “Biomass production for energy from sustainable forestry” of the International Energy Agency (IEA Bioenergy) also has expressed interest to cooperate with the Action since many of the interests and topics are relevant to its Action. Furthermore, the IEA Task 31 would provide an excellent channel of dissemination of results also reaching a much larger audience outside Europe. Task 31 is holding annual workshops and it is a possibility to arrange workshops together with Task 31, thereby reaching a broader audience.

FP Innovations, the Canadian forest research and development agency currently has a research program called “Forest Feedstocks” which investigates the possibilities to increase the use of forest biomass for energy. FP Innovations has also expressed interest to cooperate on this topic with the Action and there would be considerable mutual benefits. Researchers from FP Innovations will be invited to join Action activities.

Liaisons with ongoing or forthcoming FP7 or Interreg projects will be sought actively by the Action leadership.

E.4 Gender balance and involvement of early-stage researchers

This COST Action will respect an appropriate gender balance in all its activities and the Management Committee will place this as a standard item on all its MC agendas. The Action will also be committed to considerably involve early-stage researchers in the Action this item will also be placed as a standard item on all MC agendas. Early stage researchers will also be encouraged to join the MC and SG of the COST Action since they will be the ones that will benefit from this Action in the future.

The field of forest technology and particularly forest biomass for energy is growing vigorously. There is growing demand for scientific results to fill the knowledge gaps. Therefore, a substantial amount of research is conducted in the field at the moment. Also, the Ph.D. projects are increasing constantly and there is more competition for available positions. The Action will constitute an ideal ground for coordinating the activities of Ph.D. projects and establish new possibilities for future Ph.D. projects.

F. TIMETABLE

The duration of the Action is 4 years. The MC has a kick off meeting together with a large kick off conference including all Action participants during the first months of the Action. A total of 8 MC meeting will be held during the duration of the Action. WG 1-4 are constituted at the kick off conference and their coordinators will be selected. Except for WG 1 which will last only 1 year, the WGs will continue their work throughout the duration of the Action. WG participants will meet regularly to discuss about the progress of the workplan. Working groups participants should meet at least once, preferably twice per year either in connection with other Action activities or arrange separate workshops.

Year 1	Year 2	Year 3	Year 4
Kick off conference MC meeting 1 st WG meetings Initialisation of peer reviewed online journal 2 nd WG meetings Milestone 3	International conference MC meeting 1 st WG meetings 2 nd WG meetings Milestones 1, 6, 9	International conference MC meeting 1 st WG meetings 2 nd WG meetings Milestones 2, 4, 7	International conference MC meeting 1 st WG meetings Milestones 5, 8, 10, 11

G. ECONOMIC DIMENSION

The following COST countries have actively participated in the preparation of the Action or otherwise indicated their interest: AT, DK, EE, FI, MK, FR, DE, GR, IS, IE, IT, LV, LT, NL, NO, PL, PT, SK, SI, ES, SE, TR, UK. On the basis of national estimates, the economic dimension of the activities to be carried out under the Action has been estimated at 92 Million € for the total duration of the Action. This estimate is valid under the assumption that all the countries mentioned above but no other countries will participate in the Action. Any departure from this will change the total cost accordingly.

H. DISSEMINATION PLAN

H.1 Who?

The main aim of the dissemination plan of the Action is to reach a wide and diverse audience. It is very important not only to reach scientists in the field but other stakeholders such as policy makers on an EU and national level, the forest industry and forest owners. The specific audience targeted for the different dissemination efforts are the members of the following bodies:

- Decision makers on the EU level and national levels
- Public and private research organisations engaged in the field of forest biomass for energy and forest engineering

- Large forest industries and their stakeholders
- Forest owners
- Small to medium scale enterprises particularly entrepreneurs and their stakeholders
- Research departments in related areas such as forest ecology and forest economics
- Higher educational institutions responsible for teaching the sustainable use of forest biomass for energy

H.2 What?

The Action will use all the means for dissemination available particularly more modern means of dissemination. It is envisioned to provide useful information to all target groups mentioned above and to meet their demands.

1. Public international conferences
2. WG meetings/workshops
3. MC and editorial board meetings
4. Electronic peer reviewed online journal
5. Scientific publications
6. Non technical publications
7. Glossary
8. Handbook
9. Public website
10. Project website including Web 2.0 applications
11. Short term scientific missions (STSM)

H.3 How?

Public international conferences

The conferences are intended for the international audience. They will offer researchers within the Action and from outside to meet and discuss the progress and results of the Action. Organisation in cooperation with the International Energy Agency or IUFRO will be considered. The conferences will act a major dissemination tool for the Action and will reach a very large audience since it is anticipated to invite also other stakeholders in the forest energy sector.

WG meetings/workshops

Depending on the progress of each WG their 2 annual meetings can either be limited to Action participants or they can be open to the public in the form of a workshop. These meetings will, whenever possible, be synchronised with the annual conferences or other WG meetings. These workshops will facilitate a hands-on approach to the research tasks of the Action and will provide an excellent opportunity to reach a larger audience, and include other partners and stakeholders and their knowledge from outside the Action. When and if appropriate, workshops can be organised alongside major national or international events so as to achieve the double objective of: 1) adding a benefit to COST Action participants, who, with a single trip, can both join a meeting and visit an additional event of interest; 2) reach a larger audience, already gathered in a place by a larger and known/expected event.

MC and editorial board meetings

The meetings will be an important part of the Action since they will guide the Action participants and ensure that the Action is implemented properly. The meetings will be held in conjunction with the other Action activities in order to save costs. They will also facilitate discussions and distribution of Action results among Action participants.

Electronic peer reviewed online journal

The electronic peer reviewed online journal will be a major contribution to the scientific society. It is anticipated to create the online journal in order to speed up the reviewing process which is essential in this ever changing operation environment. It will act as a main dissemination tool of the Action and will be continued once the Action is completed. The creation of the online journal will offer scientist within the Action and outside the Action a new communication tool. The articles to be published will be available to the general public.

Scientific publications

Naturally, also traditional scientific peer reviewed articles may be produced by Action participants and may be in the form of overview articles resulting from the state of the art reports to be produced in the Action.

Publications, reports, flyers and non technical publications

As mentioned in the objectives of the Actions, it is important to reach a wide range of researchers in and outside the special field. Furthermore, the produced results also have to reach other end users such as policy makers, the industry and small to medium enterprises. The non-scientific publication will act as a major tool to disseminate information to them that is in a format which they are more accustomed to. Therefore the action will summarise major results also into shorter formats and publish them in print or on the website. This tool is one option to publish the best practice guidelines to be produced in WG 2 and 4.

Glossary

The glossary of a unified forest energy terminology and units will be an important dissemination result. Its use is intended for all stakeholders in the field of forest biomass for energy and will ensure that all of them will speak the same language. The glossary will be published in national languages and in English. They will be made available in print and through the Action website.

Best practice guidelines

The best practice guidelines to be produced in WGs 2 and 3 will be another important result of the project and its use is intended for a very broad audience both within the research sector, the industry and the private sector. They can either be published as a handbook or leaflet

Public website

A publicly accessible website is created as one of the major dissemination channel for all the Action result

Project website including Web 2.0 applications

A separate project website is created for Action participants that will include Web 2.0 applications to facilitate the online communication and coordination within the Action. The main aim of the Web 2.0 applications is to facilitate the creation of a fully functional web-based network.

Short term scientific missions (STSM)

The Action will organise as many STSMs as the budget will allow. The STSMs will be an important dissemination tool to ensure the cross border exchange of information and dissemination. By integrating the STSMs into the workplan of the different WGs it will be ensured that young scientists will get in contact with senior scientists and thereby stimulating their research. The STSM instrument is particularly important in the long term formation of a European body of knowledge and experience in the field of forest biomass for energy.

The above mentioned dissemination tools form the basic elements of the dissemination plan. The dissemination activities are under the supervision of the MC and will be elaborated during the first meeting. The dissemination plan and activities will be monitored continuously and will be discussed during each of the MC and SG meetings. The dissemination plan is the most important tool to ensure that the results of the Action will be applied by the target group and is therefore a very important part of the Action.
