Forest Energy in Action

Cost Action FP0902 Newsletter 2010

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METLA

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Forest Energy in Action

The first full year of COST Action FP0902 has been completed, and looking back it was a very successful and productive year. Recent global developments have underlined that the Action is at the heart of the current discussions about the increasing use of forest biomass for energy, as the sector has witnessed the establishment of many research projects on forest biomass, stimulated by the urgent need for overcoming the dependence on fossil fuels, and for mitigating climate change. While Europe multiplies its efforts to increase the sustainability and economic viability of forest biomass energy systems, many other countries outside Europe have started their own programmes, often achieving encouraging results.

To support these Activities the COST framework (European Cooperation in Science and Technology) of the European Union has launched a new network for stimulating cooperation between some of the key European research centres dealing with biomass for energy harvesting and supply. The goal of this initiative is to further reinforce Europe's leading role in the field of sustainable forest biomass utilization, since this huge resource is still largely unutilized due to the technical difficulties of establishing economically and environmentally viable supply chains.

In October 2009, COST launched Action FP0902 "Development and Harmonisation of New Operational Research and Assessment Procedures for Sustainable Forest Biomass Supply", which supports intensifying communication and cooperation among the most important research institutions dealing with the subject, through a joint work program, meetings, exchanges and conferences.

At present, the Action gathers Institutes from 26 COST member countries, as well as from Australia, Canada, Japan, New Zealand, Russia, South Africa and the USA.

During 2010 the Action organized two meetings where most of the Action participants joined to initiate and work on the ambitious Action objectives. In association with the second meeting in Trento, Italy, the Action also organized an international conference in which people from around the globe had the chance to learn more about the production and utilization of forest biomass for energy from Action participants.

The Action also provided the opportunity for 12 individuals to participate in an STSM in 2010 and included two RSTSMs with one going to South Africa and the other to Australia. More about these STSM's can be found on pages 8–14.

In June, the Action organized a Training School on "***System Analysis in Biomass Utilization"*** in Vienna with 30 young scientists from Europe and Australia participating.

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The first year of the Action was also marked by the establishment of an online portal that included the Action website with:

- An Online Wiki tool
- An expert database
- A company register
- A global database on harvesting guidelines
- An online database of publications and presentations called the Forest Energy Observer.
- The Forest Energy Blog
- A video platform
- A social networking site called Logger's camp
- The Journal of Forest Energy, a peer reviewed online journal

More information about all these Activities can be found in this 1st Newsletter of the Action. If you are interested to participate or join the Action please do not hesitate to contact us. We look forward to another successful year and to continue this exciting work.

Dominik Röser
Action Chair

Raffaele Spinelli
Vice Chair

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Getting to know each other –

1st Action workshop in Wildau, Germany 2010

By Mareike Schultze & Dominik Röser

The work in Cost Action FP0902 started at the first meeting of the entire Action in Wildau near Berlin, Germany from January 27th to 29th 2010. The meeting started with a field excursion where the COST action members had the possibility to get familiar with an entire supply chain for forest biomass, which is typical for North-Eastern Germany and which is based on cooperation between state forest institutions with small enterprises. The tour started with a visit to the Bioenergy Park in Güstrow where participants gained insights into the buying strategies and quality management of biomass consumers. The Bioenergy Park in Güstrow also operates a heating plant based on wood chips that is supplying heat for a Biogas installation. All the participants had the possibility to tour the heating plant as well as the receiving and handling station. The tour then continued into the deep forests of Eastern Germany where a chipping operation of dried harvest residues in mixed stands, using a JENZ drum chipper, was demonstrated. Representatives of all involved companies in the supply chain presented their part of the work process as well as the challenges and problems they face and key aspects of their businesses and answered questions regarding process management and information flows. Finally, strategies for wood fuel supply in areas with a high fraction of small scale private forests could be discussed with the head of the forest district.

The meeting then continued the next day with plenary session where all Action participants got to know each other better and the work plan for the coming 4 years was laid out. The remainder of the day was used for separate WG meetings in which the work in the different WG's was initiated.

Working Group 1

The purpose of WG 1 is to develop a common and official terminology for forest biomass for energy operations. During the first meeting, the working group identified the target groups of their work and decided to carry out a survey. The database of commonly used terms and the forest biomass glossary are intended primarily for researchers and scientists but also for political and other decision makers. Additionally it will likely be of use to foresters, other stakeholders and governmental as well as non-governmental organisations. The working group decided on the processes of forest biomass supply chains that will be covered by the glossary and the types of terminology which will be included. The glossary will be published in digital form and be available for download on the Action's webpage. Finally, the WG fixed a timetable for the entire project and a details working plan for 2010.

Working Group 2

The main objective of WG2 is to reach a common understanding of what researchers' measure, how they measure it and what devices they (should) use for measuring. WG2 will identify what can/should be improved in forest operations research and it will work on procedures which will help different researchers to achieve comparable results. The working group identified especially exigent topics such a output measurement (m^3 loose volume, odt, etc?), treatment and inclusion of delays, feedstock quality (bark, needles, leaves, etc.), portable weighing devices, determination of moisture content, storage studies and the effect of operators (ratings, error etc.?). Finally the working group fixed the tasks for 2010 and developed a detailed timetable.

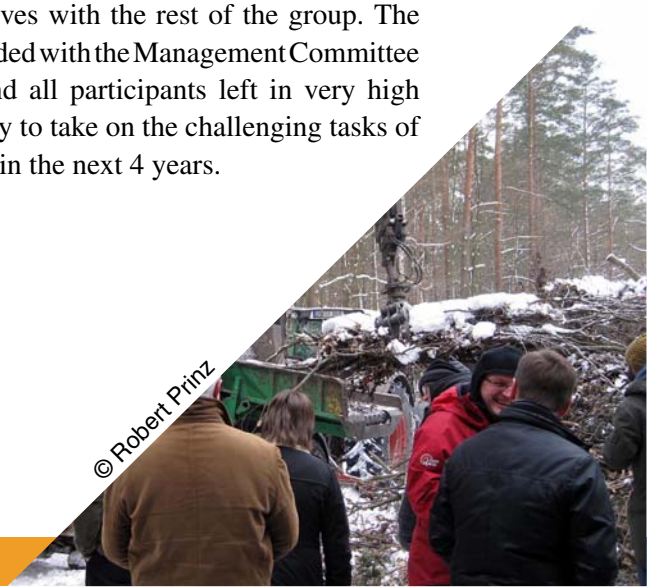
Working Group 3

WG 3 aims to develop a simple and common format for cost calculation (cost per hour) of forest machinery and to identify the most suitable methodologies in forest operations research. During the meeting, WG 3 developed a detailed working plan and time schedule. The group settled on using a questionnaire to be completed by expert researchers in order to get a synthesis of existing methods. The content of the questionnaire and the deadlines for the survey were fixed.

Working Group 4

WG 4 will investigate the state of the art regarding system analysis and modelling in forest operations as well as new approaches to design supply chains and their associated costs. During the meeting, WG 4 members discussed challenging topics regarding the biomass supply network and fuel flow, and identified problems of model implementation specific to forest operations research. The group developed a detailed working plan (incl. responsibilities) and fixed a timetable for its actions. Finally, the working group formulated questions for the national reports regarding, for instance, the scope of forest and biomass to energy systems modelling (e.g. regional or national level, the purposes and objectives of modelling, predicting costs, support investment decisions, etc.) or the variables and data sources.

The last day of the workshop was used for further plenary sessions in which each WG presented and discussed their work plan and objectives with the rest of the group. The meeting ended with the Management Committee meeting and all participants left in very high spirits ready to take on the challenging tasks of the Action in the next 4 years.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Continuing the good work –

2nd Action workshop in Trento, Italy 2010

By Raffaele Spinelli & Dominik Röser

The second workshop of the COST Action was organized in Trento, Italy from October 6th to 8th 2010, starting with a study tour. The study tour was organized on the first day with the purpose of showing COST action members the different steps of a typical forest biomass supply chain, under the conditions of the Alpine mountain. All sites were selected within the same valley, so that the local short-chain concept could be reinforced. Val di Fiemme was selected as an example, also due to the long experience with integrated forest planning and close-to-nature forest management. In this context, the tapping of forest biomass helps to fulfil the goals of sustainable multiple-use forestry. In current alpine practices, forest residues is accumulated in the cable-yarder landing as the result of the introduction of whole-tree extraction and mechanized processing, which offer the benefit of increased worker safety and facilitate a dramatic harvesting cost reduction. However, such work procedure determines the accumulation of logging residue at the landing, by the roadside. In turn, residue accumulation favors the development of noxious insects and detracts from the scenic quality of the sites, which thrive on tourism. Hence, conversion into forest fuel is a cost-effective method for disposing of the residues, while increasing the availability of renewable energy in areas with cold winters, where fuel is needed in large quantities. Consistent with this scheme, COST participants were taken to a cable yarding operation, a residue chipping operation and a district heating plant – all in the same Valley. Many of the participants had never seen a cable yarding operation, so that the visit was instrumental to a better mutual understanding during subsequent discussions about terminology, study methods and modelling, held within the WG meetings.

Working Group Meetings

WG meetings were held on the second day in San Michele all'Adige, and hosted by the Edmund Mach Foundation, the most important training and extension organization for Agriculture and Forestry in Trentino. The proceedings lasted the whole day, and important advances were achieved by all WGs.

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International Conference

On Friday October 8th, a large International Conference was held in Trento, with the title "Harvesting forest biomass: a global state of the art". The Conference lasted the whole day, with 8 general status presentations in the morning, and 7 specific technical presentations in the afternoon. All presentations were given by COST participants. Direct translation into Italian was offered by the Forest Service of the Autonomous Province of Trento. The Conference was free of charge and open to all interested people, from Italy and abroad. Overall, 342 participants were registered, including COST delegates. A small commercial exhibit of forest fuel technologies was organized by the side of the Conference, in the adjoining hall, so as to favour the cross-pollination between research and industry. The exhibit was offered for free to dealers and manufacturers of relevant forest fuel technology, so that there were over 20 stands in the hall. The basic attendance statistics showed that 25% of the participants were local, 45% came from the rest of Italy and 30% from abroad. In terms of professional background, 38% of the participants were researchers or professors, 20% forest managers and 15% industrial manufacturers (harvesting machines or industrial plants). The remainder were forestry consultants (12%), energy utilities (6%), public agencies (5%) and logging companies (5%). Overall 32 countries were represented, including several delegates from countries that had not joined the Action (e.g. Belarus, Bolivia, Croatia). The general feedback was very positive, all participants gathering much useful information and reinforcing their local and cross-country networks. There was substantial interdisciplinary exchange (silviculturists meeting with harvesting and industrial plant experts), and significant interaction was also obtained between researchers, managers and companies. The conference has clearly demonstrated the large interest in the ongoing activities of the COST Action and has also highlighted the positive impacts of such a network for local participants.

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Short term Scientific Missions 2010

Finnish forest thinning know-how to Canada – a STSM to support technology transfer (Finland – Canada)

By Johannes Windisch

There is common agreement that thinnings are necessary to achieve healthy and valuable stands. Thus, especially in intensively managed forests of the Scandinavian countries thinnings are an everyday practice. Today, Scandinavian forest equipment manufacturers offer a wide range of machinery and equipment for mechanized thinning operations. In the natural forests of Canada thinnings are not yet very common. Consequently, many stands are over-dense with limited growth due to severe within-stand competition. Therefore the urgent need for thinnings has been recognized in order to promote healthier stands in the future and to optimize timber production.

As a result of the Short Term Scientific Mission (STSM) grant from the COST Forest Energy Action, I was able to establish a trial together with FPInnovation from Canada in order to investigate the productivity and profitability of Finnish equipment for mechanized thinnings in the working environment of Atlantic Canada. In the study an accumulating felling head model Naarva Grip 1500-25E from the manufacturer Pentin Paja Oy was mounted on a Valtra farm tractor, equipped for forest operations, of a local entrepreneur.

The trial was conducted in Digby County, Nova Scotia. For the data collection, I spent 10 days there together with two Canadian colleagues. Before the study we jointly developed a study plan which was to be further refined by the experiences we gained during the study. One additional aim of the study was to develop a methodological framework which is to be used for these kind of studies also in the future.

The results of the study showed that the productivity of the machinery was rather low and thinnings cannot yet be conducted profitably if the thinning material is extracted as energywood and chipped.

Among others, the following main reasons were identified for the low productivity:

- The working pattern used by the machine operator needs improvement.
- Hydraulic hosing must be adopted meeting the requirements of the harvester head.
- High density of the stand made the maneuvering of the machinery difficult.

Thanks to the STSM grant I also got the possibility to spend one week in Montreal. There I met up with some colleagues form FPInnovations and also from the École Polytechnique to discuss possibilities for further collaboration and projects. Furthermore, I had the opportunity to travel to Québec City for meetings with researchers from the Université Laval and the Canadian Forest Service. In these meetings several potential fields for future collaborations were identified.

Investigation of the energy value of forest residue bundles (Italy – Ireland)

By Dr. Francesco Neri

This STSM, and its aims, are part of a project on wood for energy evaluation that involves the University College of Dublin, the Waterford Institute of Technology and Coillte (The Irish Forestry Board). The project has already collected the primary data on forest residue bundle weight and moisture content, and in order to correlate the energy bundle recovery per ha with the site analysis, as part of this STSM, the harvested and bundled sites were analysed again to evaluate the effective bundled area and to correlate the biomass recovery with stand and site conditions. The results could be useful for estimating the forest biomass production potential in the future.

I have also decided to conduct a STSM on biomass residues recovery in Ireland in order to analyse the whole production chain (from forests to the factories) and to make a comparison with the Italian situation.

In Italy in recent years the public and scientific debate about the reduction of CO_2 and polluting emissions has intensified and the importance of renewable energies and fuels has increased.

Scientific research on the economics of using wood and biomass to obtain electric and thermal energy has shown conflicting results. At present residues recovery is carried out in the following sites in Italy:

- North of Italy – softwood logging residue accumulated by processors at yarder landings;
- Clearcut of Pine plantations for forest health purposes;
- Clearcut and chipping of burned areas;
- Vegetation clearcut and chipping of rivers' banks;
- Clearcut of special plantations for energy (Short Rotation Forestry).

A bundling machine was contracted in Ireland from Scotland for a period of about 5 months, from November 2009 to March 2010. Fourteen sites were selected in the South of Ireland and a total amount of 18 661 bundles of 2.5 metres in length were produced (with a diameter of about 60 cm). It is important is to highlight the sites were unprepared for specific operation of residues recovery with a bundler machine.

The final delivery for the bundles was the Medite factory in Clonmel Co. Tipperary that used bundles as fuel. Medite is the leading European brand of MDF (Medium Density Fibreboard) products. During the STSM, surveys were carried out in 12 of the 14 sites chosen for bundling. A GPS was used to evaluate the real bundled area in comparison with the total harvested area from the Coillte Sale Proposal details. The first aim was to evaluate the real potential number of bundles per hectare and to understand how to increase productivity.

Bundling productivity was investigated on 12 sites and on average 228 bundles were produced per hectare. On some sites, due to the good site conditions and site preparation, productivity of 260 bundles per hectare was reached.

On about 35 % of the harvested area bundling was not possible because of:

- the steep terrain; the windblown area with a lots of stumps and roots over the ground, hindering the operation of bundling machine;
- the roughness and the presence of big stones on the ground;
- brash mat too light on the ground and too contaminated;
- branches and tops too spread out on the ground and driven on (problems of mud contaminations);
- harvested area is too small restricted ability of the bundling machine to reverse;
- very wet soil and problems of contaminations especially during forwarding operations; illegal dumping that hindered the machine to make bundles;
- mud contamination due to the forwarder that moved across the brash mat.

Residue bundling should be incorporated into either the harvesting and reforestation process, because a clean site can reduce the costs of reforestation and can also increase the quality of replanting both in terms of planting position, spacing and overall stocking.


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Forest biomass supply in Austria and its application in Bulgaria (Bulgaria – Austria)

By Dr. Sotir Gluschkov

The aim of the mission was to get acquainted with the forestry biomass supply in Austria, the present day situation, development trends, research topics and possible transfer of technologies and initiation of collaboration. Investigated topics during the mission were:

- biomass resources and availability,
- production technology, logistics and supply chains for forest biomass for energy,
- users of forest biomass and their associated utilization technologies,
- road construction,
- available literature sources.

As a conclusion of the STSM I would like to mention that the stagnation of energetic use of biomass in Bulgaria, in spite of government decisions and aggravating problems with Russian energy supplies. This is due to (1) lack of investments and financial incentives, (2) outdated or missing machinery along the whole supply chain of planting, thinning, harvesting, chipping/bundling/pressing into pellets, transporting and burning, and (3), last not least, the lack of information and experience. Nevertheless, both resources and demand exist. The annual increment of Bulgarian forest is 16 mill cubic metres, the last decade the yearly harvest varied between 4.2 to 6.1 mill cubic metres which unambiguously shows that about 10 million cubic metres stays in the forest. From this point of view the STSM will contribute to the development of this process in our country.

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Technology transfer of poplar cultivation from Italy to Latvia (Latvia – Italy)

By Dr. Kaspars Liepins and Martins Zeps

Two researchers from the Latvian State Forest Research Institute "Silava", participated in a STSM aiming to inspect the methods and technologies used for the cultivation of poplars in Italy and evaluate the possibilities for transfer of technologies to Latvia.

Currently in Latvia the research regarding fast growing tree species is focused on hybrid aspen, silver birch and willows. The main advantages of poplars in comparison to hybrid aspen are their cheaper establishment (stem cuttings vs. in vitro propagated seedlings) and possibilities of mechanized harvesting of coppice – hybrid aspen mainly re-sprouting from root suckers making coppice impossible to harvest with forage harvesters. Silver birch is a fast growing tree species; however, birch is a very light demanding species and cannot be cultivated at close spacing that is prerequisite for productive wood energy plantations. Currently the willows in our country are considered to be the most favorable species for energy plantations. However, poplars are considered to be even more productive than willows. From the viewpoint of the customers the wood chips from plantations of willows are less desirable in comparison to other products due to high proportion of bark.

The industrial cultivation of poplars in Latvia has not occurred before and therefore can be associated with some risks. Latvia is located behind the northern border of the natural distribution area of native European poplar species. This indicates that the transfer of reproductive material to our country can be

associated with problems related to adaptation of species to a different climate. However, evidence can be found that successful growing of poplars is possible even in more severe conditions.

The visit to Italy included field trips and demonstration of technologies used for harvesting of poplars. Several plantations of poplars were visited in Northern Italy to discover the practice of management of plantations at every stage from establishment to harvesting. During the visit negotiations were arranged with representatives of Agricultural Research Council (CRA) and Biopoplar about the testing of poplars' clonal material in Latvia. Subsequently an agreement was made about delivery of planting stock from Italy to Latvia next spring for the establishment of experimental trials.

Developing a calculation procedure for forest biomass supply chains (Germany – South Africa)

By Paul Fiedler

The host institution of my Short Term Scientific Mission (STSM) was the University of Stellenbosch, Department for Forestry and Wood Science under the direction of Prof. Pierre Ackerman. During my STSM we examined the implementation of mainly Excel calculation tools for the optimization of woody biomass transportation into ArcGIS. Beside the design and development of an ArcGIS based tool for the comparison of intermodal transport costs in various regions, we were able to examine a lot of common work and research fields.

From my point of view the STSM within the framework of the Cost Action Forest Energy was a great success. My personal benefits from the STSM were on the one hand the close exchange with researchers working on a similar subject with different research approaches. On the other hand the STSM gave me the opportunity to work very intensively for 1 months on my study to gain a lot of results in a short period.

I am greatly convinced that beside my personal benefit the carried out work will help the host institute in further research projects as well as adding significant value for the Cost Action Forest Energy itself.

Sieving and quality analysis of forest chips (Spain – Italy)

By Laura Ivorra

The chance to participate in a Short Term Scientific Mission (STSM) in the COST Action "forest energy" was a great opportunity to improve my knowledge and broaden my experience of biomass harvesting. In my STSM I had carried out two different studies, which were related to the forest biomass supply. These studies are as follows:

Calculation of the productivity of a wood chip sieve and chips quality analysis: The aim of this study was to determine the productivity and effectiveness of the sieve using three different types of chips. In order to define the effectiveness of the sieve, the study compared the quality of input and output chips using a granulometric analysis.

Study of the logistic of the chips transport and chips analysis: The objective of this research was to study the logistics of chips, specifically chips transportation in the Italian Apennines. This study aims to identify their weaknesses and strengths, in order to propose improvements and reduce the cost of chip logistic chain.

Furthermore, the STSM allowed me to have the possibility to work in such a specialized biomass center as the Istituto per la Valorizzazione del Legno e delle Specie Arboree (IVALSA). The collaboration with IVALSA gave me a great opportunity to know first hand how their daily activities are developed, as well as giving me the chance to become familiarised with their wood chipping innovative processes. On the other hand, the multiple similarities between Italy and Spain will bring the possibility of applying the knowledge gained in Italy to my home country.


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Energy Pellets for a better future (Germany – Finland)

By Augusto Uasuf

The main purposes of my STSM at the University of Eastern Finland and METLA was mainly to foster collaboration aiming to gain deeper knowledge of forest energy operations in Finland and possibilities for know-how transfer. I was introduced to the research areas and topics carried out at both institutions. Within these two institutions, I had the opportunity to update myself with the "State of the Art" bioenergy supply chains in Finland. This was accomplished with extensive literature surveys, extensive discussion with colleagues at the University of Eastern Finland and METLA and technical visits to a CHP plant and a wood pellets research facility. In the CHP plant different issues related to raw material quality and availability were discussed. In the wood pellets research facility, situated in Ilomantsi, I was introduced to the working methods and the kind of experiments that are ongoing at the test facility. As a consequence of mutual cooperation interests, a technical report aiming to compare production costs and environmental performance, in terms of energy consumption and GHG emissions, of industrial and torrefied wood pellets to be co-fired with mineral coal in coal power plants in southern Finland, will be developed. Finally, I would like to say that this STSM helped me to better understand the whole process of biomass energy supply chain. In addition, it opens new possibilities for future cooperation in this research subject.

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The "bundler" in Australia to process harvesting residues from Eucalyptus plantations (FYR of Macedonia – Australia)

By Valtko Andonovski

The objectives of my STSM were to do a formal assessment of the productivity, costs and effectiveness of the slash bundler in Australian plantation conditions as an effective technology for collecting forest biomass residue.

The study assessed the economic viability of harvest residue collection using the Pinox Slash Bundler, evaluation of the productivity and cost of bundling operations, assessment of collected and left slash in the operation site and cost of site preparation in clear felled area. For the Australian forest industry this was the first study completed in Australia using a slash bundling machine that produces CRL originating from Australian tree species.

Simulation in forest energy procurement for Dummies (Germany – Finland)

By Dr. Martin Döllerer

During the STSM mission, the Finnish approach to design and implement forest energy simulation systems was investigated. Furthermore, the Finnish and German base systems WITNESS (Metla) and AutoMod (TUM) to simulate forest operations were tested and compared. This process lead to the realization that there is a great harmonization potential and as a result a joint best practice guide for building simulation models in the forest energy supply chain has been initiated and will be published soon as an output of WG 4 of the COST Action. This STSM was a great example of what can be achieved by simply exchanging and combining knowledge among different researchers and institutes to create a unique practical product such as the "Discrete Event Simulation Modeling Guidelines – Forest Biomass Supply Chains" that can be applied by many researchers in the future.

Experience and Know-How Transfer of the use of forest biomass for energy from Germany to Bulgaria (Bulgaria – Germany)

By Dr. Ivailo Markoff

Bulgaria is one of the countries in South-East Europe with significant forest resources and thus forests are an important factor for the regional economic development. Because of its high biodiversity logging in Bulgaria is connected with serious ecological problems.

The use of energy biomass in Bulgaria is still at its beginnings. Fuel wood is very common for heating, however, there is little transformation into energy chips or pellets and use of sophisticated machinery and aggregates. Forest harvest waste is unusable with present day logging technology. Nevertheless, the use of biomass is considered a priority of the national energy policy. Thus, the know-how and experience transfer from more experienced countries to Bulgaria is essential.

Thuringia in Germany was chosen as a suitable place to learn more about the use of forest biomass for energy in Germany for this STSM because of the predominantly mountainous terrains, knowledge of problems of transition countries, conceptual proximity of Bulgarian and German forestry, traditional professional and commercial contacts and a good knowledge about the of use of biomass for energy.

The STSM comprised of an intensive program including various site visits to see forest energy procurement operations and heating plants, meetings with German professionals and the attending workshops.

A very practical outcome of the STSM has been the contribution to the development of knowledge in regards to the estimation of forest biomass availability and furthermore technical and economical constraints have been formulated that can be used to improve its quantification of the wood biomass available for energy use in Bulgaria based on harvest technology considerations.

How much wood can a wood chipper chip? (Italy – Sweden)

By Dr. Carla Nati

The STSM that took place in Sweden from 23 to 30 October 2010 concerned a study on the productivity and fuel consumption of two chippers both driven by a tractor, a drum chipper and a disc chipper, fed with different raw materials: felling residues and thinning in the first case, felling residues and pulpwood in the second. The first trial was carried out in South-west of Sweden, at Skultorp (N58 20.268 E13 51.267), approximately 10 km from Skovde, while the second site was between Mariestad (N58 35.873 E13 42.658) and Götene.

Time studies have been carried out at a cycle level to measure the productivity of the two chippers dealing with different raw material. Time recording was done with an Allegro hand-held computer equipped with Skogforsks SDI software regarding the main functional phases of the work cycle. Since the chippers threw the wood chips directly into containers, each of them was measured on a certified weighbridge. Each container was labelled with a number on a side, in order to match its weight to the chipping time. Samples were collected from each container, put in plastic bags, tagged and sealed, in order to avoid losses of moisture during the transfer to the lab. For each of the containers filled with chips, fuel consumption measurements were taken, by means of a hose

equipped with a nozzle to refuel the chipper tank, connected to a little pump activated by the battery of one of the cars. The pump was equipped with a fuel reader, which allowed the measurement of how many centiliters were consumed each time.

Moreover, wood chip quality was assessed in terms of moisture content by drying in 105ºC until samples did not lose further weight (i.e. according to SS-EN 14774-2) and size distribution, by sieving the wood chips according to the SIS-CEN/TS 15149-1 standard.

The STSM experience allowed me to deepen my professional knowledge on wood chip quality – related to blade sharpness and to assess if the fuel consumption of chipping may change according to the raw material. Moreover, the STSM gave me the chance to collaborate with one of the most prestigious European institutions in the Forestry sector. I hope that in the future our two institutions will continue to work together.

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All STSM reports will be available on the Forest Energy Observer at: observer.forestenergy.org

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System Analysis in Biomass Utilization –

The 1st Action Training School

By Johannes Windisch & Karl Stampfer

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In the beginning of June 2010 the COST Action conducted the first Cost Training School. The Training School was hosted by the Institute of Forest Engineering of the University of Natural Resources and Applied Life Sciences (BoKu) in Vienna Austria. Under the topic System Analysis in Biomass Utilization 30 students took part in a number of lectures, excursions, and seminars given by international experts in the field of forest technology.

During the first two days Prof. Karl Stampfer from BoKu and Prof. Hans Heinimann from the Swiss Federal Institute of Technology gave an introduction to the analysis of supply networks. After developing their understanding of the fundamentals of the supply chain during its life cycle, the students subsequently had to identify the decisive processes and develop an input-output model. The final part of the exercise was the investigation of the sensitivity of process parameters and the identification of possibilities for improving the supply chain.

The second part of the Training School focused on the art of work studies. During the exercises and lectures given by Dr. Raffaele Spinelli, Head of Department of IVALSA CNR in Sesto Fiorentino, Italy, Assoc. Prof. Rien Visser from the University of Canterbury, New Zealand, and Prof. Jörn Erler from the Technical University Dresden, Germany, the students developed their own study designs and data collection concepts which they applied in a practical exercise timing a wood chipper. Based on the collected data productivity models were developed and verified using the statistical open source software R.

On the final day of the training school Prof. Antti Asikainen from the Finnish Forest Research Institute in Joensuu, Finland gave an introduction to the application of discrete-event simulation on wood procurement systems using the software Witness®. In a guided exercise the students developed a discrete-event simulation model of a roundwood procurement chain. By means of the model the effects of different parameters on the procurement costs were investigated.

As top experts in the field of forest technology related research were invited as lecturers the students had the chance to learn about state of the art research methodologies which was certainly of great value to each of the students. Despite the tight schedule, long days, and demanding exercises the organisers of the Training School managed to create a very pleasant and relaxed atmosphere, which the typical Austrian wine taverns and rich food also contributed considerably.

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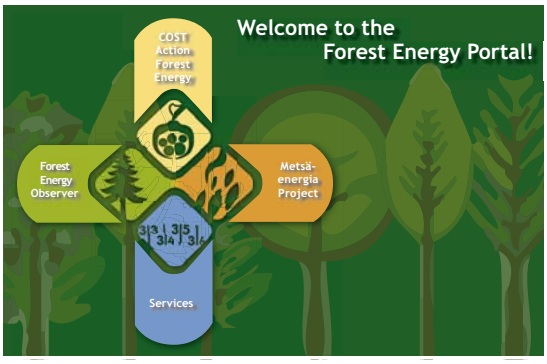
The Action on the web

The "Forest Energy Portal"

The "**Forest Energy Portal**" is a platform that interlinks the scientific and industrial communities and is designed to significantly improve information flows among the different disciplines and stakeholders regarding the sustainable use of forest biomass for energy.. Visit us at: forestenergy.org



The Forest Energy Observer

The "Forest Energy Observer" is a new and innovative publication tool to disseminate up-to-date research results about the production and utilization of forest biomass for energy. The "Forest Energy Observer" will provide a publication platform for study reports, infocards, presentations and peer reviewed articles and make them available under one roof for everybody.

The 5 categories of publications available in the "Forest Energy Observer" are:

Study Reports:
Study reports include the publication of original and initial research results, Short Term Scientific Mission results, excursion reports.

Infocards:
Inforcards are 2 page reports about interesting case studies or summaries regarding the utilization of forest biomass for energy

Technical Notes
Technical notes offer a platform to publish up-to-date information about new technical developments, innovations and new study methods regarding the utilization of forest biomass for energy. Technical notes can have a maximum of 4 pages.

Presentations
In this category presentations dealing with the use of forest biomass are published.

Journal of Forest Energy
In this section peer-reviewed scientific papers from the Journal of Forest Energy are published

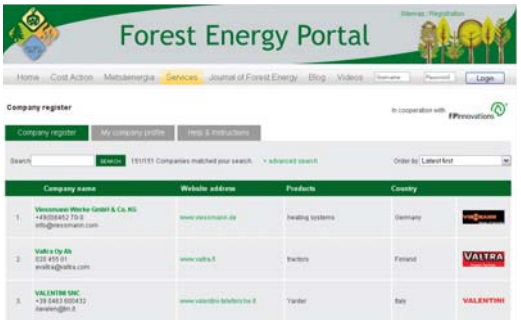
Furthermore, the "Forest Energy Observer" also offers the possibility to publish reports, Infocards, Technical Notes and Presentations from other organizations and projects. Submit your own report to the Observer at: observer.forestenergy.org

Wiki tool

The online wiki tool of WG1 is an innovative way to produce, maintain and publish the term and unit glossary for since it allows easy and real time access and offers a discussion platform for all Action participants from around the globe. This tool will be available for the public during the course of 2011. Visit the wiki tool at: wiki.forestenergy.org

Company Register

The company register is another form of innovative knowledge building and sharing. The company register provides a link between the research community and all other relevant industrial partners. Look for companies active in the field for forest biomass for energy at: register.forestenergy.org



Journal of Forest Energy

The creation of the Journal of Forest Energy Energy provides a rapid peer review process, at the same time drawing upon expert reviewers and offers a publication platform for all issues related to the sustainable use of forest biomass for energy. Don't hesitate to submit your next scientific paper to this new journal! You find the journal at: journal.forestenergy.org

Forest Energy Video Channel

Come and see Forest Energy harvesting in Action on our own YouTube video Channel at: www.youtube.com/user/ForestEnergyPortal

Forest Energy Blog

Follow the latest publication of research results, share your opinion, publish interesting news and discuss about the sustainable use of forest biomass for energy that the Forest Energy Blog! You can find the blog at: blog.forestenergy.org

Logger's Camp

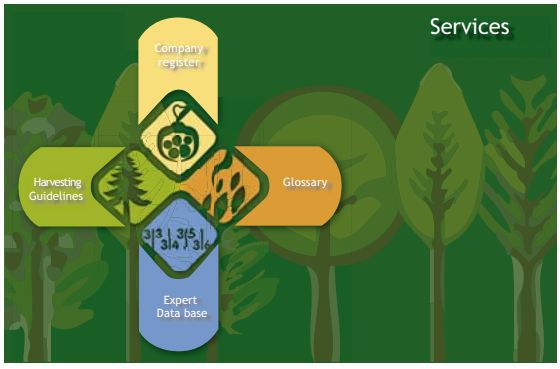
The logger's camp is the social networking platform for all interested professionals dealing with the sustainable use of forest biomass for energy. We move the discussion from the forest to the web! Join today and meet new colleagues, share your research results, ask your colleagues for advice or share your photos or videos. We are waiting for you at camp.forestenergy.org

Expert database

The expert database is a service of the Forest Energy Portal and aims to establish a comprehensive database of professionals working in the field of forest biomass for energy. Join the expert database today and build a global network of professionals in the field of forest biomass for energy and you might be contacted for a new project application tomorrow!

Other webservices

The forest energy portal also provides a range of other services such as a summary of available Forest Biomass Harvesting Guidelines or links to other interesting websites such as the Pellet Toolbox or the results of the BEE project. Let us know if you have something to share on the portal and we make sure it reaches the right people.



Visit our website at: forestenergy.org

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