

NEWSLETTER of ENERGY FORESTS PROJECT

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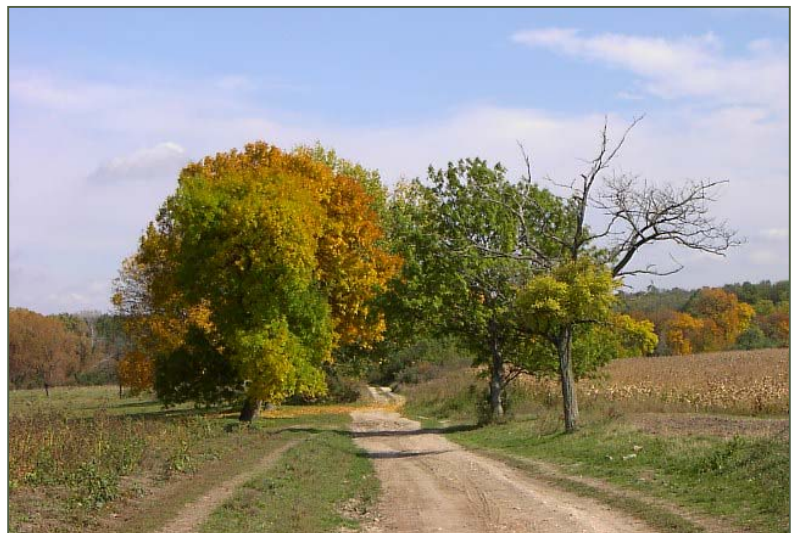
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Dear Readers,

Our main goal is to classify energy plants and low quality agricultural land to help farmers, and decision-makers to choose the best types of biomass and planting sites for growing energy crops.

We shall analyse the socio-economic implications and environmental effects of biomass planting and design a new computerised database to support decision-makers.

Since advocating biomass planting and renewable energy related research is one of our main priorities, the consortium operates a website, organises meetings, and publishes a newsletter.



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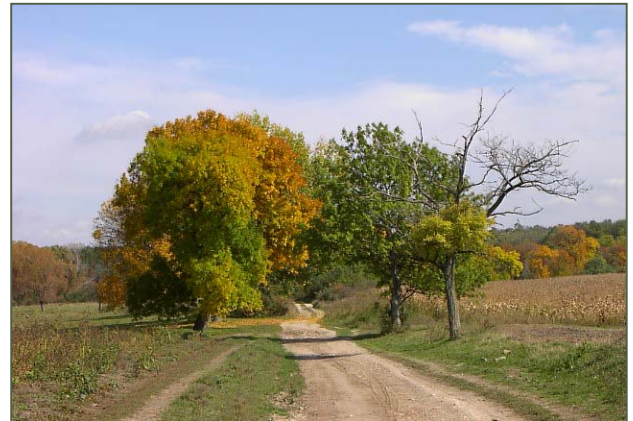
BIOMASS: RECLAIMING OUR OLDEST ENERGY SOURCE by GEOMONTAN

Mr. János HORVÁTH

CONTACT DETAILS

www.energyforest.com

Please find the contact details and survey the full project documentation including our most recently published newsletters and working papers by visiting the projects' main Website.



OBJECTIVES

Our main goal is to classify energy plants and low quality agricultural land to help farmers, and decision-makers to choose the best types of biomass and planting sites for growing energy crops.

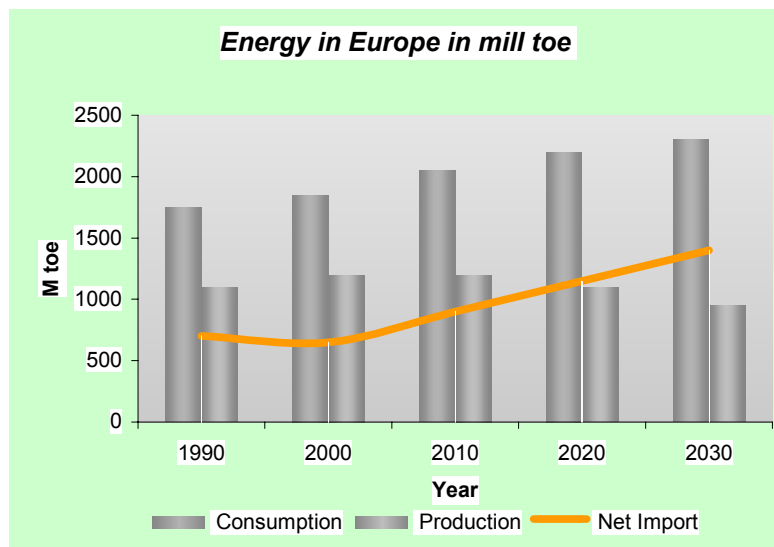
We shall analyse the socio-economic implications and environmental effects of biomass planting and design a new computerised database to support decision-makers.

Since advocating biomass planting and renewable energy related research is one of our main priorities, the consortium operates a website, organises meetings, and publishes a newsletter.

The lessons learned will be summed up in a comprehensive final report entitled 'Energy Forests for Re-cultivation', which will be available in hard-copy format.

PROBLEMS ADDRESSED

Increasing reliance on renewable energy is an important priority of the European Union, since it can reduce the dependence on import and prevent future imbalances in the energy market.



« If no action is taken in the next 20 to 30 years, the environmental impact of energy will be untenable and our external energy dependence will rise to a level of 70 % on average, going up to 90 % in the case of oil products. This situation makes us vulnerable... »

« ...Only the potential of renewable energy sources has not been exploited as much as it could be because of their high production cost. If we remedy that problem, renewables could be the only source for the future in the Union.»

(Excerpts from 'Energy: Let us overcome our dependence', a research report published by the European Commission, in 2002.)

What is more, increasing productivity in the agricultural sector and unfavourable market conditions such as overproduction constrain land use and acreage dedicated to plant cultivation.

This decline in traditional agricultural activities creates a surplus of land and labour and has repercussions on our rural communities.

We would like to promote a more rational use of low quality agricultural land and present energy forest planting as a viable alternative to unprofitable agricultural activities. We intend to offer would-be entrepreneurs guidance and help them cope with major investment risks.

BARRIERS TO OVERCOME

Nonetheless energy production from biomass is not always a popular proposition. We often encounter obstacles such as weak infrastructure, steep production costs, lack of history and public support, or just pure and plain conservatism.

Although biomass planting has a far greater potential in Hungary than other types of alternative energy sources, it is often completely ignored by policy makers and professional organisations. To help overcome these barriers we would like to inform stakeholders of the potential benefits of biomass planting and the verdict of our experts.

PROJECT STRUCTURE

The consortium carrying out this project consists of five members from four different countries, two research and educational institutions and three SMEs. The project is fully funded and was made possible by a grant from the budget of the European Union's 5th Framework Programme. The 18 month long collaboration officially started in December 2002, and the first preparatory stage has been completed by May 2003.

Execution is divided into six blocks, so called 'work packages' each of which is either focused on a specific field of research or related to project management. Each work package has a strict deadline and an organisation which will be responsible for its execution.

Work package 1 and 2 are dedicated to project management and dissemination. Scientific work will start in [work package 3](#) (Land classification) with the characterisation of potential planting sites. [Work package 4](#) (Energy forest plantation) deals with the optimal selection of biomass types. [Work package 5](#) (socio-economic outcomes) will discuss the effects of biomass planting. Since [work package 6](#) (The recultivation of open cut mining sites) is very important in some parts it will stretch over almost the entire duration of the project.



EXPECTED IMPACT AND EXPLOITATION

We hope that biomass planting will gain more acceptance and popularity, and the risks and start-up costs involved could be reduced significantly.

Our research will help stakeholders to consider planting energy crops a real alternative by supplying them with hard data. By influencing the public opinion we will certainly contribute to a better climate for future initiatives.

PROGRESS TO DATE

The project was launched in December 2002 and four and a half months later we can report progress on two fronts.

At our start-up meeting we agreed to focus on three reference areas, one in Poland, Hungary and the Czech Republic. We have reviewed so far the Hungarian literature with a special emphasis on little known pioneering experiments carried out by timber companies and forestry engineers in the past, and in the case of Poland we have characterised the most common biomass types.

As regards to software development we have defined the bare bones of the proposed database and the corresponding land classification methodology. Our earliest results will be made public in our first newsletter coming out in mid-May.

THE DECISION PROBLEM by CRES

Dr. Charalambos MALAMATENIOS

Mr. Vasilis KILIAS

A regional authority wants to evaluate the harvesting of agricultural and/or forest biomass for energy production using combustion plants in a small-medium territory (less than 1500 Km²), mainly characterized by mountainous territory covered by spontaneous vegetation. The motivation of this decision is to join advantages given by an autonomous energy production, and environmental and social advantages, such as an improvement of the territory control that should be related to a reduction of forest fire risk, a reduction of CO₂ emission for energy production and an improvement of social and work activities in rural areas.

Biomasses are present in the territory in different locations. In this work, $i=1,\dots,N$ parcels of different areas have been considered, each of them being characterized by various predominant biomass typologies ($j=1,\dots,M$). These parcels have also different characteristics, that are, for example, different slope variability and human accessibility. In this territory, $k=1,\dots,K$ locations for plants for energy conversion from biomasses have been identified. These plants may produce both electric and thermal energy.

The main objective of this work is to define a decision support system able to:

- verify that the chosen locations for plants are convenient;
- size the various plants and determine the quantity of thermal and electric energy to produce;
- find the optimal biomass flows to plants and the parcels to be exploited for energy production.

The objective function

The objective function takes into account all costs and benefits in the system. Specifically, collection, transportation, harvesting and plant costs are considered, together with benefits from the selling of thermal and electric energy. The objective function to be minimized is composed by the following five terms:

- **G**: benefits deriving from the selling of energy produced
- **C_p**: plant costs related to installation and maintenance of plants
- **C_T**: transportation costs
- **C_C**: the biomass harvesting costs
- **C_D**: costs due to the distribution of energy

The **overall cost function** to be minimized is given by:

$$C = -G + C_p + C_T + C_C + C_D$$

The formalization of the overall problem can be obtained by introducing a valid **set of constraints**, which have to be taken into account in the minimization of the overall cost function.

Problem structure and software implementation

The overall problem defined in the previous subsections turns out to be a nonlinear mixed problem (i.e., characterized by the presence of continuous and binary variables). A system allowing experts to plan the biomass exploitation in a region according to the previous optimization model has been implemented. To support the decision, the EDSS is based on three modules:

- the GIS based interface for the characterization of the problem and for the computation of the relevant parameters;
- the database;
- the optimization module.

To define the problem from a geographical point of view, the experts can view the territory by a GIS oriented interface. The territory is divided in parcels, each of them being characterized by various kinds of biomass.

BIOMASS CONFERENCE by GEOMONTAN Mr. János HORVÁTH

The Hungarian Biomass Association held its 6th Biomass Conference between March 6 and 8, 2003 in Sopron co-hosted by the Faculty of Energetics of the University of West Hungary (Sopron) and the Environmental Management and Ecoenergetics Consortium (Almásfüzitő).

János Horváth managing director of Go-Montan Ltd. co-ordinator of the Energy Forest project, and dr. Gábor Solti, management expert of the project attended the conference.

On the first day of the conference lectures were delivered on

- future of utilisation of renewable energy sources,
- prospects of energy production and consumption in agriculture,
- energy crops and their utilisation,
- cultivation and utilisation of energy grass,
- production and utilisation of biogas,
- perspectives of biofuels,
- planning and financing of energetic exploitation of biomass,
- main environmental impacts of biomass heating.

As regards our Energy Forest project the lecture delivered by professor Béla Marosvölgyi of the Faculty of Energetics at the University of West Hungary on the possibilities, limits and tasks of energetic utilisation of wood, as well as the one delivered by L. Pintér and J. Tóth on the production of electric power based on wood at the Borsodi Energetics Ltd. operating the Borsodi Power Plant, - were especially useful. The latter was about converting certain blocks of an existing Hungarian coal-based power plant deemed to be shut down to wood-heating. This conversion procedure would be in partial fulfilment of the existing European requirement according to which 4% of the current Hungarian power supply should come from renewable energy resources.

Although there is a potential for increasing utilisation of alternative energy, both lecturers and speakers emphasised the lack of legal framework for planting and exploiting energy forests. Good intentions, will and technical background are all in vain, if there are either no appropriate laws permitting the cultivation of plants, arable land and forestry, or such laws are ambivalent.

Following the lectures participants introduced their companies. When Mr. János Horváth took over he introduced briefly our Energy Forest project. His presentation was followed by a lively discussion.

On the second day of the conference, the group consisting of nearly 50 participants visited "Energie spar", a showcase of energetics and environmental technologies held in Wels, Austria, with the guidance of dr. Jenő Kovács, president of the Hungarian Biomass Association. Inside the 25 lobbies of the expo-ground visitors could find and study a wide assortment of energy-saving building construction technologies, solar energy and wind power equipment, and a selection of boilers developed for wood pellet fuel.

The visit to the fair provided a good opportunity for exchanging ideas, informal conversations and bringing the participants together.

Consultations took place on the third day of the conference.

The conference was a very important event for our germinating biomass sector and helped us understand better the tasks lying ahead in connection with the accession to the European Union.

In the European Union planned tasks of forest management – taking into account the principle of subsidiarity – was defined in Helsinki at the Conference of Ministers in 1993. There is an article in that treaty fostering research of energetic and industrial utilisation of wood.

NEWS RELATED TO THE CHOMUTOV DISTRICT by VZGLS

Mrs. Ing. Vlasta PETRIKOVA, DrSC

Mr. Petr KORAN, MSc.

The main goal of the project is to assess the potential volume of biomass production especial in the areas where the economic agricultural production are bad conditions. Due to the forced agricultural policy in EU aimed to the reduction of food production it is necessary to include the Central Europe to this programme too. In the Czech Republic, there is nearly 1,000.000 ha of agricultural land, which is not necessary for the food production. These areas can be utilised for energy production as fyto-fuel for heating of buildings.

Czech role in the project is focused especially on the area of North Bohemia. In this area, there are many industrial activities, coal mining and electricity production amongst others. Artificial agriculture land situated on brown coal mine dumps and the power plant ash depositories is a side product of coal mining. The energetic crops can be cultivated both on the agricultural and anthropologic soils. The intensive vegetation on the recultivated areas is important for the direct reduction of CO₂ in atmosphere too. The vegetation can draw on the green-house gases from the air, while the areas without vegetation are dangerous for environment from this point of view.

The first work was focused on the characterization of the selected area of Chomutov district. General conditions (location, morphology, geology, climate, environment, land use, settlements and history, transport, economy, agriculture, social sphere) were described as the base line of the pilot study in Reference Area Review report. Informational leaflets in English and Czech languages have been released too.

Expert team of VZGLS prepares detailed materials, for example the soil maps, the hydro-meteorological and land use data etc. Detailed evaluation study of possibilities for growing up the energetic crops considering its vegetation demands in the focus area will be produced using the acquired information and using outputs from research activities of Dr.Vlasta Petrikova (VZGLS) and some other external parties.

Energetical herbs are probably the best solution for the artificial areas considering specific conditions in North Bohemia. The soils for the herbal crops don't have to be changed into the forest soils. That is why it is more economical for energy production than the energy forest in usual way of understanding (energetical trees). Of course, comparison of the energy forests (trees) will be included in the study too. Potentially suitable crop - Rumex OK 2 is one of the herbal energy crops, which are supported in frame of the program "Set Aside Soils" by the Czech Ministry of Agriculture. The list of energy crops exists in frame of this programme.

Within the study, the potential biomass production will be evaluated. We will determine the best vegetate conditions in according with the individual crops requirements. The possibility of energy forests will be compared with the herbal crops to demonstrate the optimal combination between the herbal crops and trees. The results of this work will be the summarization of energy biomass in this area. Generally, the total energetic biomass in whole Czech Republic will be assessed too.

As the popularisation of this project, the propagation leaflets are distributed to the public. The special conference in the North Bohemia Region will takes place in autumn.

SUMMARY OF THE FIRST WP4 REPORT by GIG

Mr. Krzysztof Stańczyk

Mrs. Magdalena Ludwik

In the first report we characterised energetic plants suitable for Middle- East Europe countries climate like: shrubby willow, gigantic miscanthus, Pennsylvanian mallow and poplar.

The energetic value and costs of heat production for different fuels in comparison with energetic plants were presented.

The main principles of energetic plants cultivation was described and the prospects of energetic plantation in the world in 2020-2030.

More attention was paid to the description of ground utilisation and the types of soils in Poland. The soils have been classified according the soil valuation class to show the potential of energetic plants cultivation. According such classification the area of soils and grounds in Poland was presented. Also the total area of the country was presented divided into agricultural uses, forests grounds, demoted and devastated grounds according 16 provinces in Poland. The soil valuation for all provinces was also presented.

After the conclusion that the most suitable terrains to energetic plants' tillage are the areas of industrial activity concentration as well as demoted terrains to reclamation like the piles and waste dumps, which are available at Silesian province, in the next part of the report we concentrated on characterisation of Silesian province grounds.

The area of Silesian province agricultural lands and forest divided into administrative districts was shown. Also area utilisation in Silesia province and some data of agricultural production in Silesia province was presented.

In the next part of the report the already existing energetic plants' tillage in Poland and the perspective of their development was discussed. Analysis of the composition of energetic willow tillage costs was presented. Also the profit from agricultural crops to compare with the profit of energy plants' plantation was presented and discussed.

Next the ecological profit of future energetic plants' plantations in Silesia province was demonstrated.

Finally, the plans of further work in the nearest future were presented.

ASSESSMENT OF THE FREE AVAILABLE DIGITAL DATA SUITABLE FOR ENERGY FOREST PROJECT by GEONARDO

Ms. Zsuzsa Décse

Mr. László Ádám

To realize the theoretical decision support model to be constructed in the project, we need many input data, because without these data, the model won't be representative.

The budget of the project doesn't afford the buying of the expensive datasets, so the using of the freely available data is a very good opportunity. In our assessment we have explored the world wide web for freely accessible spatial data, that can be download from internet.

Our work concentrated on the different satellite images and some maps. The satellite images and the aerial photos are the most suitable input data for the land use map. The topographic maps

help us to pre-process the images. The existing land use and soil maps are directly applicable in the GIS.

In this assessment we use different search engines, the expressions looked for were forestry, GIS, free data, satellite image. Furthermore we have checked the most known public website which can contain data and scientific results, for instance FAO, EEA, ESDI.

Beside the data collection, we attempt to gather all of the links to other international projects that even not containing downloadable data, but they are connected to forests' survey by remote sensing and development of decision-supporting systems. Nevertheless we didn't disregard the commercial datasets when we have found these on the website, so the datasets of this kind are mentioned as well in our assessment.

We have described 11 opportunities as free data source, among them the European Environmental Agency, the GeoCommunity, the European Forestry Institute and the Earth Science Data Interface seemed the most useable from the point of view of the project.

The assessment is available on the project website among the results.

DUMP SITES FROM MINING AS NATURAL RESOURCES AND RECULTIVATION RELATED RESEARCH IN HUNGARY by GEOMONTAN Mr. János HORVÁTH

According to the Hungarian Geological Service there were 1217 dump sites from mining activities in Hungary, totalling up to 485 732 m³ of waste material in January 1 1991, but during the past decade no new data have been gathered. It has become necessary to carry out a new survey, not only because nature has reclaimed part of these sites since then, but because research laid the foundation for better site recultivation and new applications in construction building, civil engineering, agriculture, and forestry - including energy forest planting.

In 1984, a conference was held on the prospects of dump site recultivation and their possible exploitation. Lectures were delivered mainly on experiments dealing with the agricultural exploitation of dump sites resulting from coal mining. In Hungary two types of mine recultivation had become the most popular depending on whether they employ humic soil covering or whether they try to create the conditions for soil formation and natural evolutionary processes to take place on the crude surface.

Years of experience proved the efficiency of the latter technique on a 200 hectare orchard and vineyard.

One of the most interesting lecture with regard to the Energy Forest project was the one which presented the lessons learned from a tree planting experiment on the dump sites of the Ostrava-Karvina coal mines. The results of the experiment showed that those trees are the best for planting, which grow naturally around the area. (This may also be true elsewhere.)

Planting was done without mixing in humic topsoil, but with employing 5 kg and 10 kg topsoil respectively. The following tree species were planted: *Fraxinus excelsior*, *Quercus robur*, *S. petraea*, *Acer pseudoplatanus*, *A. platanoides*, and *Ulmus glabra*. Other species were also planted to provide soil covering and protection: *Betula verrucosa*, *Prunus serotina*, *P. padus*, *P. avium*, *Crategeus monogyna*, *Rosa rugosa*, *Tillasp*.

According to these findings, cuttings can already been planted three years after the dump site was set up, because due to climatic conditions the material of the top layers disintegrates quickly. In case of planting in holes, mixing in soil from layers of high humic content is not absolutely necessary, yet adding a dose of 5 kg humic soil will improve the sprouting rate and first year plant development.

The three or four year old breeding stock from tree farms is the best for planting, or the two year old of oak and alder. Saplings must possess well developed rooting systems and can not be taller than 75cms.

The advantage of planting energy forests on dump sites is, that high quality agricultural land does not have to be set aside for tree planting.