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RENEWABLE ENERGY SOURCES IN AGRICULTURE AND RURAL AREAS - TRANS-BORDER CO-OPERATION OF YOUNG RESEARCHERS

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SUMMARY

The EU and World community expect from our region to follow up agreement on replacement of fossil fuels with renewables. The sources of renewables are mostly placed in rural areas. These areas have many disadvantages in the period of transition, especially in poor and less developed countries. According to the abovementioned, the following problem has been identified: how to introduce wider use of renewables and simultaneously support development of rural areas?
The society is interested in both issues, but it is also faced with limited funds, and all appropriate usage of renewables and environmentally sound techniques with fair user's comfort are expensive and need to be subsidized. In that regard, the most appropriate available practice should be defined, but correct decision-making based on right information on potentials and engineering solutions, and societal and environmental circumstances would be indispensable. At the same time, the search for the most suitable solutions and innovation strategies for low costs facilities has to be provided.
From the point of view of regional co-operation, there are many similarities within three countries in the region. Considering this issue, but also many others, trans-regional co-operation of young people, young researchers could be of crucial importance for the development of the whole region. Furthermore, the described scientific and social tasks are future-oriented and entirely suitable for young researchers.

KEY WORDS:
renewables, young researchers, regional cooperation

BACKGROUNDS

In the first half of nineteen seventies due to big energy crises, production of energy at reasonable prices was the main concern.

Nowadays, the worldwide energy supply is much more stable, but with uncertain future. The nature of this uncertainty is not only the fact that for millions of years accumulated fossil energy is being used in only few decades, but its negative impacts to the environment, first of all greenhouse effect. Many EU and World agreements, decisions and documents focus the problem of environment and fossil energy replacement by renewables. Typical measure in that direction is declared and agreed replacement of 12% of fossil fuels with renewables in EU, before year 2010, which has to be fulfilled by all member and candidate countries.

It is apparent, though, that all, or almost all, renewable energy sources still cost more than fossil ones. This is especially if all costs of energy with adequate comfort and environment protection facilities are included. The whole society should have very clear benefits from the replacement of fossil fuels, firstly due to achievement of better environmental conditions. Therefore, it is one very important activity, which is not the question of individuals any more. All well organized countries are trying to develop programs for setting up balance between private and public interests, making partnerships between them. Firstly, this means creation of societal awareness of need of solving environmental problems, selection of most appropriate renewable sources for the country-region, development of facilities, constant R&D and demonstration activities, and providing funds for program realization. Many EU countries have already started programs of that kind and some of them, already achieved declared goals, like Austria for example.

PROBLEM IDENTIFICATION

The presented program of fossil fuel replacement is expected to be realized also in new member countries, like Hungary, candidate countries, like Romania, and other like Serbia and Montenegro. The economic situation in many countries is not on the level that can easily support implementation of renewables, by taxes and governmental funds for example.

There is another problem, which all these countries are faced with. In the time of transition a lot has been done in cities, but considerably less in rural areas. Therefore, rural areas are nowadays very big social, demographic and economic problem for most of transition countries. There are many reasons for that. On the other hand, most of sources of renewables are allocated in rural area, where it is only economically feasible to use it. The logical question arises: would it be possible to solve two problems at once? Making expected and needed replacement of fossil fuels with renewables and helping the development of economically weaker regions.

Identification of all renewable sources and their potentials has been already done in all abovementioned countries. The question is if this is precise enough and realistic for real production and environment situation. Martinov et al. (2004) have recorded some doubts about figures

published, especially concerning crop residues. Researchers, aiming at including of as much as possible renewables, sometimes exaggerate the data, counting everything in, not only realistically usable sources.

The most promising application field of renewables in rural areas is household heating. It should, at the same time, offer comfortable heating, use of locally available energy sources, and contribute to the national, regional and European program of fossil fuels replacement. It can offer imports reduction on the national level, and better employment chances.

Which kind of renewables should be used? Which type of utilization and which type of facilities should be used, and is it going to be accepted by people? What should be developed, improved or innovated to enable proper use of renewables? What would it be the reasonable and feasible governmental support to the program? These questions are looking for some answers, which imply serious scientific and social research activities.

HYPOTHESES

Based on identified problems, the following hypotheses are set up:

1. Proper program and usage of renewables in rural areas, first of all for household heating, will enable efficient partial replacement of fossil fuels and at the same time contribute to the development of economically weaker regions.
2. It is possible to identify the most proper way of utilization of renewables in rural areas based on local tradition and contemporary achievements in the field and according to available renewables.
3. It is possible to develop program and facilities of renewables, which will be accepted by the inhabitants of rural areas in the region.
4. Consequent policy in the region, followed by adequate funds and legislation, can enable dissemination of use of renewables in rural areas of the region.
5. Adequate innovation, research and development strategy can contribute to constant improvement of usage of renewables in the region.
6. Young researchers, using trans-border co-operation, and parallel co-operation with EU institutions, can considerably contribute to realization of tasks defined.

NEEDED ACTIVITIES

Related to the hypotheses following actions are needed:

1. Overall study of current programs used in developed EU countries, which should enable considerably better overview on policies, legislations, practice and prospects of renewables usage in developed countries, and it should be done in co-operation with their experts. This material has to be evaluated according to the specific conditions in the region with adequately foreseen consequences.

One example of action 1 is to set up targets regarding efficiency and emission limits of biomass facilities as given by Brkic et al (2002).

2. It is very clear that economic factors are crucial for implementation of renewables, but others are also important and influencing. The proper implementation can be realized only if all influences are considered, not only engineering and economical ones. The task is to learn about approach of local-regional potential consumers to usage of renewables. This is not an easy task, and should be a result of substantial inquiry. The evaluation of the inquiry should result with very tangible outcomes, which should determine feasible solutions for the region, taking into consideration all impacts and future prospects, and sublimates social effects. It should be a good basis for guaranteed success and acceptance by very sensitive social groups.

One example how to define influencing factors is determination of locally specific biomass yields – crop residues. Fig. 1 and 2 illustrate the yield of straw and maize residues.

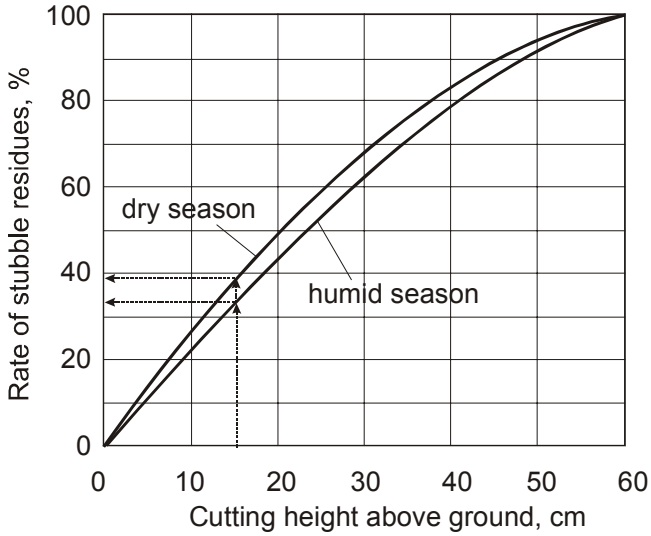

FIG. 1 RATE OF STUBBLE RESIDUES VS. CUTTING HEIGHT FOR WHEAT, CURVES FOR MINIMUM AND MAXIMUM, EXAMPLE FOR CUTTING HEIGHT 15 cm GIVEN, (Martinov, 1980)

3. With results of two previous and similar investigations, it should be possible to define next practical step, to set up the list of most realistic ways of renewables utilization in the region, but only ones that could fulfill wider environmental, economic and societal requests. This should be realized in co-operation of regional and EU experts. The decision is very sensitive and it should include all results of former activities, including very specific prerequisites and conditions of the region.

One example of this action is to compare costs of diverse biomass forms, Fig. 3.

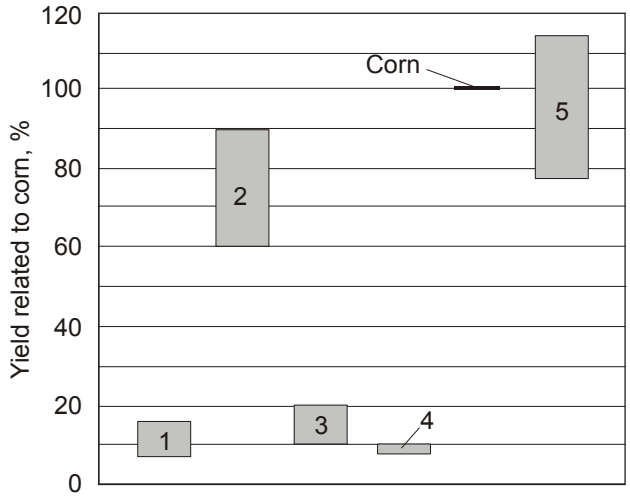

Fig. 2 YIELD RATIO OF RESIDUAL MAIZE PLANT PARTS, DRY MASS (yield of corn 100%);
1– first 20 cm of stalk above the ground, 2– stalk without first 20 cm above ground, 3– cob, 4– husks, 5– residual parts, total, (Martinov, Topalov, 1984)

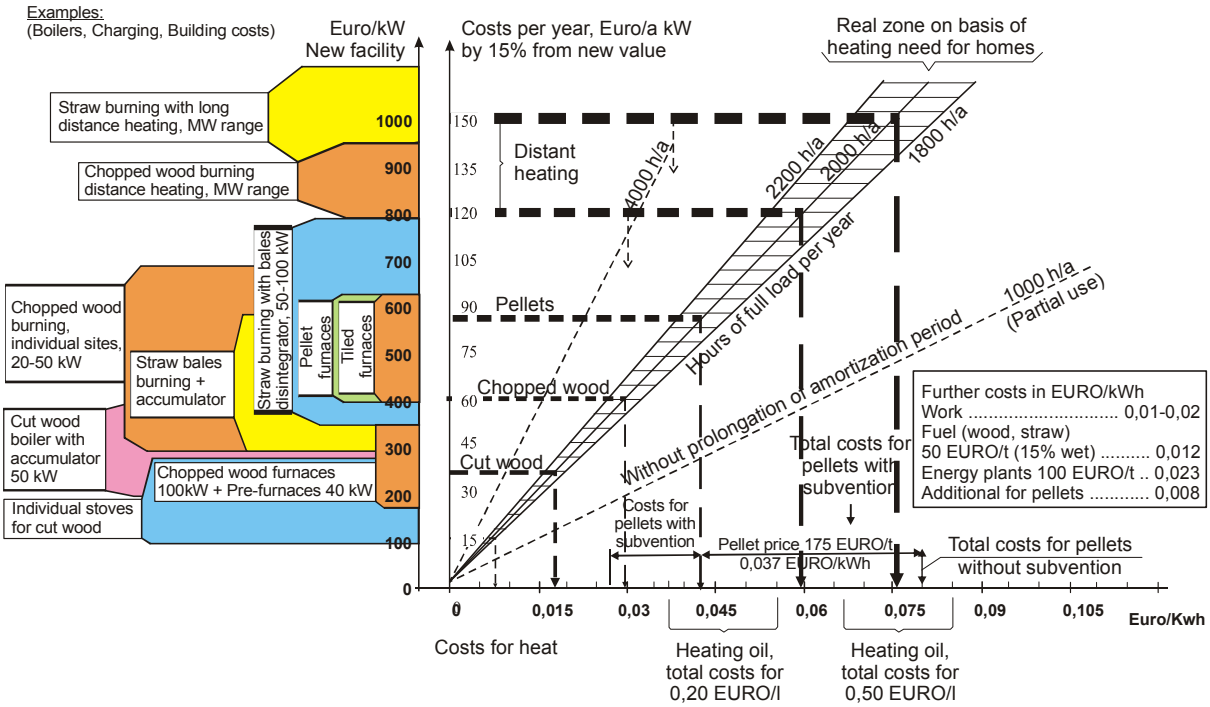

FIG. 3 COMPARISON OF COSTS FOR DIVERSE FORMS OF BIOMASS FUELS (Strehler, 2001)

4. Involved researchers should define very clear guiding principles for regional and local decision makers. The policy and legislation have to be realistic support for its realization. This should include very clear national policy, agreed by competent institutions, definition of needed legislations, laws, guidelines, education, and financial support.

5. Previously defined outcomes should enable identification of needs for specific development and innovation of acceptable, but primarily low cost solutions.

Typical example is improving of design of existing, traditionally used biomass furnaces, Fig. 4 and cookers in the region of Pannonia plane. Its improvement and introduction of this low cost solution can be one of joint tasks in the future.

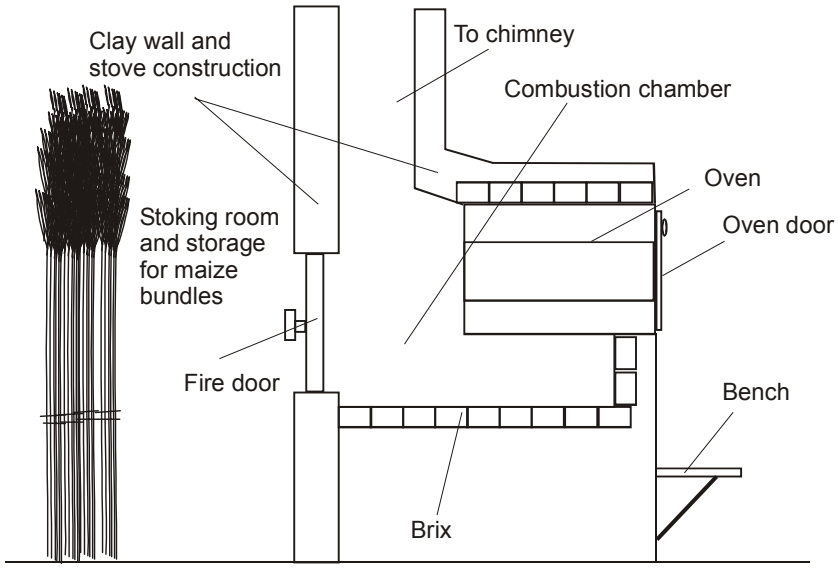

Fig. 4 TRADITIONAL BIOMASS FUELED FURNACE,
(Martinov et al, 2003)

Using achievements and experiences from developed EU countries, different facilities should be considered as possible solutions for the region. Complex plant with biomass boiler with heat accumulator, Fig. 5, and continuous boiler feeding, which could be adapted for maize cobs combustion, Fig. 6 were given only as examples.

The district heating plants, with high level of pollutants control as used in Denmark, should be also considered for heating of public houses, e.g. schools, (A1, 1998).

6. Here defined issues are future oriented and should include young researchers. The R&D funds are limited in all countries, what directly limits the development of local human resources. European and some other international projects can considerably impact positive development with huge effects, which are not only economic.

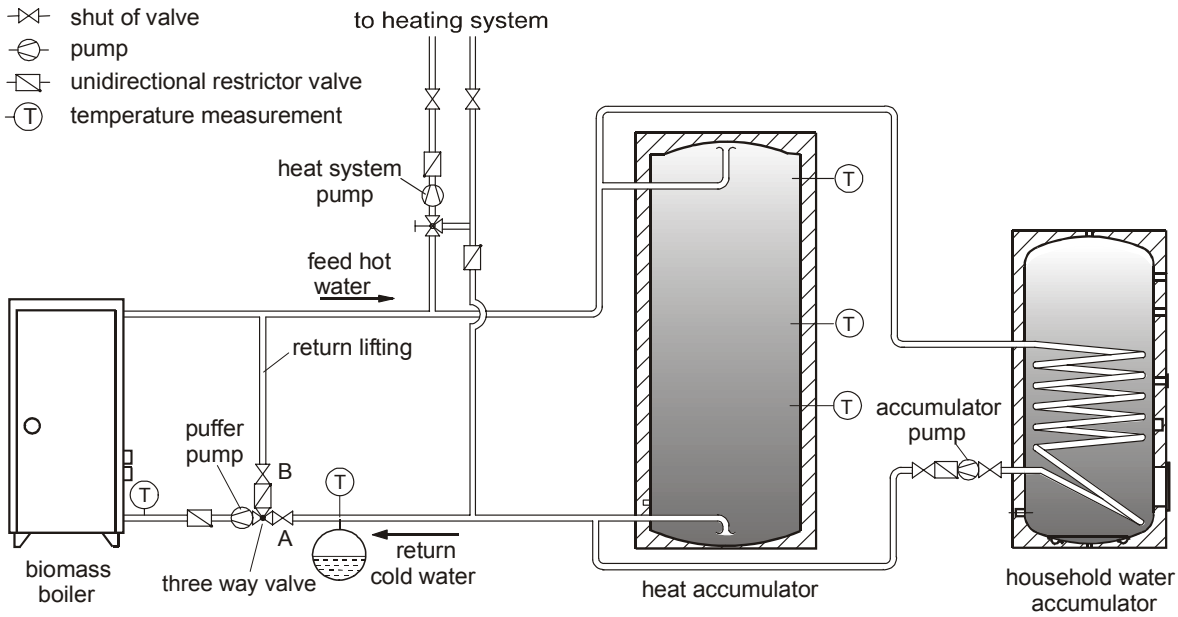

Fig. 5 EXAMPLE OF HEATING PLANT WITH BIG VOLUME COMBUSTION CHAMBER - BOILER AND HEAT ACCUMULATOR (Kaltschmitt, Hartmann, 2001)

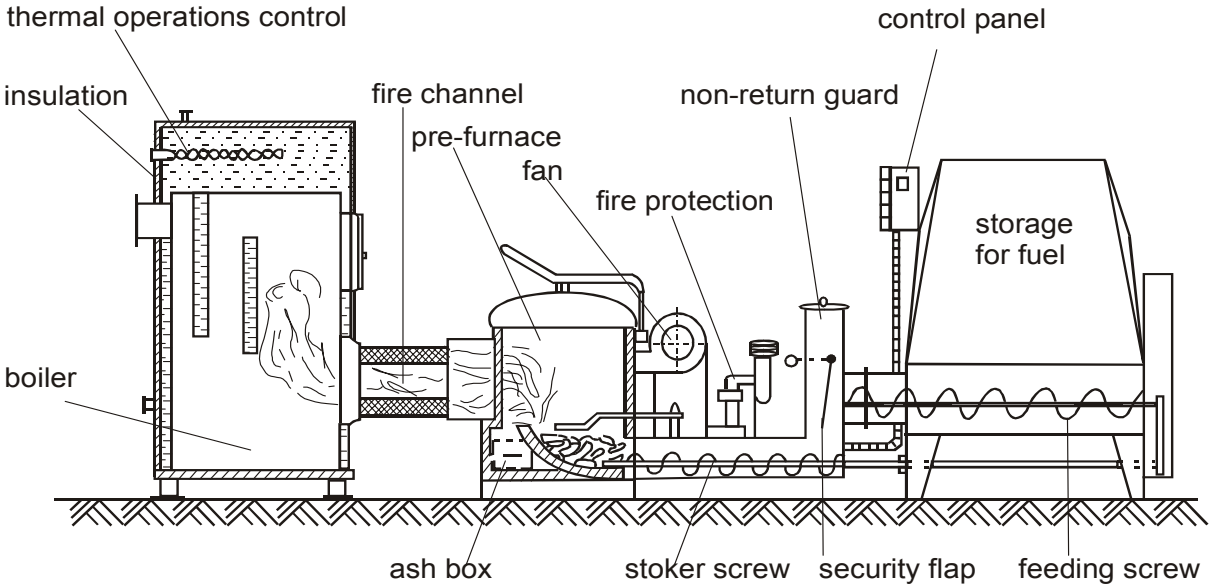

Fig. 6 CONTINUOUS FEEDING BOILER FOR CHOPPED BIOMASS WITH PRE-FURNACE, (Strehler, 1988)

WHY TRANS-BORDER CO-OPERATION?

Energy saving and use of renewables has a national importance, but if its positive environmental impacts are concerned, the importance is on worldwide scale. The most appropriate measures should be based on locally and regionally specific natural and societal conditions. European

region covering provinces and counties with major cities of Novi Sad, Szeged and Timisoara have similarities and the solutions of the focused problem are also similar. The social problems and impact of measures supporting the development of rural regions are also same or very similar. Joint project and close co-operation, exchange of experiences and results can considerably contribute to quicker and more adequate solutions. Reduction of pollutants and introduction of environmentally sound techniques will not affect only one country or one part of a country, but it also would have trans-border effects.

The environmental problems and pollutants do not recognize any borders. They cross them without obstacles. The same case should be with new solutions, ideas and improvements.

It is necessary to illustrate delicacy of this specific problem. According to our knowledge, proposed furnaces cannot fulfill strict environmental demands set up in developed EU countries. On the other hand, they are presently used in rural areas, with typical efficiency under 40% and high emission of pollutants. If only these were improved by low-cost solutions, it would considerably contribute to energy and environmental aspects in the whole region. In the light of previous, proposed solution could be accepted as the best available solution of the problem in the region within the period of next 10 or 20 years. Moreover, extension of market for business with renewables is expected to be another positive effect of trans-border co-operation.

WHY YOUNG RESEARCHERS?

Young researchers belong to, in almost all transition countries, to the group of economically weaker population. The first reason for this is a lack of R&D funds, which could be compensated by EU and other international R&D funds/projects.

It is natural that young people are more future-oriented and their responsibility for environmental and societal issues should be encouraged. Most of them are enthusiastic about topics written here, ready to contribute to the welfare of their countries, region and the whole World. Young researchers under fair and supportive supervision could realize most of here-defined activities. Their involvement in trans-border co-operation can contribute not only to their professional development, but also to their societal and international attitude.

Many of them would be able to find long-term engagement in the prosperous field of usage of renewables, either as an employee in the administration, planning/consulting companies, supervising and testing institutions or as a young entrepreneur – manufacturer of facilities for renewables.

CONCLUSIONS

The R&D actions on replacement of fossil fuels with renewables, especially concerning its implementation in rural areas of Hungary, Romania and Serbia and Montenegro have environmental, economic and

social importance. These should include all possibilities of energy savings, determining the most convenient types of fuel, facilities for its usage, identification of potentials and prospects. The important output should be to define the best available practice respecting the locally specific conditions, but also giving future oriented solutions in compliancy with achievements in developed EU countries.

Trans-border co-operation of young researchers on these issues will not only contribute by giving the best available solutions, but it also will strengthen the local R&D resources and creation of European oriented ambient of regional co-operation.

This would not only contribute to better energy supply, positive environmental effects, but it would help and support development of economically weaker rural regions. New technology of usage of renewables in agriculture and rural areas is expected to enable employment and economic progress.

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