

PROFESSIONAL AND TRAINING NEEDS IN THE AREA OF HYBRID POWER SYSTEM - ALTERNATIVE ENERGY CONDITIONS OVERVIEW IN HUNGARY TO IDENTIFY THE VOCATIONAL TRAINING PRIORITIES AND INFORMATION CONTENT LEVELS

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Introduction

Barriers to use renewables and hybrid technologies, and extend their scope of usage come mainly from those difficulties, that every technology has to face, once introduced on the market. One of the main factors here is the knowledge and trust of potential users, which is the biggest barrier of all, and the most difficult to work out. The user is influenced by the knowledge one has about the technology, and his/her own approach and arguments to use it: how convenient, trustful and lack of difficulties it is. A very important role is here the state and civil society playing, by raising awareness, and giving advice to newcomers, new users without prior knowledge.

To inform the public, municipalities are the best suited to deal with the awareness raising. On this level existst namely such apparate, institution, that deals with every single public service, and can support new technologies through the operation of these devisions. The biggest tool is here the system of professional referents, their training, who can enter this arena by unified capacity building, information giving to persuade the public about the goods of the innovations. Also is the role of municipalities to get to know the EU and national tendering opportunities, and make public to gain tha biggest available share of the subsidies to go on into new areas like hybrid technologies. By vocational training, in the form of any learning method, the overall goal is to make referents capable to administer and operationalise renewables and alternative energy projects on the level of municipalities and regions. The spread of the renewables will for

sure raise the demand towards these referents, whose vocational training needs can be later as permanent predicted.

Priority fields of alternative energy training courses

Nowadays in Hungary there is „Renewable energy expert” vocational training course on the Debrecen University, and in Sopron on the West Hungary University’s Forestry Engineering Faculty. The Szent Istvan University has traditions on this field too, having energy economy related courses. This field of profession is mainly taught on the Faculty for Environmental Engineering, and alternative energy related courses are taught on the Faculty of Mechanical Engineering. Another important step is the cooperation within the international, european renewable energy clusters. Such an opportunity is given in the framework of the CER2 (Central European Regions Cluster for Energy from Renewables – NETwork). The CER2 was introduced by the initiation of 7 countries’ 14 partner companies and institutions – inbetween the Széchenyi István University too – with the objective to make renewables publicly well-known, and hopefully spread across the countries. The objective of the CER2 is to open new perspectives on the field of regional economics. The CER2 has the following objectives: organising vocational trainings, carrying out quality management duties, supports the setting up of companies, researching regional energy concepts, and building up regional groups and expert networks. The programme helps to share experiences and getting in touch with experts from the field of renewables, also there is education of alternative energy experts on the priority fields, the programme has identified before:

- biomass use
- thermal use of photovoltaics
- solar energy use in passive house architecture and eco-buildings
- photovoltaics (PV)
- heat-pump energy usage

As a sectoral and vocational development goal, the alternative energy field was clearly identified by having priorities in the biomass energy usage, solar energy usage, and heat-pump energy utilization. This gives the picture about the alternative energy conditions, that in our country – mainly on the short term – are educational and vocational training priorities. In case to identify the frameworks, and groups of knowledge and information in educational and vocational thematic, the single alternate energy educational fields must be deeper analysed.

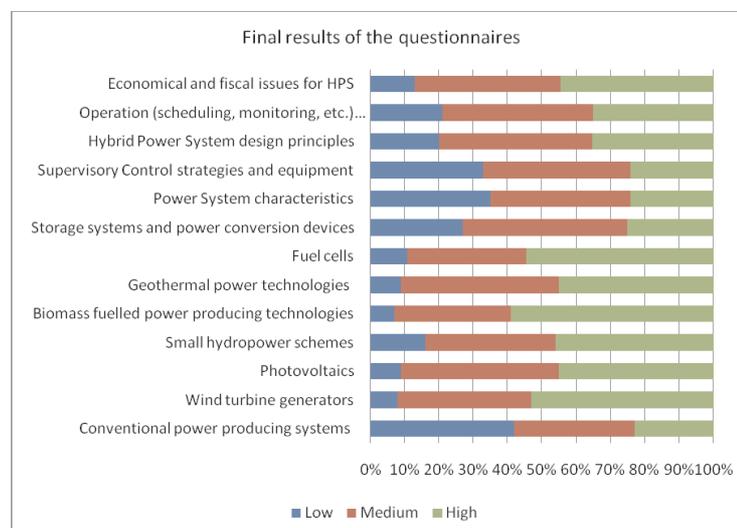


Figure 1.

Inputs, feedbacks and datas from questionnaires

The questionnaires were distributed on paper and email to people, and 104 questionnaires were received from respondents and evaluated given now as basis for feedback on the content of the HUN HYPOS (Hungarian e-learning development program) material. Personal datas were supplied by less than half of respondents.

General questions' evaluation show, that 86% have not participated in a training on hybrid power systems. Respondents had the following breakdown in numbers in terms of schooling: students 42, B.Sc level 19., M.Sc level - 32, Ph.D.level – 11 respondents. Some have indicated to be a designer – 24, or a planner – 35 but many, mainly the (45) rest indicated to be none of these or left the questions blank, that means the necessary need of educating people about the precise understanding of the new field: hybrid power systems or combined, alternative energy systems. 77% told he or she would consider the course to be useful for later carrier, which is a promising figure, although as previously understood, many people need still a clarifications on what hybrid power systems mean.

The target groups were characterised as we can see at the end of this study according to the Hungarian system of vocational trainings, or similar topic courses in higher education or beyond, at the beginning of professional carrier, therefore potential applicants for a future course of designers or planners were targeted and met. Clarification on Hybrid power systems are a clear need for both target groups, other identical special needs were not recognised by the questionnaires, rather a feedback of the different areas were made clear, as we indicate at the beginning of this study.

The study material of the HYPOS DILETR project will be adopted for the Hungarian circumstances, where a lot of already

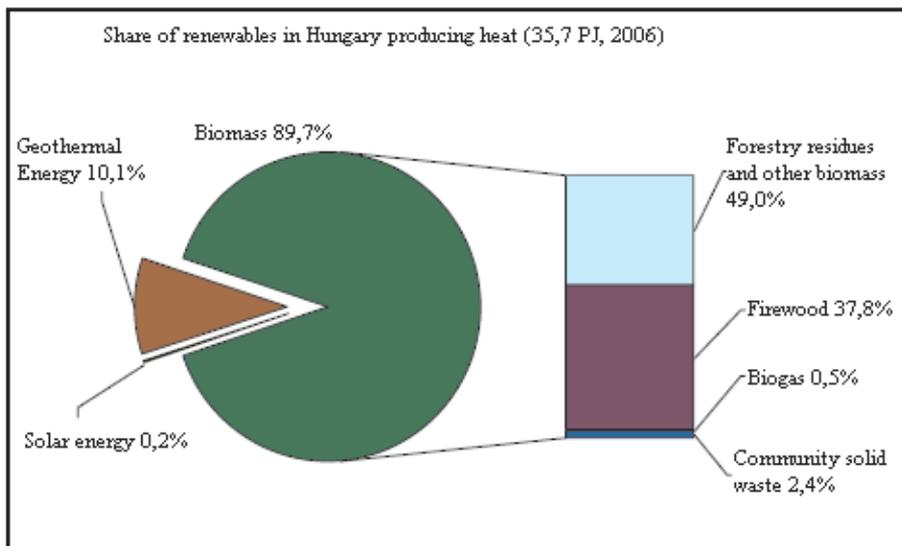
characterised up-date needs were stated. At the same time one important complex issue should be incorporated in the whole material, which is the sustainability, and sustainable growth, natural resource use, energy resource use and planning, that have the 3 axes, the society, economy and the environment involved. Without these elements, the study material would not have the same outcome, as it is expected in recent times, where sustainability, climate change and energy production, security and other issues are of high importance.

Alternate energy conditions overview in Hungary to identify the vocational training priorities and information content levels

In this part we have a look at the single domestic renewables and identify their importance in educational politics. We research the domestic conditions of the single energy carriers, the potentials of them, conditions of production and raw materials, usage pathways and those environmental conditions, that can be a barrier to their usage. The overview is based on the study, „Strategy of developing the renewables usage in Hungary in 2007”.

As a starting point we can have a look at the following diagramm, which contributes to the CER2 programme too.

The biomass is a collective noun, it means the products, wastes and byproducts (both plant and animal origin) from the agriculture, forestry and their connecting industrial activities, and also the biodegradable part of the industrial and community waste. The given raw material for energy use can be solid (eg: biobrikett, pellet), liquid (eg. bioethanol, biodiesel), and also gas aggregate. In Hungary we call biomass the sewage sludge, that arises from the waste water treatment plants, and is used to generate energy, and also the waste burning, which are not sustainable energy sources, but the handling of community waste provides the opportunity for energy use.



The biomass for energetic use is very diverse, one can use it to produce heat, or electricity and can be used as fuel too. Most of the given biomass is at the same time serving as feedstock for food production or used for agricultural goals, the energy use is very low thorough whole Europe, but is growing part of biomass use. According to EU studies, the biomass for energy use will grow 2,5 times its value from 2003 to 2010, approximately on 200 Mtoe, if the EU will use close to all of its potential.

Domestic analysis show, that in Hungary, the biggest and most easy to extend energy basis is the biomass. The on purpose production of energy plants is not yet very significant, but biomass

resources can be extended easily with energy plant production. Also big potential is in the biomass kindly byproducts, residues, and waste for energy use (the so called secondary and terciery biomasses), because all technologies resulting in waste utilization (eg. biogas) keep having a growing role. Therefore in education materials these systems' complex knowledge is necessary to gain experience and proper know-how for agricultural biomass systems. The agricultural basis therefore is one of the main educational element to teach the energetic biomass systems.

The biomass for energetic use is highly important question for the agriculture, because the intervention rules and also the WTO

rounds support and push to a lower domestic and EU wide food production in agriculture productions. Some of the estimations show, that even 20%, approximately 800-1000 thousands hectares land of Hungary can be touched, and so 80-120 thousands jobs can be affected. The energy use of plant production, the biomass use as a renewable energy can provide a solution to the problem, through this can that be maintained, that producers can carry on their agricultural activity, and that the grains produced can be without significant central budget support be marketable.

The biomass for energy use is although nowadays still in its childhood, when looking at the technology levels. The very efficient burning facilities are many times given, but adaptation to local conditions is needed, continuous feedstock supply is needed, solutions for transportation and storage and the view of combined use with other renewable energies (eg. Biosolar plants). The biomass production comes with certain damage to the environment, like reduced biodiversity, growing waste output, growing pollution of the soil and water. Analysis for the whole lifecycle of the biomass energy source tells, that the environmental impact arises mainly (80%) during feedstock production. The unfavourable environmental impact can be reduced by native domestic species for bioenergy use, that is less dangerous for the fauna, and has a longer cutting round. In this way environmental points can be closely integrated into the strategy of plant production for energy use.

The arboreal and non-arboreal plants for biomass use in the future can give the most of the renewable electricity. The favourable features: technical parameters, an easy to rule and adjust feature, additional conditions (creating jobs, rural development) of the technologies, and the favourable agricultural situation in Hungary is supporting this use. The technology to proceed the arboreal plants is already given, developments and research must at the same time help the conditions to improve the more varied use of energy plots for burning. The technology of non-arboreal plants for energy use is not yet a mainstream technology, on the long it can have a very serious research potential.

Conclusions

Concluding, Hungarian natural attributes are very favourable for biomass utilization, geothermal energy and solar energy fields, which could be followed by the wind and hydro energy. Identifying the barriers and opportunities on all fields, we can conclude, that both the national and EU expectations to raise the share of renewables are only viable by growing the biomass based energy production and utilization, even if other renewables are used to their limits. For this goal, all of the biomass product ways should be carefully studied, and utilized. Highly important is the both environmentally, energetically and rural economically beneficiary, very promising technology and energy source, the biogas. The biogas is the only technology, where organic waste is disposed, and at the same time useful energy arises. By using the wind energy, there are also limitless opportunities, but for the current situation everything depends on the managing features and governance of electricity-regulation system.

Biomass, solar energy, and geothermal energy can be best used, taking into account the domestic attributes for heat generation

very competitive to supply warm water for institutions and the public and also for complementary heating purposes. The condition here is however, that the regulation should not result in an unfavourable realtive prices for the bad of the heatmarket and being beneficiary for the natural gas use and renewable electricity production

Teaching the alternate energy production systems, and identifying the content elements, the niveau and structure of knowledge needed to compile with the requirements, the single fields of professions' economical and market potentials should be taken into account, and the know-how adapted to these local and regional attributes. On the field of education and teaching, the biomass energetic use and utilization program should be the most developed and emphasised, and because of having strong interrelations with agriculture, bringing it close to the target groups knowledge, and extending based on their prior education. Highly relevant is furthermore the complex professional knowledge transfer by overwiewing whole range of product verticums and product cycles.

Same importance has the geothermal system planning in the future, but the professional arrear is pretty huge, lack of knowledge on the market is big. Higher education, and vocational trainings don't involve this field, therefore the basic level knowledge transfer and related management issues, and know-how can be a first, and short term realistic educational goal.

The spread of solar energy in the public sector can be the highest volume, by these trainings and vocational educations the public can focus on learning basic environmental and economical interrelations, and also awareness rising on the issue.

Hydro energy and wind energy utilization and planning has already many experiences, that are present on the domestic market, therefore the connected education and trainings are present in the educational systems. But at the same time, the national economical importance and expected small growth means a more moderate knowledge demand from the target groups, a basic alternative energy knowledge on these fields in the near future.

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