THE ROLE OF RENEWABLE ENERGY RESOURCES IN THE FARMSTEADS OF THE HUNGARIAN PLAIN

ROLUL RESURSELOR ENERGETICE REGENERABILE IN FERMELE DIN CAMPIA MAGHIARA

GALNE HORVATH ILDIKO[1]

[1]Nemeth Laszlo Gimnazium es Altalanos Iskola, Hodmezovasarhely, Hungary; horvi967@freemail.hu

Abstract: *Energy intake and energy supply imply more and more problems in each field of life from day to day. Conferences are called together for experts, applications are announced on the subject of possibilities of new energy resources to reduce energy intake. Almost in each level of education energy-saving life style is integrated in the curriculum in the interest of the future generation. I survey this problem in point of view of farmsteads and a middle size town called Hodmezovasarhely.*

Keywords: *farm, rural development, boondocks, society, renewable energy*

INTRODUCTION

Energy intake and energy supply imply more and more problems in each field of life from day to day. Conferences are called together for experts, applications are announced on the subject of possibilities of new energy resources to reduce energy intake. Almost in each level of education energy-saving life style is integrated in the curriculum in the interest of the future generation.

The fossil energy resources of the Earth are decreasing. According to certain sources, the oil production reached its peak in 2008 so the oil resources are now limited, their extraction cannot be increased in the future. Since on the basis of our present knowledge and technology there are not hydrocarbon supplies in significant amount which could be exploited with

the present technology economically, and the supplies of the other non-renewable energy resources are running out, so the energy supply of our Earth should be provided from other sources. According to our present knowledge, possibilities and assumptions, it could be solved only with the renewable energy resources the condition of which is development of the technology.

In this present essay I am aiming to show how and where these renewable energy resources can be applied in Hungary, or more specifically in the farmsteads of the Hungarian Plain. There are some areas where they have been realized, while in other parts we cannot meet this solution.

MATERIAL AND METHODS

In my paper I have surveyed the roles of renewable energy sources in life of people living in rural areas. I summarized the most important literature and talked people using interview method. I mention different forms of renewable energy sources can be found Hodmezovasarhely area like thermal energy, biomass and generally used wind and solar energy.

RENEWABLE ENERGY RESOURCES AND POSSIBILITIES OF THEIR APPLICATION IN HODMEZOVASARHELY AND ITS ENVIRONS

The renewable energy resource is something which is always available because it always reproduces itself during its use. It is very important to mention that its exploitation does not ruin the environment, it meets the disciplines of sustainable development, it provides the energy for production of material goods of the human and finally, it does not pollute the environment. Its disadvantage is that exploitation of the energy from these resources requires a well-developed technology and sufficient capital on behalf of the country.

The most frequently used renewable energy resources are solar (solar cell, solar collector)-, water (tide, energy of wave)-, wind- and geothermal energies, but we have to mention the bio-mass (bio-diesel, bio-ethanol) as alternative energy resources.

Their importance is that people can produce the greater part of the necessary energy for themselves. They mean a long-range solution to provide enough energy for the human. For example, solar energy will be available for about 5 billions of year.

Nowadays, the proportion of renewable energy resources out of the total energy intake is around 3,6-4%.

I live in Hodmezovasarhely, my subject of research is formation and changes in the farmsteads around Hodmezovasarhely so I attempted to examine the application of the available renewable energy resources. From the above mentioned possibilities solar-, wind-, geothermal energies and the biomass could be utilized in the environs of my town, so I am analyzing them further on.

SOLAR ENERGY

Solar energy is the energy coming from the thermonuclear processes within the Sun. The energy found in our Earth originates mainly from it. Energy produced by the burning of coal is nothing else than solar energy stored in plants which lived millions of year ago. Though indirectly, the source of wind and water energy and the biomass is the Sun itself.

Utilization of solar energy depends on the number of sunny hours the figure of which is affected by the geographical position and the climate. The number of sunny hours is relatively high in the area of our country (1750-2050 hrs) (Figure 1). This quantity would be enough to meet the needs of heating and hot water supply of the country. (In Austria this figure is much lower, though they use much more solar collectors.)

Regarding its application there is the thermal power plant which is used where the number of sunny hours reaches the third of the number of theoretically possible hours. The other type is the solar collector where the radiation energy is transformed into heat on the radiation surface and then this heat is transported in insulated reservoirs. The third type is the solar cell in which the light energy of the Sun is transformed into electricity (BORA GY. – KOROMPAI A. 2003.p.130). In the Hungarian Plain only the solar cell is mentioned in the specialized literature, especially in the area called ‘Homokhatsag’.

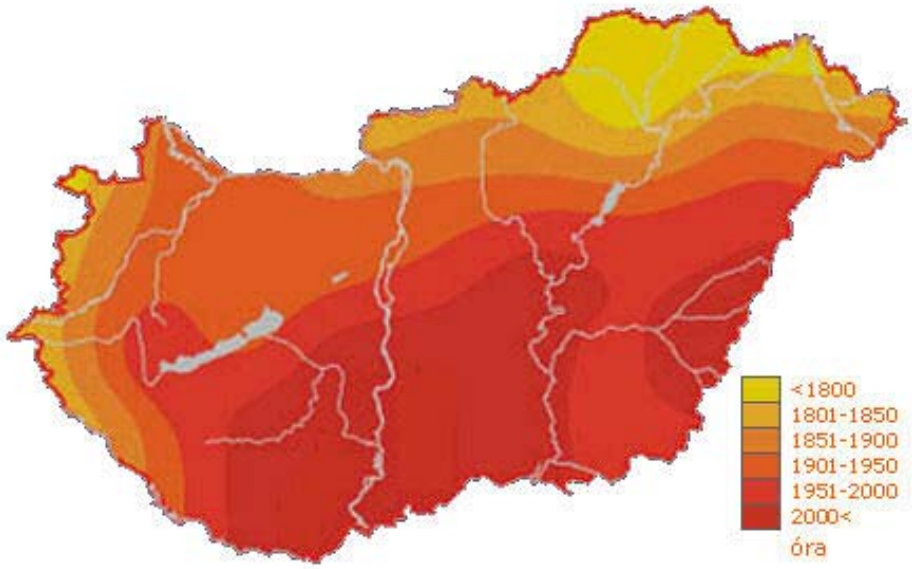


Figure 2: The annual average of sunny hours in Hungary (Source:: www.solartisnapkollektor.hu 29 January, 2011)

In Hodmezovasarhely the number of sunny hours is high (2050 hrs/year) so there is a possibility to utilize the solar energy, however in the outskirts we cannot find it, in the town we can find only some of them mainly for private purposes, they are not used for public purposes.

WIND-ENERGY AND GEOTHERMAL ENERGY

Wind is the air moving in parallel with the surface the movement of which is provoked by the pressure differentials; it flows from places of high pressure to places of lower pressure. Its speed depends on the temperature differential between the two air masses and the size of the two air masses. Its energy is determined by the speed of wind and to describe it we use the Beaufort-scale. The annual working capacity of wind is calculated on the basis of the speed diagram obtained while recording the changes of wind speed in time. As a result, the wind power machines are set where it is

possible to utilize the most the kinetic energy of the wind coming through them. Besides wind-speed, the frequency of direction of wind is considered, since it is favorable if the wind blows from different directions in the place of plantation. The wind power machines can utilize 60% of the air flowing through them. (Bora Gy. – KOROMPAI A. 2003). It is Denmark which achieved the most significant performance in utilization of wind power, but we have to mention the wind-mills in the Netherlands which produce the necessary energy to pump the water into channels. We have to mention the wind-mills in the Hungarian Plain, as well, which produced energy to grind the corn. (Picture 1)

Although in Hodmezovasarhely and in its environs several wind-mills worked, today the wind energy is not utilized in its region. However, in the area of Homokhatsag wind generators are applied in several places. In this region the small wind generators are the most economical since they work independently, do not need much maintenance, and can be utilized in the house, as well; they can contribute to provide electricity for weekend houses or smaller farmsteads in an environmentally-friendly way. To get them operated it needs a significant cost but they are competitive with the traditional or other alternative energy resources provided we regard the total cost in the life-span of the system and compare it to the expenses of other sources of electricity or the main current. Electricity produced by the wind energy costs less than the half of the solar cell's but the wind does not blow continuously so it is fitted to a solar cell system with a battery thus assuring the continuous power supply. (ZAVACZKI A. 2006) This so-called „hybrid system" is applied in several places in the region between the rivers Duna and Tisza. When constructing it, it is very important to find a suitable place which means a plot of bigger size but here 1 million households have a plot of this size in the outskirts where even the wind speed is appropriate, too. (UNK JNÉ, 2008)

It can be seen in the wind map of Hungary that in the central part of the Hungarian Plain the force of wind is 3,5-4 m/sec. It is very important to install the generator above the highest construction which is in the direction of the wind.



Picture 1: The wind-mill in Dorozsma which is a museum today but it still can be utilized to grind corn (the writer's photo)

The investment to build a wind power plant is refunded within 7-8 years, investment to connect to the main current will not be refunded within as much time, and in case of wind generator people do not have to pay for the electricity.

Going downwards under the Earth's surface the temperature rises by 3°C in every 100 meters as an average (30m/°C). This value is called geothermal gradient. Under the Earth's surface this gradient is different depending on the thickness of the Earth's crust. Where the crust is thinner the gradient is higher. It is possible to utilize the Earth's thermal energy where this value is higher than the average.

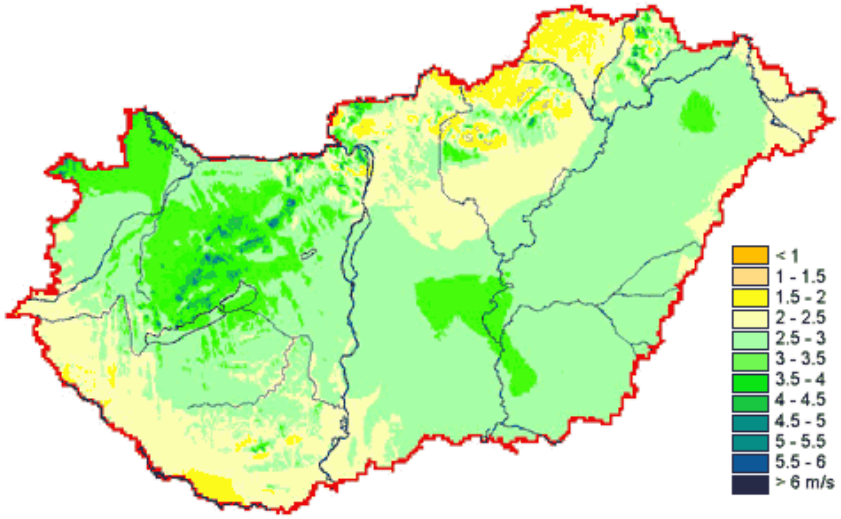


Figure 2: Wind map of Hungary (Source: http://www.met.hu/omsz 07 February, 2011.)

People utilize the hot water coming to the surface to produce energy. However, to produce electricity it is necessary to have water at least of 160-180 °C. In several countries of the world geothermal power plants have been established (New-Zealand, Iceland the USA, Italy). Besides their economic advantages, it is necessary to calculate with the following problems: mineral salt content of the geothermal water is high, so it causes corrosion in the equipment, thus continuous maintenance is absolutely necessary. The other important problem is that the used thermal water should be re-pressed since mixing it with the surface waters they can pollute the environment. (BORA GY.-KOROMPAI A. 2003)

Our country has favorable geothermal conditions, since in its area the value of the geothermal gradient is higher than the average: 20-22m/°C. Temperature of our thermal waters is 35-100 °C, however, this value is not enough for energy production. Today, thermal waters are utilized in three fields: where the surface water supply is low, for drinking water supply; for water supply in spas, pools; and mainly in the environs of town Szentes, for heating plastic tunnels; and in Hodmezovasarhely for heating flats, public institutions (hospital, schools). (Picture 2)



Picture 2:Thermal center in Hodmezovasarhely in Hodto district (picture made by author, 2011)

In Hodmezovasarhely there is a modern and foreshadowing example for utilization the geothermal energy.

In 1986, geothermal systems of district heating to heat housing estates were established in 5 towns, besides Hodmezovasarhely. New wells were drilled, and the necessary infrastructure was built connecting to it. In our town thermal water of 80-86 °C, coming from the depth of 2000-2300 meters, is utilized for heating in an indirect way. The completely automatic system starts and finishes in the area of the town's swimming pool. After heating the public institutions and housing estates the water turns back to the swimming pool where it is used to keep the temperature of the thermal pool balanced. Then the cooled thermal water is re-pressed to the depth of 1700 meters, thus forming geothermal energy a renewable one.

The system of re-pressing was constructed in 2003 adapting to the new requirements of environmental protection. In the town the population pays less for heating as compared to the country's average.

Unfortunately, it is impossible to build a geothermal power plant in the town because of its geological conditions. According to our present knowledge, there is no such a hot rock under Hodmezovasarhely and its environs which would make it possible.

There are some ideas to transform the town's thermal baths into wellness baths or spa but some experts suggest that it would be more practical to develop the Sanatorium of Kakasszek, which belongs to the municipal hospital, into a medicinal touristic centre. My opinion is that the medicinal water and mud in Kakasszek is more valuable from medical aspect than the thermal water under the surface.

BIOMASS

Biomass is the whole of organic materials and living beings in a living space in the given period of time.

Nowadays, its energetic utilization is of low-scale but in the future it will have an important part. Its energetic potential can be interpreted in several ways: on one hand, it means the measure of energetic capacity of the products involved, on the other hand, energetic utilization of the biomass.

As a row material, the biomass comes from five fields of economy: cultivation, sylviculture (primary production), animal husbandry (secondary production), food industry and communal sphere (tertiary production).

In Hodmezovasarhely and its environs we can hardly find any examples for utilization of the biomass. The necessary row material would be available in all five fields but application of the primary production is typical to households and in some smaller ventures.

Among side-products of agriculture it is necessary to mention the straw utilized for heating in the region. We can find houses heated with boilers of trusses mainly in farmsteads and farm centers. Its disadvantage is that trusses can only be used in small heating equipment which the families utilize, but it is not typical to industrial works in Hodmezovasarhely.

Also, in the outskirts people use corn-cobs for heating, or in several places they heat with wood and corn-stalk, besides, a venture in the outskirts heats with sunflower pellet the calorific value of which is excellent because of its oil-bearing.

In the region the possibility of utilization of the biomass is given from the energetic aspect, with special regard to bio-diesel and bio-ethanol. Potential of the biomass is excellent, since the agricultural conditions are favorable. Its utilization in big firms is the question of future.

Utilization of biomass of animal-origin is performed by ÁTEV. It is especially expensive to store the fat produced by burning animal carcasses. However, energy can be produced by burning this fat. The boiler which burns the animal fat was put into operation in December, 2010 by which 2600 tons of fat can be utilized a year. With application of this boiler they can spare 2,7 million m³ of gas. It is necessary to mention that this company is owned by the state.

CONCLUSIONS

While writing this essay I found information about application of renewable energy resources in farmsteads in the specialized literature. I found several examples in the area of Homokhatsag and I expected to meet them in the environs of my town, too. I was disappointed when I had to conclude, after examinations and analysis, that so many possibilities to utilize alternative energy resources are still not exploited in the region of Hodmezovasarhely.

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