

REUSABLE ENERGY, MAJOR PREOCCUPATION FOR THE REDUCTION OF THE ENVIRONMENT'S POLLUTION

Nicolae Rusan¹

Key words: climatic reusable energy, Aeolian, solar panels, biogas, hydro energy

Abstract. Assessing the The work with the title reusable energy, major preoccupation for the reduction of the nature's pollution, analyses a part of the sources of the reusable energy, presently used worldwide and countrywide, in Romania. From all the reusable sources, Aeolian energy became known as the biggest evolver worldwide, and likewise, in Romania, over the past years. Modern civilization is conditioned on a bigger scale to satisfy the necessity and consumption of energy, elements that are indispensable towards technology, and the continued development of the quality of life. Today, there are investment efforts, technical intelligence, for the usage of unconventional energy. Towards these investments, there is a constant preoccupation for the capitalization of the potential energy that contains the seas and the oceans. The progressive wastage of the fossil fuels, and the necessity to conserve the environment, imposed 2 important characteristics for the new sources of energy: as much time possible and the lack of nuisance to avoid the pollution of the environment.

Introduction

In the last decades, more than ever, unconventional energy sources,(ecological), that were not capable of being capitalized until the present time, portrays huge preoccupations for scientists, and the ones who are implicated in the economical sectors (especially the energetic ones).

And there are three reasons for this, and these are:

- the energy resources are exhaustible,
- the energetic industry that is based on conventional fuels causes the most pollution, which regenerates greenhouse gases, and so it has a substantial contribution to global warming,

¹ Meteorologist PhD at Centrul Meteorologic Regional Transilvania Sud Sibiu, Romania, rusan1958@yahoo.com

-on the other side, to assure that there is a durable development that will beneficiate the future generations.

The vast problem of the environment in the context of the durable development is concentrating to fight the pollution elements, the related and the inevitable development of the industrial and human activities, to prevent environment pollution, adaption, assimilation and application of the nature's needs.

In the present time, in Romania, the political side of the environment protection concentrates in the following priorities: the monitoring of the water quality and the state of the forests, the protection of bio diversity and the wet zones, the fight of the economic effects of worldwide scale, the solving of the acute problems, like the diminution and capitalization of the deserts and ecological agriculture, the promotion of the clean technology, the transformation of the human settlement in durable locations.

We have to be aware that harsh actions towards the environment have an effect on itself, an equilibrium that is one of the essentials to the survival of the human race, plants and animals.

Contents

One of the economical sectors with a big impact towards the environment is the energetic one.

Worldwide, energetic politics were orientated based on the effects of the petrol crises, towards:

- the reassurance of the energy which was necessary for the built of the economy.
- the reassurance of the energetic security
- the improvement of the impact, which the energetic sector had towards the ambient environment at local and regional levels

The economical and political integration of Romania, in the UE structures, which shows the respect for the imposed conditions of two important documents from the energetic field: The Treaty of the Energy Bok and the Protocol for the Energetic Efficiency, that set out the co-operation conditions in the energetic field and that contain the following important provisions:

- the promotion to stabilize the energy prices marketwise
- the reflection of the costs and benefactions that refers to the environment on the whole energetic cycle
- the promotion of the efficient energy, the usage of pure fuels and the reusable energy resources.

Through the Protocol for the Energetic Efficiency, the signatory countries, including Romania, are obliged to stabilize and implement the strategy of energy

growth on the whole energetic package, resources –production-transport-distribution-utilization.

The major problems that overshadow the pollution and degradation of the environment are coherent to how the energy is produced, transported, stocked and utilized.

The main actions of energetic politics that are taken into account by the majority of the country to reduce the impact towards the environment are:

- the growth of the energetic efficiency
- the reduction of the contribution of fossil fuels towards the production of the electric energy
- the promotion, development and growth shared by the usage of the regeneration of energy resources.

The scenario of the energetic worldwide plan, on long term, which is the most favorable in the durable development, is the one that realizes an equilibrium with the environment: stabilized stocks, and relatively limited nuclear deserts, and the reduced emission of greenhouse gases, which can be reabsorbed in a natural way, into the environment.

This means resorting to the reusable energy, which should play an essential role in the future.

Of all the reusable sources of energy (solar, Aeolian, geo thermal, marine waves, hydro energy, biomass, etc), it is estimated that the Aeolian energy, hydro energy, biomass energy, and that which is obtain from the sun, is the most used.

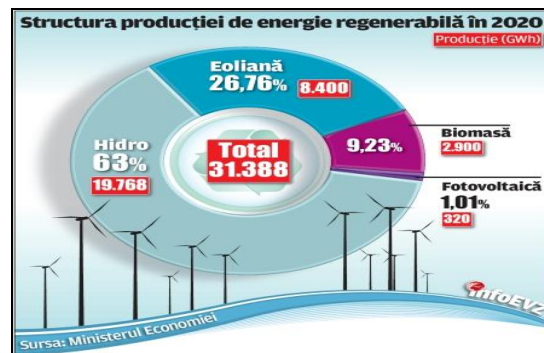


Fig.1 – The scheme for the production of reusable energy in 2020

Research carried out on a worldwide plan, for the Aeolian energy, shows that this can assure 5 times more energy, that of which is being used at the present time. This way, it will be necessary that 12.7% of the dry surface be occupied by parks with Aeolian turbines (Apostol, Jianu, 2007).

The production of the aeoliene motors, depend a lot on the frequency of the wind, of the land, and its geographical position, which can take us to a close analysis of the hour, monthly, annual and seasonal value, and also the probability and certainty of the production of the different wind speeds.

Based on wind sates and studies conducted, in geographical terms, the Romania region with the greatest potential aelian energy is located in the east of the country, including the mouth of the Danube, Delta, and the Romanian seaside of the Black Sea, and the Moldova and Dobrogea plateau, insufficient in the practical capitalization. (Rusan, 2008) (fig.2)

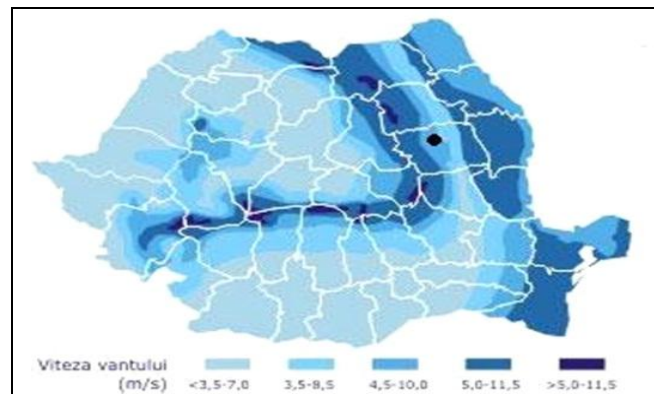


Fig.2 – The Romanian Map with the repartition of the wind environments (ANM Bucharest Source)

Romania has the greatest Aeolian potential from South-East Europe. A research made by the Erste Bank positions Romania on the second place on the European scale regarding the ideal location for the built of a Aeolian park.

According to the national strategy of the capitalization of the energy resources from 2003, to 2015, in Romania, there Aeolian parks should be put into action with the capacity to produce over 280MW each, and a total capacity of 3000 MW, so approximately 1500 Aeolian aggregates (conf. AREE). The biggest 20 Aeolian projects in Romania, with an installed power of 2463.5 MW, is found in Constanta, Tulcea and Galati, first place being Constanta (Transelectrica).

On the Romanian Map, the Aeolian locations are very different to the potential that is being displayed by the wind environment, which is used in the energetic studies (fig.3).

Specialists in this field say that there are three important factors that matter most in deciding of a location to invest in the Aeolian energy field. Firstly there is the wind, which has to have a big frequency and speeds over 3 m/s, to be able to

put the Aeolian aggregate in motion and this is why the best zones are Dobrogea and Moldova. Secondly there is the possibility of a connection to the electric network, and Dobrogea begins to lose its attraction because of numerous production projects of electric energy, not only and the Aeolian segment, and in the receiving network, it does not permit the development of some big projects.



Fig.3 – Map of Romania, with the locations of the Aeolian aggregations

In contradiction to the other sources of energy, wind power is inexhaustible, it does not pollute the environment and it does not emit acid rain or amplifies the greenhouse effect. Aeolian energy has one of the most inexpensive technology productions, with costs between 4 and 6 eurocents per kilowatt/hour.

Aeolian turbines can be built near farms, improving the rural economy, where the wind intensity is bigger than in other areas. Also, the turbines do not affect farm activities because it occupies a relatively small area.

One of the biggest advantages of these generators is represented by their longevity, without any supplementary investments when they are being installed.

In order to succeed, the Aeolian energy has to be appropriate to the cost of conventional energy. However, in this case, the competitive side of the price has to depend on the activity of the air masses from that particular zone. Even if in the last decade the cost of the production of Aeolian energy decreased, a bigger investment is necessary in this field rather than in the thermo central field. To become more profitable, there needs to be more finance projects for the development of the production technology. The biggest disadvantage is that the wind does not have continued activity and it cannot create energy all the time, and the wind power cannot be stocked and utilized when it is needed, like the solid fuels.

Zones with intense wind activity are usually found in isolated places, away from the cities, where energy is necessary. Even though Aeolian energy plants have lesser influence on the environment in comparison with other energy plants, there

are complaints due to the noise that is being produced by the propellers, static effect, but also due to the birds that die because of the impact they have with the generators' propellers. Nowadays, these problems have been solved or more reduced through the technological progress or through the good position of the energy plants.

We consider that the utilization of the Aeolian energy remains a priority of the present and future time and for Romania too.

Another important source of energy obtained from the reusable sources is the hydraulic energy, a mechanic energy formed from the water's potential energy, given by the difference between the level of water between the accumulation and central lake, especially from the kinetic energy of the moving water.

Worldwide, hydro energy represents the second biggest source of energy production from the reusable sources. It is not a wonder that this technology, already tested, became such a predominant thing in Romania.

The most recent estimations show that the potential of hydro energy of Romania is approximately 32.000 GWh/year. According to the project of Energetic Strategy of Romania from 2011-2035, authorities will continue the program of realization for the hydroelectric centrals, with approximately 1.400 MW until 2035

At the end of 2010 the capacity installed at Hidroelectrica was of 6.438,11 MW. From this total capacity, a power of 276.74 MW is installed in 162 centrals with less power or equal to 10 MW, so micro hydro central (MHC). According to information given from the CEO of Hidroelectrica, in the company's records there are 93 dams of different importance and dimensions. (information given for "Green Report") (fig.4).



Fig.4 – Hydro central from Portile de Fier

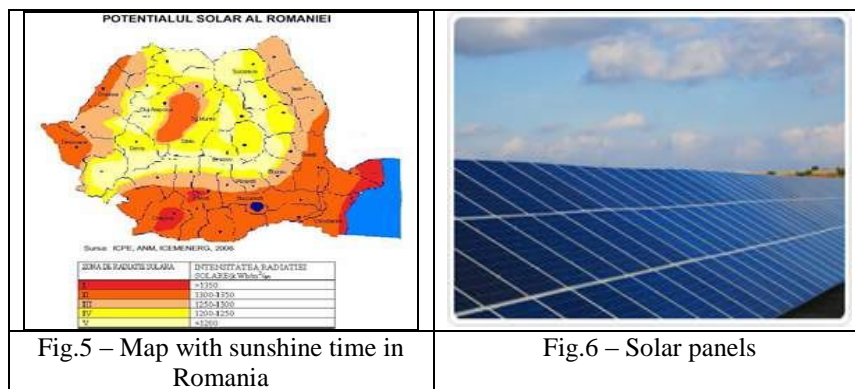
The advantage of this type of energy is that it has a high efficiency, small prices, having a long lifetime and does not pollute.

Another inexhaustible and clean source is the solar energy, which, unfortunately, in Romania does not represent the interest that the Aeolian energy receives by the people.

Even though Romania has an important solar potential, until 2015 there will not be a plan to develop this energy due to the dominant Aeolian energy, and from the point of view of resources that will beneficiate of certificates, the biggest part will play the Aeolian energy (source **GE Energy**).

According to Transelectrica, the request for energy in Romania will double in approximately 20 years. Also, according to the Energetic Strategy of Romania, the solar potential of the country can generate 1.2 TWh per annum of energy, so 2.5% form the annual nation consumption. In the west of the country, Campia Romana, Dobrogea, and the south of Moldova, are the best zones for these kinds of investments (fig.5).

The first investors in this field came with projects for solar energy and the biggest project is made for the town of Gataia, Timis, which spreads on a surface of 86 hectares, with an installed power of 32 MWh. Also in this town, there is the making of another smaller project, only on 20 hectares, with a power of 2.99 MWh (source Transelectrica) (fig.6).



Another zone, where reusable energy can be developed could be the biogas zone. To produce biogas, the materials that are needed can be any organic product, which can be fermented by micro organisms, but it has to be known that the prime material has to agree with the environment in which the microorganisms develop and produce activities, which occurs at the digestive layer and, finally to the production of biogas. Prime, organic materials from different surroundings can be used to obtain biogas.

One of the biggest sources of biogas is the result of mud, which forms from the used waters from the exhaust stations, and so it develops a desert. It should be

capitalized at all the exhaust stations from the huge urban congestions. Also deserts produced from animals in agricultural farms could be fuels instead of waste. Also household waste, under landfills, forms a gas that is shameful not to be used. This is a zone where investments should be educated and that can play an important role in the production of reusable energy (GE Energy) (fig.7).

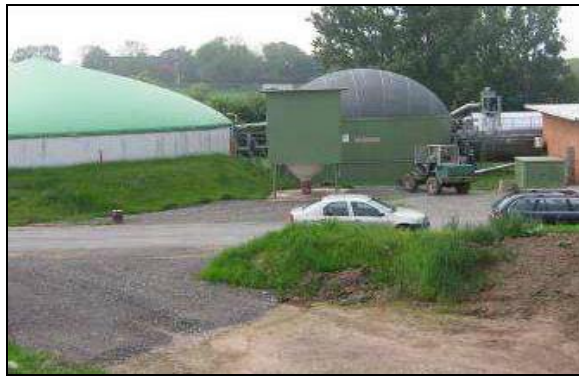


Fig.7 – Station where production of biogas takes place

As far as geo thermal sources are concerned, the Panonica depression, which contains the west side of our country, including Banat and the west of the Apuseni Mountains, is a rich zone in geo thermal deposits.

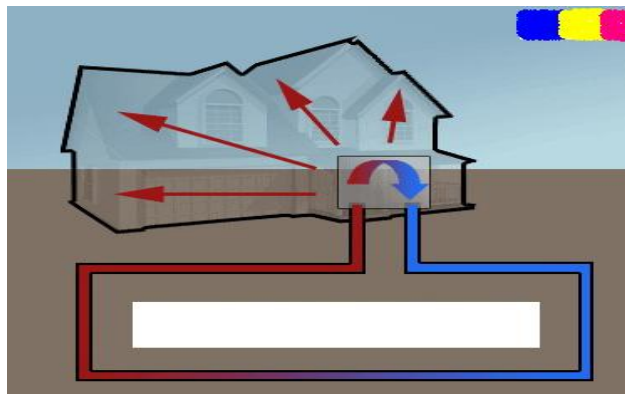


Fig.8 – The circuit of the geothermal water for the warming up of a house

For over 100 years, around Oradea, drilling was made and geo thermal waters have been explored in therapeutic purposes. In the last quarter of a century, systematic actions for prospect and evaluation of geothermal deposits have been made, and also of hydrocarbons in this side of the country. From this it was found that West Campia, in all the geological formations, there can be found varied aquifers layers with capacity and thermo physic properties. Thermal flows at surface have values of 85 MW/m squared, bigger than in other zones. The thermic level of the geo thermal waters from the west is reduced: 30- 90 degrees Celsius. Because of this, these can be used in special therapeutic ways, the preparation of warm household water, etc.

In Oradea and Bihor, warm household water is produced for 800 apartments, to warm baths, vegetable greenhouses, pools, and hotels. In Timis, the geo thermal water is used for warmth, in therapeutic ways, and for the warming up of the household water (fig.8).

Another source of reusable energy is the marine energy. The marine energy is also understood as the energy from waves, energy of currents and also the energy of the water. For the Black Sea, there is a difference in the temperature between the surface and deep water, a reason why the thermic energy is only present for a short period of time and this form of energy does not represent an interest in any form. For us, the marine energy that deserves to be taken into consideration is the energy of the waves.

Conclusion

Humans are conflicted in this century with some major problems like the energy, water and alimentation, this being resolved by the preoccupation for a durable development.

Concerning the reusable energy at national level, Romania shows important sources the same as they have been presented while in work. On first place, there is hydro energy, followed by Aeolian energy biomass, solar and geo thermal. At the same time as the entry into the European Union, Romania has become close to all the states of the Union, towards fighting pollution in the environment and for the reduction of any emissions, to maintain equilibrium between man and nature.

References:

- Apostol, L. (2003)**, *Unele aspecte privind potențialul de risc climatic al vântului în Subcarpații Moldovei*, Anal. Univ. Ovidius – Geogr., **I**, Constanța.
- Apostol, L. (2004)**, *Clima Subcarpaților Moldovei*, Edit. Univ., Suceava, 439 p.
- Apăvăloae. M., Apostol, L., Pârvulescu, I. (1986)**, *Posibilitati de valorificare a potențialului energetic eolian în partea de nord-vest a Podișului Moldovei*, Stud. și Cercet. de Meteorolog., vol. Omagial, „ 100 ani de la infiintarea I.M.H. ”, I.M.H, București.

Bogdan, Octavia (1993), *Influențe topoclimatice induse de lacurile de acumulare cu exemplificare la Porțile de Fier I (Defileul Dunării)*, S.C.G.-**XL**, p. 93-104.

Patrichi Silvia, (1984), *Câteva caracteristici cadastrale pentru calculul energiei vântului, cu referire specială la zonarea vitezelor energetice, pe teritoriul României*, Studii și cercetări „Fundamentarea meteorologică și hidrologică a resurselor energetice neconvenționale” INMH, București, p.169-198.

Popa Anestina, Tuinea, P. (1997), *Particularități ale distribuției spațio – temporare ale vitezelor maxime anuale ale vântului în Podișul Moldovei*, Lucr. Sem. „D. Cantemir”, 13-14 /1993 – 1994, Iași.

Rusan, N. (2010), *Potentialul energetic eolian din partea de est a Romaniei*, Editura Univ. „Lucian Blaga” Sibiu, 257 p.

Țâștea, D., Lorentz, R., Bâzâc, Gh. (1976), *Zonarea vitezelor maxime anuale ale vântului pe teritoriul României*, Studii și Cercetări , I / 2, p. 441 - 457 , INMH, București.

* * * (1983), *Geografia României, I, Geografia Fizică*, Edit. Academiei, București, 662 p.

* * * (1984), *Fundamentarea meteorologică și hidrologică a resurselor energetice neconvenționale*, Studii și Cercetări , INMH, București, 388 p.

www.naturaenergy.ro

www.adrcentru.ro

www.energieeoliană.org

<http://instalatii-solare-eoliene.ro/>

<http://www.sunairenergy.com>

http://www.agir.ro/univers-ingineresc/energia_eoliana.ro