

DEVELOPMENT AND APPLICATION OF POTENTIAL ALTERNATIVE ENERGY SOURCES

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Abstract: *This paper presents the potentials of alternative energy sources, their uses, opportunities and perspectives for further development of their application. In addition, the paper will analyze the potentials of renewable energy sources such as solar energy, wind energy, hydro energy, biomass and geothermal energy. The use of the potential of renewable energy sources and energy efficiency results in significant energy security and are one of the necessary components of possible ways of achieving sustainable development. The concept of sustainable development is to balance the three key factors of sustainable development: the sustainable development of the economy and economy, the sustainable development of society based on social balance and environmental protection, along with the rational disposal of natural resources. The goal and purpose of the work is to raise environmental awareness as well as the importance of contributing to the application of renewable energy sources on a global scale.*

Key words: *alternative energy sources, solar energy, wind energy, hydro energy, biomass, geothermal energy*

1. INTRODUCTION

Consequences caused by continuous pollution of air, water and soil by waste materials that a person rejects in the process of increasing urbanization and industrialization. In addition to problems related to the reduction of environmental pollution, there is also the problem of creating economic envy.

After a long period of use of fossil fuels, today's global image is changing, and renewable sources are increasingly considered one of the key sources of energy for the future development of the Earth. Renewable energy sources are considered sources of energy that are preserved in nature and are renewed in part or in whole. Energy sources can be classified as: solar energy, wind energy, geothermal energy, biomass energy, water energy, tidal and tidal energy, internal heat of the sea and ocean, gas energy from landfills or wastewater treatment plants.

Changing the way of using renewable and non-renewable energy sources can significantly affect the growth of social wealth and the preservation of the environment. It is necessary that the ecological knowledge become an integral part of the matrix of general and basic knowledge. If people resort to the use of renewable energy sources, the possibility of further global warming of the Earth would be significantly reduced. Preservation of the environment is of crucial importance for the survival of people, plant and animal life on the planet.

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2. ENERGY POTENTIAL AND EFFICIENCY BY SOLAR ENERGY

Solar energy is the energy of solar radiation that we observe in the form of light and heat that we receive from the largest source of energy on Earth, the Sun. When the sun's rays reach the earth's atmosphere, the amount of sunlight on a surface on Earth depends on several factors: season, time of irradiation, characteristics of receiving area, location, inclination of the surface in relation to the horizontal plane and weather conditions.

Today's technologies of solar energy use include the most diverse applications, from solar lighting, the operation of audiovisual and refrigeration devices, the operation of signaling devices on roads, airports and lighthouses, operation of telecommunication devices and systems, pumping water, power supply to boats, boats, drive. Modern society has recognized numerous advantages of solar energy potential: reducing dependence on fossil fuels, improving air quality and reducing greenhouse gas emissions, while the production and installation of solar systems stimulates the creation of new jobs.

3. ENERGY POTENTIAL AND EFFICIENCY OF ENERGY WIND

Wind energy has been used for centuries and the use of this energy has been focused primarily on electricity generation today. The power that the Earth receives from radiation from the Sun is $1.74 \times 10^{17} \text{ W}$, of which 1-2% turns into wind power. The movement of air masses in the atmosphere occurs due to uneven warming of the Earth's surface at different latitudes because the air is heated indirectly over the ground. [1][2] Good sides of the exploitation of the wind potential, it is emphasized: high reliability of operation of the plant, no investment costs of propellant and pollution does not occur in the natural environment. Wind power also has a bad side: high investment construction costs and wind speed variability.

The construction of wind farms represents a significant contribution to the preservation of the quality of the environment. Electricity produced from wind farms reduces the share of production from thermal power plants. In this way, it reduces emissions of harmful substances into the environment, reduces the consumption of non-renewable energy sources and reduces the amount of waste generated.

4. ENERGY POTENTIAL AND EFFICIENCY OF WATER ENERGY

Water energy is the most important renewable source of energy, and at the same time it is the only one that is economically competitive with fossil fuels and nuclear energy. It is a conventional renewable energy source that has been used for centuries to get mechanical, and for more than a hundred years and electricity. The installed capacity of small hydropower plants in the EU is around 12.5 GW, which represents 9% of the total power of all hydropower plants, and 2% of the total power of all EU energy capacities. [3] The technology of using marine energy potentials offers the possibility of clear and precise control of energy production, which is reliable, which, by itself, is much higher than the production of electricity from wind, solar or biomass. [4]

The good sides of the exploitation of small hydropower plants are: elasticity and reliability in work, domestic industry, low investment maintenance costs and increased tourist attractiveness of the environment. The poor side of the exploitation of small hydropower plants is: significant impact on the ecology of the site where they are built, the disruption of the reproductive cycle

of fish, the reduction of forests around the hydroelectric power plant can cause landslides, which can cause a change in the flow of running water.

5. ENERGY POTENTIAL AND EFFICIENCY OF BIOMASS ENERGY

The use of biomass or fuel and waste materials derived from biomass as a source of energy requires minimal investments that can be quickly and repeatedly returned. One of the most important factors determining the potential role of biomass in the energy industry is the strong competition that exists between the value of biomass and land needed for its breeding, which is not the case with other renewable sources. The advantage and efficiency of the use of biomass as a source of energy are abundant potentials, not only for the purpose of planted plant culture, but also waste materials in the agricultural and food industry. The barrier that occurs with the increased use of biomass potential is insufficient availability and experience of using equipment, as well as an insufficiently developed biomass market.

The main aspect in using biomass potentials should be the sustainability of use. Sustainability first of all means that the amount of biomass used to generate various types of energy is always smaller or equal to the increase in the amount of biomass. When it comes to agricultural crops, the sustainability of the use of biomass should involve the planned and regular return of a certain amount of organic matter of biomass to about 30% in the soil in the form of harvesting, as this ensures balance and results in higher fertility of the soil. The sustainability of the use of forest biomass involves long-term planning in terms of afforestation and exploitation of forest biomass.

6. ENERGY POTENTIAL AND EFFICIENCY OF GEOTHERMAL RESOURCES

Geothermal energy is somewhat readily available or is itself exposed to the surface of the earth in hot water or steam, and somewhere at a great depth and inaccessible. The most practical areas for the exploitation of geothermal energy are those where the hot mass is located near the surface of the earth. The structure of the Earth's interior is such that temperature depending on the layer structure increases from 10°C to 30°C every kilometer closer to the core. The almost immutable temperature of the Earth's crust layer can be used to a large extent for the indirect heating or cooling of residential and commercial buildings.

The greatest advantage of geothermal energy is that it is clean, safe for the environment and the energy supplies available to us are practically inexhaustible. Geothermal energy is reliable because it does not depend on meteorological conditions as opposed to hydroelectric power plants, which depends on the amount of water available, wind power plants vary greatly and cannot be known when it will be, solar system, which cannot work at night and depend on meteorological conditions. Electricity from geothermal sources can be produced 24 hours a day. Geothermal power plants have very low production costs. They only require energy to run water pumps, and this energy produces the power plant itself. The biggest disadvantage is that there are not many locations that are suitable for exploiting the potential of geothermal energy and suitable for the construction of geothermal power plants.

7. CONCLUSION

In the time ahead, it seems that the solution for the efficient and necessary supply of energy, and consequently of the significant substitution of exhaustive and polluting energy resources, lies in the diversification of the use of various and especially renewable energy sources. Any

smallest or seemingly most significant source of energy should not be discarded. In addition, forms of energy that do not significantly pollute the environment will have the advantage in development and application.

Renewable energy sources are increasingly gaining importance as a replacement for fossil fuels, and their development and their use are growing over time. Their participation as an inexhaustible source of energy, according to experts' predictions, could already be 50% of the total amount of energy needed by 2050, with the tendency to gradually replace fossil fuels. Until that happens, the world will fight for a long time to deal with the problem of providing the necessary energy. Transition to renewable energy sources will be neither quick nor easy, and especially not cheap, and fossil fuels will be a long-standing backbone of the energy world, an important factor in energy policy.

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Investments in the field of renewable energy sources are large, starting from research, adoption of necessary legal acts and measures, to the construction of large energy facilities, but also to household appliances for own consumption. Regardless of the large investments, they are certainly justified because in the course of more or less years, the funds invested are returned, and afterwards they bring benefits to both the investor and the whole country. The biggest investments are in exploiting the potential of wind and solar energy, sources available to all, as well as the potential of biomass energy that can be considered renewable only if it is being used for a planned purpose.

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