

ENVIRONMENTAL AWARENESS AS A DETERMINANT OF THE USE OF RENEWABLE ENERGY SOURCES

Mirjana Galjak¹ Bojan Jovanović²

Abstract: The development of society is significantly conditioned by the increase in energy consumption. In addition to the noticeable absolute increase in the global energy use, a significant change in the percentage of the participation of certain types of energy has also been seen. The primary energy consumption continues to grow. This paper shows the importance of developing environmental awareness as a determinant of the energy efficiency improvement in order to protect the environment and combat further degradation of its ecological value.

Key words: environmental awareness, renewable energy sources, environment

1. INTRODUCTION

The use and economic evaluation of natural resources is a prerequisite for the economic development of a country. The use of natural resources should be planned, controlled and directed since they can contribute to the general wealth of a country and its citizens. Problems that occur with non-renewable energy sources are, primarily, associated with their quantity and distribution. Fossil fuel reserves are limited and fast being depleted. Due to the fact that energy resources are concentrated in only a few areas in the world, the use of non-renewable fuels has led to the creation of a system of interdependence within which countries dependent on the import of fossil fuels are placed in a subordinate position. Another big problem refers to the environmental pollution. The burning of fossil fuels causes, among other things, the greenhouse effect due to the emission of carbon dioxide, sulfur, nitrogen compounds and other polluting compounds and particles [1].

Because of the increase in the demand for energy and the degradation of the quality of the natural environment, there is a necessity to conserve those energy resources as much as possible. One of the ways to save them is their substitution with renewable energy sources. Renewable energy sources can be used indefinitely if they are handled in a planned manner. Their use is becoming more popular (more socially acceptable alternative) because they have a negligible negative impact on the environment. The issues of greater use of renewable energy sources and the achievement of energy efficiency are not only within the competence of the highest authorities of the central government. It is the issue that has to be dealt with at all levels of the state hierarchy [2].

Renewable energy sources such as hydropower, geothermal energy, biomass energy, solar and wind energy are constant and, therefore, should be used to the maximum. Their use provides energy that does not create waste, and does not cause, as well, problems related to air, climate, water and other natural elements. Renewable energy sources promote sustainable development that meets the needs of the present without compromising the rights of future generations. The priority of global development today is the security of energy supply at affordable prices, but with the aim of maintaining and increasing the people's standard of living [3].

¹Kosovo and Metohija Academy of Applied Studies, Dositeja Obradovića bb., Leposavić, mirjana.galjak@akademijakm.edu.rs

²Kosovo and Metohija Academy of Applied Studies, Dositeja Obradovića bb., Leposavić, bojan.jovanovic@akademijakm.edu.rs

At the same time, the negative effects of energy use, especially fossil fuels, on the environment has to be reduced. Therefore, all the countries redefine energy policies year after year and focus on creating a competitive energy market, through the use of renewable energy sources. Those sources and their management are considered an important issue in all developed countries.

This is supported by the agreement of the Ministers of Energy, the members of the Group of Seven Richest Democracies (G7), who, in Toronto on April 30, 2024, agreed to end the coal use in the production of electricity in the first half of the 2030s. The communique also includes an alternative goal of phasing out coal-fired power plants "in a timeline needed to keep the 1.5C warming limit within reach, and in line with countries' ways to achieving "net zero pollutant emissions" from the coal use. That alternative target was included in the final version of the communiqué to give room for manoeuvre to Germany and Japan, whose coal-fired power plants produce more than a quarter of their total electricity [4].

Knowledge about the need to protect nature also contributes to the developed ecological human awareness that is based on new knowledge, attitudes, values, opinions and behaviors. It is a term that refers to the developed understanding of the environment, its problems, negative impacts on it, as well as the possibilities for improving the energy efficiency and reducing environmental pollution and its further degradation [5].

2. POSSIBILITIES OF APPLICATION OF RENEWABLE ENERGY SOURCES

The development of renewable energy sources such as wind, water, solar and biomass in particular is crucial for several reasons [6]:

- these energy sources play a very important role in reducing the carbon dioxide emission into the atmosphere;
- they increase the share of renewable energy sources increasing, thus, the energy system sustainability of a country. At the same time, they help improve the security of energy supply, and consequently reduce the reliance on the imported energy raw materials and electricity,
- in the near future, it is expected that renewable energy sources will become economically competitive with conventional energy sources.

Provision of useful (final) energy using energy flows is based on the flows of energy originating from the movement and gravity of the planet such as, tidal energy, then, heat that is stored in the Earth itself (e.g. geothermal energy) and especially the energy that comes to us from the Sun (solar radiation) [7]. In fact, most renewable energy technologies are directly or indirectly powered by the Sun. The Earth's hydrosphere, i.e. water, absorbs most of the incoming radiation. Quantitatively, the highest amount of radiation is absorbed in lower latitudes, in areas closer to the equator, but driven by winds and sea currents, this energy is dispersed throughout the planet. Solar energy is indispensable for the precipitation distribution as well as for the cultivation of plants needed for the production of biofuels. The renewable energy flow includes natural phenomena such as: sunlight, wind, waves, geothermal heat as the International Energy Agency explains: renewable energy is energy derived from natural processes that are

constantly replenished. In its various forms, it is obtained directly from the Sun or the heat generated deep within the Earth. It also includes electricity and heat derived from sources such as sunlight, wind, ocean, hydropower, biomass and geothermal energy as well as biofuels and hydrogen obtained from renewable sources. Each of these renewable sources has unique characteristics that have an effect on the way how and where they are used [6]. Therefore, there is a wide range of current and future technological processes and methods for the successful exploitation of renewable energy.

Figure 1- Options for using renewable energies to provide useful energy [7]

The three sources of renewable energy provide the possibility for numerous different energy flows and energy carriers through different energy conversion processes that occur in nature (Figure 1). In this sense, for example, the energy of ocean tidal currents, solid and liquid biofuels, as well as the wind energy and water currents (as energy carriers), represent more or less transformed solar energy [7].

3. THE ROLE OF ENVIRONMENTAL AWARENESS IN IMPROVING ENERGY EFFICIENCY

Environmental awareness can be defined as a respectful attitude towards the living space that people share with other living things, plants and nature. However, the answer to the question “what environmental awareness is”, has become a phenomenon that includes renewable alternative energy sources and ecological movements, since it encompasses many areas nowadays. Environmental awareness, as a very broad term, is widely perceived as the protection of natural resources. The dependence of human beings on natural resources triggered much more the necessity for the creation of ecological and natural awareness. The rapid depletion of water resources, the reduction of forest areas and the increasingly frequent occurrence of natural disasters are among the biggest reasons that impose this need [8].

The creation and development of ecological awareness are the basis for the creation and development of ecological culture. It is a culture that contributes to the protection, preservation and improvement of the environment [9]. Environmental awareness, therefore, can be defined in several ways depending on their starting points. The key elements of environmental awareness are: ecological knowledge, ecological situation and ecological behavior. Ecological knowledge is the knowledge about the limitations of natural resources, the ecological situation includes all the values of the society itself, while ecological behavior, in addition to the previous two elements, includes the characteristics of the personality self-concept, human needs and the way they are satisfied. The stages in addressing the development of environmental awareness are the following [10]:

- awareness of the threats to certain ecosystems (environmentalism);
- awareness of the planetary threats and the need for an adequate understanding of humans' place in the biosphere;
- the phase when it is understood that ecological crisis mitigation is possible only with the change in the value system and the respect for eco-humanist values.

Therefore, "ecological awareness presupposes, in addition to knowledge about the social and natural conditions and their causes, the understanding of the need to protect the nature and prevent further violation of the natural ecological value as to preserve the natural framework of human life." [11] When we talk about ecological awareness, it is impossible not to mention the environmental crises that occur as a result of human activities. Based on the impact of human activity on the environment and the creation of ecological crises, the following table shows the aforementioned impacts.

Along with awareness of the changes occurring in nature as a consequence of the human action, and manifested in the disruption of ecological balance, awareness of those changes also arises – that is ecological awareness. It does not involve only knowledge about the state and changes in nature that stem from the attitude of the society towards it, but also includes understanding about possible ways and means of finding solutions to environmental problems.

Table 1- Systematization of input impacts and ecological input crises [12]

S.n	Input impacts	Ecological input crisis
1	Land use	Decrease of natural and agricultural land by occupying space for industrial facilities and activities, as well as special roads
2	Consumption of fuel and other forms of energy	Reducing the stock of non-renewable resources energy, reducing the available renewable energy sources by using them up to the capacity limit, degradation of land due to daily coal mining activities
3	Water consumption	Reducing the availability of limited unpolluted fresh water resources essential for ecosystems and humans
4	Consumption of differently processed material resources	Reducing the stock of non-renewable raw materials (ores of copper, zinc, lead, bromine, etc.), reduction of available renewable material resources to their maximum or even by their excessive use

Many people believe that, as individuals, they cannot do anything, not even bring any changes to their environment. However, there are many ways in which everyone can do something. The psychology of raising awareness starts from the following:

- doing more with less - in order to improve energy efficiency, it is neither necessary to give up all activities, nor to ignore them. That, in other words, means that with the help of new technologies, it is possible to improve living conditions without jeopardizing the environment;
- behavior change - make public transport an adequate alternative for cars, and reduce heating bills by installing insulation and using thermostats;
- education - to raise awareness among citizens about the necessity of energy efficiency, which is probably the most important issue.

The main problems in raising the population awareness about greater use of renewable energy sources are the following:

- lack of specific knowledge on how to use energy efficiently;
- lack of awareness and failure to carry out campaigns in order to increase energy efficiency;
- the public sector is not interested in educational activities;
- companies do not have enough time to conduct trainings;
- school programs do not include numerous activities in the field of energy;
- the economic crisis demotivates people;
- marketing activities and experts are expensive;

- difficulties in behavioral changes;
- technological barriers to the best practices implementation

Awareness raising campaign involves four key components: message, audience, strategy, and timing [13]. Raising-awareness messages must be short and understandable to every individual, that is, they must create a positive image among the target audience. Strategy, as a way of achieving goals, implies the application of appropriate communication tools. All these elements are to be accomplished within the planned time. For these purposes, SEEI (South East European Institute) has outlined appropriate programs for the promotion of energy efficiency at the local level. These programs contain the following steps [14]:

- step 1-team building;
- step 2-situation analysis/SWOT analysis: energy consumption at the municipal level; awareness of the importance of energy efficiency;
- step 3-goal formulation: support for energy efficiency goals; setting communications goals and goals at the level of awareness;
- step 4-communication plan development: defining communication tools; defining target audience; developing communication messages;
- step 5-program implementation: defining the duration of the program; a budget period determination;
- step 6-program evaluation: evaluation of achieved results; monitoring and reporting results; message correction.

Environmental awareness has a direct impact on the development of environmental responsibility, which, among other things, implies the use and development of renewable energy sources. For example, the Intercontinental Hotel Group is one of the first hotel chains that has embraced the technology, equipment and programs based on the sustainable development and application of renewable energy sources, that is, they are based on the protection of the environment. The official website of this company (<http://innovation.ihgplc.com>) shows only some of the activities that this hotel company carries out in terms of the environmental responsibility as a result of developed environmental awareness. All sources of renewable energy are relevant for tourism, including wind, solar and geothermal energy, and biomass. There has been an increase in consumers' environmental awareness of sustainable development, so the tourism and hotel companies that are proactively working on sustainability, environmental responsibility and the application of renewable energy sources are in significantly better position to survive in the market. Another example of the impact of environmental awareness on the use of renewable energy sources is the current situation in the EU, showing that, small and medium-sized enterprises use energy-efficient technologies for the use of renewable energy sources [15]. Also, another good example of how environmental awareness affects raising of the awareness on the importance of using renewable energy sources and increasing energy efficiency is the power plant in Copenhagen, which is considered one of the cleanest power plants in the world [16].

4. CONCLUSION

All the countries in the world are facing a difficult task which, on the one hand, involves the reduction of fossil fuel use and the emission of harmful gases that cause the greenhouse effect, global warming, climate change, natural disasters and the occurrence of acid rain, and on the other hand, preservation of the achieved level of technological and economic development. The only way to accomplish it is to reduce the fossil fuel utilization, to develop technologies for the use of renewable energy sources, and to work on the development of environmental awareness as a determinant of improving energy efficiency. Renewable energy sources and new technologies for using those sources are becoming an increasingly important segment in all spheres with an impact on the environment in particular. The use of renewable energy sources does not affect only the reduction of non-renewable energy consumption, but it is also very significant from the environmental protection aspect. A clear example is energy itself representing an area of the economy on which the development of all other areas of the economy is based. It is the biggest polluter of the environment without whose protection it would not be possible to achieve sustainable development of the human species and the living world on the planet. The environmental pollution knows no national borders, so it is the reason for further development of environmental awareness.

The replacement of fossil fuels with renewable energy sources and the development of environmental awareness at all levels in a society has a great impact on finding successful solutions to global environmental issues. Today, the use of renewable sources is gaining more and more importance, especially for the purpose of environmental protection and the use of sources available on one's own territory. Stopping climate change is currently the most serious global issue, a part of which we are also. The technologies of using renewable energy sources are becoming more economically profitable and competitive on the market every day, what thus eliminates fear that the transition from fossil fuels will threaten the economies of the countries that use them.

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