



## IMPACT OF ALTERNATIVE ENERGY SOURCES ON THE ENVIRONMENT

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**Abstract:** This paper provides extensive information about alternative energy sources. The principle of operation of solar panels, which began to be used quite recently, is shown. Their ease of use is assessed. Nuclear power plants that are considered environmentally friendly are analyzed and the difficulties encountered in ensuring their safety are shown. Information was presented about wind engines, thermal water sources, various biomass, hydrogen energy, which are considered sources of green energy.

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### **Introduction:**

One of the most pressing problems facing humanity in the modern era, when the fourth industrial revolution is taking place, is the issue of energy. When we look at the economic map of the world, we see that about 30 years ago we can show the USA, the European Union, the USSR and Japan as industrial centers. But now China, India, South Korea, Southeast Asia, South Africa, and Brazil have been added to this geography. If we add to the aforementioned industrial centers billions of cars, incessant forest fires, deforestation, desertification processes in Africa and South America, and rapid population growth, we see that the world's environmental problems are increasing even more. Moreover, as the influence of anthropogenic factors increases, environmental problems increase (Regmi & ets, 2022; Razak & Sharip, 2019; Ngayakamo, 2020). It is necessary to solve a number of problems in order to eliminate these causes that determine the destruction of humanity. The first radical steps that need to be taken in this direction include the following measures:

- In a short time, the world's most advanced automakers must ensure a transition from the production of cars running on gasoline and diesel fuel to the production of electric vehicles. Because these cars account for 80% of the toxic gases emitted into the atmosphere.
- The management of plants and factories for various purposes should be required to use filter systems that meet modern requirements. This method should prevent pollution of the atmosphere and water bodies.
- Traditional energy sources that provide light and thermal energy to all industrial and agricultural enterprises, residential buildings and other social facilities must be replaced by renewable "green" energy sources.

If these factors are taken into account, many environmental problems will be solved. Therefore, extensive research has been carried out in this direction recently. Smart technologies, green technologies, and biotechnologies are developing. According to this direction, the green economy is developing rapidly. Various studies are carried out using



both experimental methods and mathematical modeling (Guseynov & ets, 2014; Darby, 2018).

Advances in technology have meant that more energy can be obtained from alternative energy sources. It is known that the development of semiconductor physics leads to the purchase of new converters. Therefore, recently extensive research has been carried out in the direction of purchasing and researching new semiconductors (Abdinov & ets, 2012; Abdinov & ets, 2014; Abdinov & ets, 2004). Obtaining inverters with higher efficiency leads to the creation of more efficient alternative energy systems. Technological capabilities are developing towards the acquisition of wind and hydroelectric power. Due to the reduction of water resources, hydroelectric power plants are considered not a very promising area. In the presented work, alternative energy sources were investigated and their technological and economic capabilities were shown. It is shown that the development of green energy can lead to the beginning of a new era in many areas.

#### **Research methods:**

Alternative energy sources are explored, the advantages and disadvantages of these methods are shown. Using this method, both energy consumption and environmental impact factors were shown. It is known that alternative energy sources are diverse. Electricity is obtained from these sources using different methods. Each method has its own advantages, as well as environmental impacts. Each of these effects was investigated in the presented work. Scientific innovations in the direction of green energy with the development of smart technologies are analyzed.

#### **Results and discussions:**

It is known that there are various sources of energy in nature. Recently, extensive research has been carried out towards the discovery of renewable energy sources and the use of these energies. Because without these energy sources, the energy sources may run out after a certain period of time. The increase in the number of industrial plants and automobiles has further increased the demand for energy. Therefore, the search for new energy sources and energy

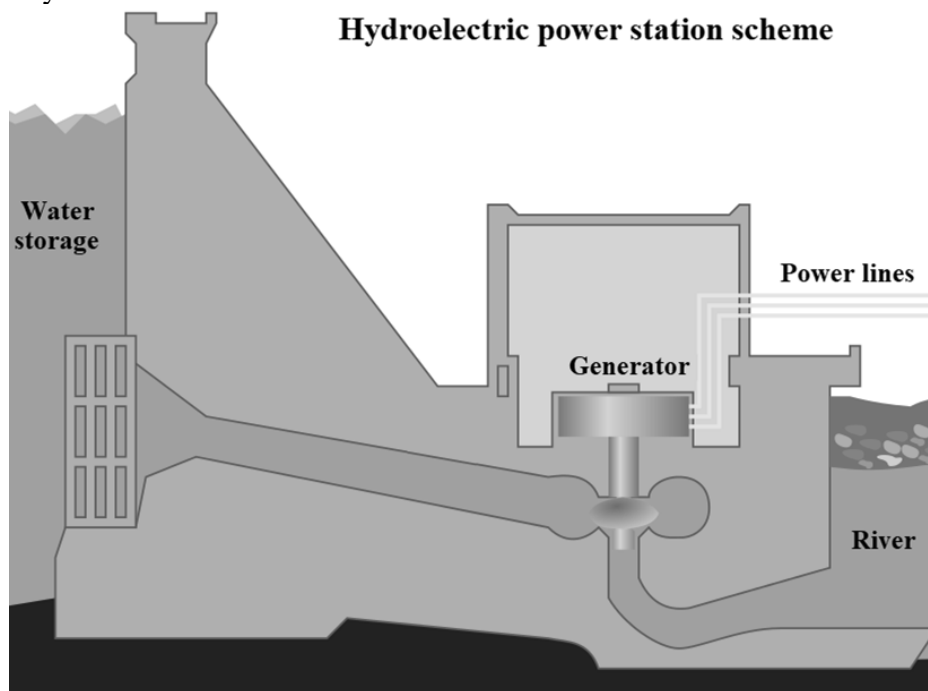
production is one of the pressing problems of science and technology. Currently, ~80% of the energy produced on Earth comes from traditional or portable energy sources. We can include fuel sources such as oil, gas, coal, fuel oil and peat. It is a well-known fact that these fuels deplete over time. Therefore, it is important to conserve these energy sources. On the other hand, when these energies are used, the atmosphere, water bodies and large land areas are polluted. Such processes cause environmental problems. When extracting fuel, soil and water bodies are polluted. Atmospheric pollution occurs when fuel is used. As a result of the combustion of these types of fuel, millions of tons of carbon dioxide, nitrogen oxides, and sulfur compounds are released into the atmosphere. Carbon and many of its stable compounds have the property of adsorbing solar energy, preventing the dissipation of energy absorbed by the Earth from the atmosphere. Therefore, there is a gradual increase in temperature on Earth, which ultimately leads to global warming. As a result of the reaction of nitrogen and sulfur with water in the atmosphere, acid rain occurs, which leads to the destruction of living things and vegetation, as well as biodiversity in general. Therefore, it is important to study these processes and prevent the occurrence of environmental problems.

It is known that hydroelectric power plants are considered environmentally friendly. However, these plants also cause significant damage to the environment and human lives. When a hydroelectric power station is created, hectares of usable land remain under water. Therefore, the construction of these stations is not economically profitable. It is more expedient to plant forests on these lands and use them for agricultural purposes. Another harmful aspect of hydroelectric power plants is that they seriously impair the free movement of fish and other creatures in rivers. On the other hand, hydroelectric power stations limit movement along rivers and narrow the geography of navigation. Water basins occupying a large area cause climate changes in the area: increased humidity, increased hail and rain, and the creation of winds. Figure 1 shows a schematic diagram of a hydroelectric power station. As can



be seen from the diagram, in order to raise the price of mechanical (potential) energy, it is necessary to raise the water level. At this time, a large area is flooded. When the water level decreases, the price of mechanical energy decreases. It is known that the resulting electrical energy is called mechanical energy. Therefore, as the price of electricity produced increases, the area of land under water also increases. Given this, hydroelectric power is not considered a very effective method of use as an

alternative energy source. From Figure 1 it can be seen that water, passing through the station, continues its movement, forming a river. This water can be used for irrigation. However, it is impossible for fish and other creatures to live in the water passing through the station. It is very important to study the impact of hydroelectric power plants on the environment, to predict events that may occur during their creation and use.



**Figure 1. Hydroelectric power station scheme.**

Nuclear power plants are environmentally friendly, but not safe. Accidents and leaks of radioactive substances at the Chernobyl and Tokoshima nuclear power plants have significantly reduced confidence in these energy sources. Another harmful aspect of nuclear power plants is the release of hot water used to cool the nuclear reactor into rivers and other bodies of water. The service life of radioactive elements used in modern nuclear power plants is ~20 years. After this period, disposal of this waste becomes a problem. When nuclear reactors shut down, the materials used in that reactor become radioactive for a long time. Using them and standing next to them is quite dangerous. Therefore, nuclear reactors, including nuclear power plants, are environmentally hazardous. They manifest their

negative impact not only on humans, but also on other creatures around him. The Russian-Ukrainian war, which began in 2022, has made nuclear issues even more pressing. Because the processes occurring around nuclear power plants can lead to the emergence of another danger. Despite safety measures, any explosion at this station could cause radioactive contamination of these areas for many years. Therefore, nuclear power plants in a combat zone are more dangerous. It is known that the use of nuclear weapons during war is unacceptable. Explosions at nuclear power plants can also be equated to nuclear weapons.

Green energy sources occupy a special place among alternative energy sources. Such energy sources include wind engines, thermal water sources, various biomass, hydrogen, etc.

includes. Although their share in the modern global energy market is insignificant, recently interest in these sources and the accumulation of energy produced from them has been growing rapidly. Wind energy is known to be the most widely used green energy source. Wind energy facilitates the conversion of mechanical energy into electrical energy. The main advantage of this method over other alternative energy methods is that it is environmentally friendly. When using wind energy, a small area is used. There is no pollution in this area. Depending on the wind power, more energy can be generated. Recently, the use of hydrogen energy has become more relevant. Extensive research is being conducted in the direction of obtaining hydrogen energy using various physicochemical methods (Imanova & ets, 2023; Ali & ets, 2021).

It is known that the most inexhaustible and reliable source of energy is the Sun. The idea of turning solar energy into electricity belonged to Lavoisier, a French scientist who lived in the 19th century. Even after many years, this question is still relevant. The previous generation of solar inverters temporarily lost

their relevance due to high cost, rather low efficiency (~10%), limited resources (Se, Cd, Pb, etc.). However, the fourth industrial revolution, the widespread use of intelligent systems, an increase in the efficiency of solar cells (~22-30%), the fact that the basic element (silicon) has very large reserves, led to the rapid development of solar energy. Currently, the developed countries of the world are considering the possibility of using solar energy at any time of the year. This type of energy is increasingly used in southern countries. Like other energy sources, panels made from semiconductor polycrystals, monocrystals and thin films occupy a significant area. Recently, these panels are placed on the roofs and balconies of individual houses, but in case of huge energy production, these panels occupy hectares of land. To organize continuous operation of energy panels of this type, it is necessary to ensure that the surface is clean and that the sun's rays fall perpendicular to the surface. Figure 2 shows solar panels.



**Figure 2. Solar panels for used to generate electricity.**

After the end of the service life of modern solar panels (~25-30 years), the problem of their disposal will arise. Decommissioning silicon panels, considered environmentally toxic, and replacing them with new ones is a serious

problem awaiting solution. Therefore, solving the following tasks to include environmentally friendly, reliable solar panels as a source of “green energy” in our daily lives are the main tasks facing modern energy:



- increase the efficiency of semiconductor photoconverters;
- develop supercapacitors for storing energy generated by solar inverters and organize their mass production;
- ensure the recycling of solar panels that have expired, while protecting the environment.

As you can see, each method of using alternative energy has its own advantages and disadvantages. However, by using renewable energy, a number of environmental problems can be solved and energy can be obtained cheaper.

### Conclusion:

Alternative energy sources were explored and methods for solving environmental problems were analyzed. The impact of alternative energy sources on the environment has been studied. The study examined the environmental issues of hydroelectric and nuclear power plants. It has been determined that each method of using alternative energy sources has advantages and disadvantages. It has been determined that it is important to increase the efficiency factor when using renewable energy sources. At the same time, by obtaining more energy, you can also increase the economic efficiency of the work performed.

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