



Alternative Energy Sources

Charyeva Makhbuba Rizakulyevna

Senior Teacher Of The Department Of Energy, Bukhara Engineering And Technological Institute, Uzbekistan

Copyright: Original content from this work may be used under the terms of the creative commons attributes 4.0 licence.

ABSTRACT

This article discusses the problems of finding new types of fuel that could be called wasteless and inexhaustible. The issue is being discussed the question of what material and by what methods should humanity receive energy in the future.

KEYWORDS

Energy production, energy sources, energy problems, solar energy, wind energy, nuclear energy, fuel energy, thermonuclear fusion, hydrogen energy, ebb and flow energy, geothermal energy, hydrothermal energy, ebb and flow energy, wave energy.

INTRODUCTION

Energy production, which is a necessary means for the existence and development of mankind, has an impact on nature and the human environment. On the one hand, heat and electricity has so firmly entered the life and production activity of a person that a person

does not even think of his existence without it and consumes inexhaustible resources for granted. On the other hand, people are increasingly focusing their attention on the economic aspect of energy and requires environmentally friendly energy production. This suggests the need to address a set of

issues, including the redistribution of funds to cover the needs of mankind, the practical use of achievements in the national economy, the search and development of new alternative technologies for generating heat and electricity, etc.

In the second half of the twentieth century, a global problem arose before humanity - this is environmental pollution by the products of fossil fuel combustion. Even if we consider separately each sector of this problem, the picture will be dire. For example, here are the statistics on emissions of harmful substances into the environment by cars: 14.7 million tons of carbon monoxide, 3.4 million tons of hydrocarbons, about one million tons of nitrogen oxides, more than 5,5 thousand tons got into the atmosphere with the exhaust gases of cars highly toxic lead compounds. And this is data for the distant 1993, and if we take into account that every year over 40 million cars leave the conveyors of automobile factories, and the pace of production is growing, then we can say that in ten years all major cities of the world will be bogged down in smog. To this it is also necessary to add the products of fuel combustion at thermal power plants, the flooding of vast territories by hydroelectric power plants and the constant danger in the regions of nuclear power plants. But this problem also has a second side of the coin: all currently used energy sources are exhaustible resources. That is, in a century, with such rates of consumption of coal, oil and gas, the population of the Earth will get bogged down in an energy crisis.

Therefore, nowadays all scientists of the world are faced with the problem of finding and developing new alternative energy sources. This paper will consider the problems of finding

new types of fuel, which could be called wasteless and inexhaustible.

MATERIALS AND METHODS

The modern period of human development is sometimes characterized through: energy, economy, ecology. Energy occupies a special place in this row. It is decisive for both the economy and the environment. The economic potential of states and the well-being of people depend on it to a decisive extent. It also has the strongest impact on the environment, ecosystems and the biosphere as a whole. The most acute environmental problems (climate change, acid precipitation, general pollution of the environment, and others) are directly or indirectly related to the production or use of energy. The power industry is the leader not only in chemical, but also in other types of pollution: thermal, aerosol, electromagnetic, radioactive. Therefore, it would not be an exaggeration to say that the solution of energy problems depends on the possibility of solving the main environmental problems. Energy is a branch of production that is developing at an unprecedented rate. If the population size under the conditions of the modern demographic explosion doubles in 40-50 years, then in the production and consumption of energy this happens every 12-15 years. With such a ratio between the growth rates of population and energy, the power supply increases like an avalanche not only in total terms, but also per capita.

There is no reason to expect that the rates of production and consumption of energy in the near future will change significantly (a certain slowdown in them in industrialized countries is

compensated by an increase in the power supply of the third world countries), therefore it is important to get answers to the following questions:

- What influence the main types of modern (thermal, water, atomic) energy have on the biosphere and its individual elements and how will the ratio of these types in the energy balance change in the short and long term;
- Is it possible to reduce the negative impact on the environment of modern (traditional) methods of obtaining and using energy;
- What are the possibilities of energy production due to alternative (non-traditional) resources, such as the energy of the sun, wind, thermal waters and other sources that are inexhaustible and environmentally friendly.

At present, energy needs are met mainly by three types of energy resources: organic fuel, water and the atomic nucleus. The energy of water and atomic energy are used by man after converting it into electrical energy. At the same time, a significant amount of energy contained in fossil fuel is used in the form of heat, and only part of it is converted into electricity. However, in either case, the release of energy from organic fuel is associated with its combustion, and, therefore, with the flow of combustion products into the environment. Let's get acquainted with the main environmental consequences of modern methods of obtaining and using energy.

Putting aside thermal energy, which must be completely abandoned, and nuclear energy, a small share of which (especially for the first time) will still have to be left in the global

energy balance, let us turn to alternative energy based on the use of renewable energy sources. These include already existing energy sources that use the energy of the Sun, wind, ebb and flow, sea waves, the internal heat of the planet. Let us now consider each of them in more detail and find out whether it is possible and how effective their application is.

The main reasons indicating the importance of an early transition to alternative energy sources:

- **Global ecological:** today it is well known and proven the fact of the detrimental effect on the environment of traditional energy-producing technologies (including nuclear and thermonuclear), their application inevitably leads to catastrophic climate change already in the first decades of the XXI century.
- **Political:** the country that will be the first to fully master the alternative energy, is able to claim the world championship and actually dictate the prices of fuel resources;
- **Economic:** the transition to alternative technologies in the energy sector will save the country's fuel resources for processing in the chemical and other industries. In addition, the cost of energy produced by many alternative sources is already lower than the cost of energy from traditional sources, and the payback period for the construction of alternative power plants is significantly shorter. Prices for alternative energy are falling, for traditional energy they are constantly growing;
- **Social:** the size and density of the population is constantly growing. At the same time, it is difficult to find areas for the construction of nuclear power plants, state district power plants, where energy

production would be cost-effective and safe for the environment. The facts of the growth of oncological and other serious diseases in the regions of the location of nuclear power plants, large state district power plants, enterprises of the fuel and energy complex are well known, the harm caused by giant flat hydroelectric power plants is well known - all this increases social tension.

- **Evolutionary-historical:** due to the limited fuel resources on the Earth, as well as the exponential growth of catastrophic changes in the atmosphere and biosphere of the planet, the existing traditional energy seems to be a dead end; for the evolutionary development of society, it is necessary to immediately begin a gradual transition to alternative energy sources.

Energy of sun

The leading environmentally friendly source of energy is the Sun. Currently, only a tiny fraction of solar energy is used due to the fact that existing solar panels have a relatively low efficiency and are very expensive to manufacture. However, one should not immediately abandon an almost inexhaustible source of clean energy: according to experts, solar energy alone could cover all conceivable energy needs of mankind for thousands of years to come. It is also possible to increase the efficiency of solar installations several times, and by placing them on the roofs of houses and next to them, we will provide heating of housing, water heating and the operation of household electrical appliances even in temperate latitudes, not to mention the tropics. For the needs of industry that require large energy consumption, you can use kilometer-long wastelands and deserts,

completely lined with powerful solar plants. But the solar industry faces many difficulties with the construction, placement and operation of solar energy plants on thousands of square kilometers of the earth's surface. Therefore, the total share of solar energy has been and will remain rather modest, at least for the foreseeable future. For billions of years, the Sun has been emitting tremendous energy every second. About a third of the energy of solar radiation hitting the Earth is reflected by it and scattered in interplanetary space. A lot of solar energy is used to heat the earth's atmosphere, oceans and land. At present, solar energy is often used in the national economy - solar installations (various types of solar greenhouses, hotbeds, desalination plants, water heaters, dryers). The rays of the sun, collected at the focus of a concave mirror, melt the most refractory metals. Work is underway to create solar power plants, use solar energy for heating houses, etc. Solar semiconductor batteries are found in practical application, allowing the direct conversion of solar energy into electrical energy.

Wind

The potential of wind energy has been calculated more or less accurately: according to the World Meteorological Organization, its reserves in the world are 170 trillion kWh per year. Wind power plants have been developed and tested so thoroughly that the picture of today's small wind turbine supplying the house with energy along with the farm looks quite prosaic, and tomorrow's thousands of giant hundred-meter towers with ten-meter blades, built in a chain where strong winds constantly blow, which also make their own important "percentage" into the global energy balance.

Wind energy has several significant drawbacks that complicate its use, but do not detract from its main advantage - environmental friendliness. It is highly dispersed in space, so wind turbines are needed that can constantly work with high efficiency. The wind is very unpredictable - it often changes direction, suddenly dies down even in the windiest regions of the world, and sometimes reaches such a force that it breaks windmills. Wind power plants are not harmless: they interfere with the flights of birds and insects, make noise, and reflect radio waves with rotating blades. But, as we will see further, these shortcomings can be reduced, or even completely eliminated.

At present, wind power plants have been developed that can operate efficiently in the weakest wind. The pitch of the propeller blade is automatically adjusted in such a way that the maximum possible use of wind energy is constantly ensured, and if the wind speed is too high, the blade is automatically transferred to the vane position, so that an accident is excluded.

The so-called cyclone power plants with a capacity of up to one hundred thousand kilowatts have been developed and operate, where warm air, rising in a special 15-meter tower and mixing with the circulating air flow, creates an artificial "cyclone" that rotates the turbine. Such installations are much more efficient than solar panels and conventional wind turbines.

To compensate for the variability of the wind, huge "wind farms" are being built. At the same time, the windmills stand in rows in a wide area, because they cannot be placed too closely, otherwise they will block each other.

There are such "farms" in the USA, in France, in England, but they take up a lot of space; in Denmark, the "wind farm" was placed in the shallow coastal waters of the North Sea, where it does not bother anyone, and the wind is more stable than on land.

A positive example of the use of wind energy was shown by the Netherlands and Sweden, which made a decision during the 90s to build and place in the most convenient places 54 thousand high-efficiency power plants. More than 30 thousand wind turbines of various capacities are currently in operation in the world. Germany receives 10% of its electricity from the wind, and the entire Western Europe wind provides 2,500 MW of electricity.

Hydrogen

At the moment, hydrogen is the most developed "fuel of the future". There are several reasons for this: when hydrogen is oxidized, water is formed as a by-product, and hydrogen can be extracted from it. And if we consider that 73% of the Earth's surface is covered with water, then we can assume that hydrogen is an inexhaustible fuel. It is also possible to use hydrogen to carry out thermonuclear fusion, which has been happening on our Sun for several billion years and provides us with solar energy.

Controlled thermonuclear fusion

Controlled thermonuclear fusion uses nuclear energy released by the fusion of light nuclei, such as the nuclei of hydrogen or its isotopes deuterium and tritium. Nuclear fusion reactions are widespread in nature, being the source of energy for stars. The closest star to us - the Sun - is a natural thermonuclear reactor that has been supplying life on Earth with

energy for many billions of years. Nuclear fusion has already been mastered by man in terrestrial conditions, but so far not for the production of peaceful energy, but for the production of weapons, it is used in hydrogen bombs.

Hydropower

Hydropower plants are another source of energy that claims to be environmentally friendly. At the beginning of the 20th century, the large and mountainous rivers of the world attracted attention, and at the end of the century most of them were blocked by cascades of dams, providing fabulously cheap energy. However, this led to tremendous damage to agriculture and nature in general: the lands above the dams were flooded, below the groundwater level fell, huge expanses of land were lost, which went to the bottom of giant reservoirs, the natural flow of rivers was interrupted, the water in reservoirs rotted, fish stocks fell and etc. On mountain rivers, all these disadvantages were minimized, but one more was added: in the event of an earthquake capable of destroying a dam, a catastrophe could lead to thousands of human victims. Therefore, modern large hydroelectric power plants are not really environmentally friendly. The disadvantages of hydroelectric power stations gave rise to the idea of "mini-hydroelectric power plants", which can be located on small rivers or even streams, their electric generators will work with small water drops or driven only by the force of the current. The same mini-hydroelectric power plants can be installed on large rivers with a relatively fast flow.

Centrifugal and propeller power units of sleeve portable hydroelectric power plants with a

capacity of 0.18 to 30 kilowatts have been developed in detail. In the continuous production of unified hydro turbine equipment, "mini-hydroelectric power plants" are able to compete with "maxi" in terms of the cost of a kilowatt-hour. An undoubted advantage is the possibility of their installation even in the most inaccessible corners of the country: all equipment can be transported on one pack horse, and installation or dismantling takes only a few hours.

Another very promising development that has not yet received widespread use is the recently created Gorlov helicoid turbine (named after its creator). Its peculiarity lies in the fact that it does not need a strong pressure and works effectively using the kinetic energy of a water flow - a river, ocean current or sea tide. This invention changed the usual idea of a hydroelectric power plant, the capacity of which previously depended only on the force of the water pressure, that is, on the height of the hydroelectric dam.

The energy of the ebb and flow

A disproportionately more powerful source of water flows is the ebb and flow. It is estimated that the potential ebb and flow could give humanity an estimated 70 million billion kilowatt-hours per year.

Geothermal energy

The planet's underground heat is a fairly well-known and already used source of "clean" energy. In Russia, the first geothermal power plant with a capacity of 5 MW was built in 1966 in the south of Kamchatka, in the valley of the Pauzhetka River. In 1980, its capacity was already 11 MW. In Italy, in the areas of Landerello, Monte Amiata and Travele, 11 such

stations operate with a total capacity of 384 MW. Geothermal power plants also operate in the USA (California, the Valley of the Great Geysers), Iceland (near Lake Myvatn), New Zealand, Mexico and Japan. The capital of Iceland, Reykjavik, receives its heat exclusively from hot underground springs. But the potential power of geothermal energy is much higher.

Geologists have discovered that massifs heated to 180-200 ° C at a depth of 4-6 km occupy most of the territory of our country, and with temperatures up to 100-150 ° C they are found almost everywhere. In addition, hot underground rivers and seas with a depth of 3.5 km and a water temperature of up to 200 ° C - naturally under pressure - are located on several million square kilometers, so that by drilling a shaft, you can get a fountain of steam and hot water without any electric heating plant.

Hydrothermal energy

Besides geothermal energy, water heat is actively used. Water is always at least a few degrees of heat, and in summer it heats up to 25 ° C. Why not use some of this heat? This requires an installation operating on the “reverse refrigerator” principle. It is known that a refrigerator “pumps out” heat from its closed chamber and releases it into the environment. If you pass water through a refrigeration apparatus, then heat can also be taken away from it. Hot steam, which is formed as a result of heat exchange, condenses, its temperature rises to 110 ° C, and then it can be sent either to the turbines of power plants, or to heat water in central heating batteries to 60-65 ° C. For each kilowatt-hour spent nature gives energy for this 3 kilowatt-hours! The

same principle can be used to generate energy for air conditioning in hot weather.

Such installations are most effective at large temperature differences, as, for example, in the seas: at depth the water is very cold - about 4 ° C, and on the surface it heats up to 25 ° C, which is 20 degrees of difference! All the necessary engineering developments have already been carried out and tested experimentally (for example, at the Kawaratti atoll in the Lakkadive archipelago near the southwestern coast of India), it remains only to put them into practice wherever there are suitable natural conditions.

The time has come when mankind must come to grips with preserving its habitat. Both scientific and practical efforts are needed to preserve nature so that the human race not only survives, but also continues to develop.

The natural way of survival is to maximize the strategy of thrift in relations with the outside world and to increase the closedness of the circulation of all substances involved in the sphere of human activity.

However, it is easy to formulate this theoretically, but very difficult to translate into the language of practical activity. All members of the world community should participate in this complex process, from international organizations to each individual individually in his everyday life. Then, not ideological, but environmental problems will come to the fore; it will not be relations between nations that will dominate, but relations between humanity and nature.

CONCLUSION

Energy is the driving force behind any production. The fact that man had at his disposal a large amount of relatively cheap energy contributed greatly to the industrialization and development of society. However, at present, with a huge population, both production and consumption of energy is becoming potentially dangerous. Along with local environmental consequences, accompanied by air and water pollution, soil erosion, there is a danger of global climate change as a result of the greenhouse effect.

Humanity is faced with a dilemma: on the one hand, it is impossible to ensure the well-being of people without energy, and on the other, maintaining the existing rates of its production and consumption can lead to the destruction of the environment and serious damage to human health.

Today, about half of the world's energy balance is accounted for by oil, about a third by gas and the atom (about one-sixth each), and about one-fifth by coal. All other energy sources are left with only a few percent. It is quite obvious that at the present stage mankind is not able to do without thermal and nuclear power plants, and yet, whenever possible, where available, alternative energy sources should be introduced in order to mitigate the inevitable transition from traditional energy to alternative. Then it will be vitally important how many solar panels will have time to go into action, how many “mini-hydroelectric power plants” and tidal stations that open the way to thousands of others, how many chains of wind turbines will rise over the mountains and how many chains of wave buoys pumped off the coast.

Nuclear energy plays an exceptional role in the modern world: nuclear weapons have an impact on politics, they are a threat to everyone living on Earth. In the meantime, humanity seeks to satisfy its constantly growing energy needs through the unlimited development of nuclear energy, radioactive waste pollutes our planet. In reality, life on Earth has always depended on nuclear energy: nuclear fusion energizes the Sun, radioactive processes in the bowels of the Earth heat its liquid core, and affect the mobility of continental plates.

The first half of the 20th century was marked by the greatest victory of science - the technical solution to the problem of using the huge reserves of energy from heavy atomic nuclei - uranium and thorium. This type of fuel, burned in nuclear boilers, is not so much in the earth's crust. If the entire energy of the globe is transferred to it, then at the current rate of growth in energy consumption, uranium and thorium will only last for 100-200 years. During the same period, the reserves of coal and oil will be exhausted.

The second half of the 20th century was the century of thermonuclear energy. In thermonuclear reactions, energy is released during the conversion of hydrogen into helium. Fast thermonuclear reactions take place in hydrogen bombs.

Fusion reactors will certainly use not conventional, but heavy hydrogen. As a result of the use of hydrogen with an atomic weight different from the most frequently found in nature, it will be possible to obtain a situation in which a liter of ordinary water will be equivalent in energy to about 400 liters of oil. Elementary calculations show that deuterium

(a type of hydrogen that will be used in such reactions) will be enough on earth for hundreds of years with the most rapid development of energy, as a result of which the problem of caring for fuel will disappear almost forever.

Conclusion

And yet again and again we turn to the question of what material and by what methods in the future should humanity receive energy? Today there are several basic concepts for solving the problem.

1. Expansion of the network of uranium-fueled stations.
2. Transition to the use of thorium-232 as nuclear fuel, which is more widespread in nature than uranium.
3. The transition to nuclear reactors on fast neutrons, which could ensure the production of nuclear fuel for more than 3000 years, is currently a complex engineering problem and carries a huge environmental hazard, in connection with which it is experiencing serious opposition from the global environmental the public and is unpromising.
4. Mastering thermonuclear reactions, during which energy is released during the conversion of hydrogen into helium.

At present, the development of power engineering seems to be the most reasonable in terms of expanding the network of uranium and uranium-thorium nuclear power plants during the period of solving the problem of controlling a thermonuclear reaction.

However, the main problem of modern energy is not the depletion of mineral resources, but a threatening ecological situation: long before all

imaginable resources are used, an ecological catastrophe will break out, which will turn the Earth into a planet completely unsuitable for human life.

REFERENCES

1. Дементьев Б.А. Ядерные энергетические реакторы. М., 1984
2. Тепловые и атомные электрические станции. Справочник. Кн. 3. М., 1985
3. Ф. Н. Мильков Общее землеведение
4. Б. С. Залогин Океаны
5. Б. С. Залогин Океан и человек
6. М. Р. Плоткин Основы промышленного производства
7. М. М. Дагаев Астрофизика
8. Солнечная энергетика и солнечные батареи (<http://solar-battery.narod.ru>)
9. Интернет версия журнала «Наука и жизнь»
10. Атоева М.Ф. Периодичность обучения физике. Аспирант и соискатель. Москва, 2010. – №6. – С. 41-43.
11. M.F. Atoyeva. Interdisciplinary relations in physics course at specialized secondary education. The Way of Science. – Volgograd, 2016. – №9 (31). – P.22-24.
12. M.F. Atoyeva. The significance of periodicity at teaching physics. The Way of Science. – Volgograd, 2016. – №10 (32). – P.62-64.
13. Атоева М.Ф. Эффективность обучения электродинамике на основе технологии периодичности. The Way of Science. – Volgograd, 2016. – №10 (32). – P.65-66.
14. M.F. Atoyeva. Use of Periodicity in Teaching Physics. Eastern European

- Scientific Journal. – Düsseldorf-Germany, 2017. № 4. –P. 35-39.
15. M.F. Atoyeva. Didactic foundations of inter-media relations in the training of university students. International Scientific Journal. Theoretical & Applied Science. p-ISSN: 2308-4944 (print) e-ISSN: 2409-0085 (online). Year: 2020 Issue: 06 Volume: 86, P. 124.
16. M.F. Atoyeva, R. Safarova. Pedagogical integration as a means of forming professionally important qualities among students of a medical university. *Academicia*. ISSN: 2249-7137 Vol. 10, Issue 8, August 2020. Impact Factor: SJIF 2020 = 7.13 *ACADEMICIA: An International Multidisciplinary Research Journal* <https://saarj.com>.
17. M.F. Atoyeva. Pedagogical Tests As An Element Of Types Of Pedagogical Technologies. *The American Journal of Applied Sciences*, 2(09), (TAJAS) SJIF-5.276 DOI-10.37547/tajas Volume 2 Issue 9, 19.09.2020. ISSN 2689-09. 92 The USA Journals, USA www.usajournalshub.com/index.php/tajas 164-169. Имн.5.2.
18. Farkhodovna, A. M. (2020). The problems of preparing students for the use of school physical experiment in the context of specialized education at secondary schools. *European Journal of Research and Reflection in Educational Sciences*, 8 (9), 164-167.
19. Saidov S.O., Fayzieva Kh. A., Yuldosheva N. B. Atoyeva M.F. The Elements Of Organization Of The Educational Process On The Basis Of New Pedagogical Technologies. *The American Journal of Applied Sciences*, 2(09), (TAJAS) SJIF-5.276 DOI-10.37547/tajas Volume 2 Issue 9, 19.09.2020. ISSN 2689-09.92 The USA Journals, USA www.usajournalshub.com/index.php/tajas 164-169. Имн.5.2.
20. Atoeva Mehriniso Farhodovna, Arabov Jasur Olimboevich, Kobilov Bakhtiyor Badriddinovich. (2020). Innovative Pedagogical Technologies For Training The Course Of Physics. *The American Journal of Interdisciplinary Innovations and Research*, 2(12), 82-91.
21. Charyeva Makhbuba Rizakulyevna, KNOWLEDGE OF NATURE BY LEARNING THEORY AND EXPERIMENT, *European Journal of Research and Reflection in Educational Sciences* Vol. 8 No. 10, 2020 Part II ISSN 2056-5852, Progressive Academic Publishing, UK Page 27-30 www.idpublications.org
22. . Safarova Rakhima Sattor kizi (2020). Preparing students for use of school physical experiment in the process of teaching physics. *European Journal of Research and Reflection in Educational Sciences*, 8 (9), 126-130.
23. Hamroev Rustam Rasulovich, Teaching Ict In The Training Of Future Doctors, *The American Journal of Interdisciplinary Innovations and Research* (ISSN–2642-7478) Published: November 30, 2020 | Pages: 169-172 Doi: <https://doi.org/10.37547/tajiiir/Volume02Issue11-29> IMPACT FACTOR 2020: 5.498 OCLC – 1091588944
24. Hamroev Rustam Rasulovich, THE IMPORTANCE OF INFORMATION TECHNOLOGY IN TRAINING MEDICAL PERSONNEL, *European Journal of Research and Reflection in Educational Sciences* Vol. 8 No. 12, 2020 Part III ISSN 2056-5852, Progressive Academic

- Publishing, UK Page 176-180.
www.idpublications.org
25. Nasirova Nigora Karimovna, Tuksanova
Zilola Izzatullaevna & Nasirova Nargiza
Gayratovna, INNOVATIVE
TECHNOLOGIES IN PHYSICS
EDUCATION, European Journal of
Research and Reflection in Educational
Sciences Vol. 8 No. 10, 2020 Part II ISSN
2056-5852, Progressive Academic
Publishing, UK Page 19—22,
www.idpublications.org