Economic aspects of green technologies

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Abstract. The article reveals the characteristics and principles of "green" technologies from an economic point of view and discusses the key points of implementation and operation of "green" technologies. The authors have analyzed the development of "green" innovations in different countries and the level of their economic development. They have considered a number of countries using innovative technologies and the process of implementing such technologies in practice in the case of water-purifying product "BINGSTI".

1. Introduction
In the modern world, the main hopes for solving urgent environmental problems are rested in tech-related scientific breakthroughs. Today, developed countries are reorienting their development towards the implementation of an environmentally-oriented growth strategy, one of the main and priority components of which is "green" technologies. Emerging economies are increasingly involved in the process of introducing that kind of technologies. This process indicates a fundamental transformation of the global economy.

Developed countries are trying to accelerate the development of "green" technology. According to the classification of Organization for Economic Cooperation and Development (OECD), "green" technologies comprise the following areas:
- general environmental management (waste management, water and air pollution abatement, land restoration, etc.);
- producing energy from renewable sources (solar energy, biofuels, etc.), mitigating the effects of climate change, reducing harmful emissions into the atmosphere, improving fuel efficiency and energy efficiency in buildings and lighting devices.

"Green" technology involves almost all sectors of the economy: energy, industry, transport, construction, agriculture, etc. They are currently being introduced into the activities of companies, including (in addition to production) consumption, management and methods of organizing production [1-5]. Among the main areas of development of "green" technology, energy is the key one. The main directions of its "environmentalization" are improving energy efficiency and the development of new energy sources, primarily renewable ones [6-10].

Analyzing the processes of development and implementation of "green technologies", we can say that they are aimed at:
- sustainable functioning and development that meets all modern needs of society;
- reproduction of products that can be fully restored or reused;
- a significant reduction in waste and in environmental pollution by changing the production system and consumption patterns;
innovations that develop alternative solutions to technologies that had been previously associated with causing damage and harm to the environment;

- the formation of economic development centers around fundamentally new technologies and products that create fundamentally new jobs and raise the country's economy in general.

A serious issue is the economic efficiency of the development and application of "green" technologies, which depends on the specific field of activity. At the initial stage, the development of "green" technologies can be very costly, but later, as studies show, "greening" can provide not only an increase in natural capital, but also a higher level of GDP of the country which uses the technology [11-13].

This largely depends on the government's policy aimed at smoothing the differences in prices for technologies that pollute the environment and "green" technologies. Thus, the high price of "green" electric cars still is one of the main constraints for the development of this sector of innovative technologies.

Experts at various levels on the issue of "green" technologies are virtually united in their opinion that the next technological paradigm of economic development will be based on "green" innovations. Technologies for improving the energy efficiency of all sectors of the economy, as well as technologies for the production of materials and closed-cycle structures with a high degree of recycling will be greatly developed. That is, "green" technologies are considered as one of the key factors in the functioning of the future technological paradigm [14-18]. That is why, after Germany, the United States actively joined in the race for first place in the market for green technologies, proposing the development of alternative energy as the main way to overcome the economic crisis, and China is the most dynamically developing country among the major economies.

"Green" technologies will allow economic activities in which the production, distribution and consumption of goods from an economic point of view does not result in negative environmental consequences and at the same time improve human well-being. The introduction of "green" technology is considered cost-effective. For example, "green" technologies are closely connected with the global trend of transition to a new type of economy - a resource efficient, safe for the planet's ecosystem. While this field of knowledge is being developed and implemented, such situations occur as the emergence of additional work positions, improving the life quality and reducing risks in the economy [19-23].

2. Methods and materials

The work is carried out using a set of modern methods of theoretical and experimental research: the use of methods of mathematical statistics and computational software package Microsoft Office; modeling of economic processes; comparative tests of innovative energy structures; laboratory experiments on the selection of optimal modes.

3. Results and discussion

The use of green technologies begins with the construction of passive eco-houses, ending with the production of cars on clean fuel. In the global aspect, there is an active search for solutions to combat global climate change and environmental pollution. Numerous UN programs in the field of the environment intend to introduce green technologies, to gradually eliminate hazardous industries and to replace sources of anthropogenic greenhouse gas emissions, which also has a positive impact on the economy.

The concept of "green" technology is paid the most attention in the business environment. Financial foundations, venture capitalists, governments of advanced countries, businessmen and consumers are already building systems of "green" technologies, in which investments in energy-efficient technologies and natural infrastructure yield favourable results.

It is worth paying attention to the intensity with which Denmark invests in growth of green technologies. Since 1980, GDP grew by 78 % with only a minimal increase in energy consumption. Even in the midst of economic boom Poland have managed to reduce emissions by a third in the last 17 years. Such savings turn into profit for entrepreneurs. Today, European companies from the green
technology sector enjoy significant advantages as pioneers: they account for a third of the green technology market that is thriving in the world.

An example of stimulating the economy with green technologies is South Korea, the host country of the forum, which became the only state that chose green growth as a national strategy. According to of the Organization for Economic Cooperation and Development, in this area South Korean investments amounted to 9.3 billion euros. They went to the development of "green" types of transport, alternative sources of fresh water, industrial waste processing technologies. Its green growth strategy focuses on three elements: industry, energy and investment. The strategy is aimed at preserving the range of productive economic activities with the least expenditure of energy resources, as well as minimizing the pressure on the environment of all types of energy and resources used and taking measures to transform investments into environmental protection activities and the driving force of economic growth.

A successful example of the practical application of "green" technologies is the development of Alexander Prigodin, a scientist from Novocherkassk. So, wastewater and its sediments, as a product of human life, contain a large number of pathogens of parasitic infections. The concentration of parasites in sediments has a higher degree than in wastewater, which makes them even more dangerous to the environment and all of humanity. The innovation proposed by the company is a modern disinvasive formulation "BINGSTI" that can solve this problem. The drug is intended for the purification of waste water and their sediments. It naturally kills infections without having an effect on human health.

From an economic point of view, BINGSTI it is the advantageous solution, since one liter of liquid is sufficient for cleaning 10 thousand m$^3$ of effluents. Instead of cubic meters or even tons of other means, a consumer can use only a few liters of BINGSTI.

It is also important that the drug does not adversely affect the environment and humans. BINGSTI is easily integrated into any existing treatment technology. The introduction of the drug into the treatment technology allows for guaranteed purification of the entire volume of wastewater and sediments with an efficiency of 99 %.

The formulation includes such components as dried potato stalks up to 20 cm high, disinfectant “SSD-200”, drinking water, sodium benzoate (E211) and sorbic acid (E200) according to the current technical documentation.

"BINGSTI" is most advanced in use. In its introduction to wastewater treatment technology, the costs are insignificant. Also, this development can be used as the means of the additional purification of the unpurified wastewater while applying other methods of processing. The ambient temperature does not affect the effectiveness of the drug, so it can be used for disinvasion of environmental objects in any climate zone. The introduction of the environmental technology with the use of innovative drug "BINGSTI" allows you to:

- remove highly toxic chemical reagents from the technology or significantly reduce their dosages by replacing them with an environmentally friendly biological product;
- at the same time, process wastewater and sediment;
- significantly reduce the level of energy consumption for wastewater treatment;
- lower purification costs by 6-12 times;
- remove restrictions in the technological modes of disinvasion;
- maintain a high level of disinvasion efficiency in extreme technological modes;
- start disinvasion of 100% of wastewater with repeated cost reduction and reduction in the prime cost of disinvasion throughout the wastewater treatment cycle.

4. Conclusion

Thus, the development and introduction of a new environmentally friendly product is hygienically relevant. It makes it possible, while respecting the environment, to more effectively carry out disinfection from pathogens of parasitic diseases of various environmental objects and reduce the risk of infecting the population, as well as expanding the possibilities of using wastewater sludge as an organic fertilizer.
Thus, today developed and developing countries are reorienting their policies towards "green" growth, stimulating the development and introduction of environmental technologies, aiming educational programs towards the formation of environmental awareness, and conducting extensive information campaigns. All these measures increase not only the ecological state of the countries, but also raise their economy, helping to overcome the crisis.

Despite the complexity of introducing innovative technologies, the future of the planet remains with them. The priority was chosen to protect nature, not destroy it, which increases the strength not only of the economy, but also of the state itself. Globalization is forcing many countries to reconsider the existing line in economics and politics, increasingly paying attention to "green" improvements and the introduction of modern innovations.

Acknowledgments
This paper has been prepared using the equipment kindly provided by the Joint Instrumentation Centre “Baikal Center of Nanotechnologies”.

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