technological innovation, financial instruments, knowledge management, and supportive public policies creates a robust framework for agricultural resilience. As climate change, market volatility, and other challenges continue to intensify, the importance of developing and implementing such comprehensive risk management systems will only increase. Further research should focus on developing region-specific risk assessment methodologies and innovative financial instruments tailored to the unique needs of Ukrainian agriculture.

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HARNESSING THE POWER OF TIDES (ВИКОРИСТАННЯ ЕНЕРГІЇ ПРИПЛИВІВ ТА ВІДПЛИВІВ)

У статті досліджено використання енергії припливів та відпливів як надійного джерела відновлюваної енергії. Розглянуто основні технології генерації, такі як греблеві системи, припливні лагуни та динамічні припливні установки. Аналізуються технічні, економічні та екологічні аспекти, зокрема вплив на морські екосистеми, фінансова ефективність і перспективи інтеграції з іншими видами енергетики. Також розглядаються інноваційні рішення для підвищення продуктивності та можливості міжнародної співпраці.

Ключові слова: *припливна енергетика, відновлювані джерела, гідродинаміка, екологічний вплив, альтернативна енергетика, економічна ефективність, інноваційні технології.*

The article explores the use of tidal energy as a reliable source of renewable energy. The main generation technologies, such as dam systems, tidal lagoons, and dynamic tidal plants, are considered. Technical, economic, and environmental aspects are analyzed, including the impact on marine ecosystems, financial efficiency, and prospects for integration with other types of energy. Innovative solutions to increase productivity and opportunities for international cooperation are also considered.

Keywords: *tidal energy, renewable sources, hydrodynamics, environmental impact, alternative energy, economic efficiency, innovative technologies..*

Tidal energy is a renewable and sustainable source of power generated by the gravitational interaction between the Earth, Moon, and Sun. It is one of the most predictable energy sources due to the periodic nature of tides, making it a highly reliable option for energy production. The movement of ocean waters follows a consistent and measurable pattern, ensuring a stable supply of energy compared to other renewable sources like solar and wind power, which can be affected by unpredictable weather conditions. This unique characteristic makes tidal energy an attractive option

for countries with coastal access, looking to diversify their energy portfolios and reduce dependence on fossil fuels. [1]

Tidal energy generation relies on different technologies, including tidal barrages, tidal stream generators, and dynamic tidal power (DTP). Tidal barrages function similarly to hydroelectric dams, trapping water during high tide and releasing it during low tide to drive turbines and generate electricity. This method is considered highly effective, as it can generate a significant amount of energy. However, the construction of tidal barrages often requires significant financial investment and can have profound ecological impacts, affecting fish migration and water salinity. Tidal stream generators, on the other hand, operate like underwater wind turbines, utilizing tidal currents to produce power with less environmental disruption. They are smaller in scale but can be deployed in multiple locations, making them a more flexible option for energy generation. DTP, a newer concept, involves constructing long dams perpendicular to tidal flows to create pressure differentials that drive turbines. While this approach has great potential for energy production, its large-scale implementation remains limited due to high costs and technological challenges. [2]

The advantages of tidal energy include its predictability, sustainability, and low operational costs. Unlike wind and solar power, which depend on weather conditions, tidal cycles are highly consistent, allowing for precise energy output forecasts. This consistency ensures that energy providers can plan ahead and integrate tidal power into the electrical grid with minimal fluctuations. Additionally, tidal energy is virtually inexhaustible, as long as gravitational forces persist. Once infrastructure is built, maintenance costs are relatively low compared to fossil fuel plants, making it an economically viable solution in the long term. Furthermore, tidal energy production does not emit greenhouse gases, contributing to global efforts in reducing carbon emissions and combating climate change. [3]

However, there are challenges associated with tidal energy. The high initial investment for infrastructure development remains a significant barrier to large-scale adoption. The cost of building and installing tidal barrages and turbines can be substantial, and financial incentives or government subsidies are often required to make these projects feasible. Tidal barrages can alter water salinity levels, disrupt marine habitats, and affect sediment transport, raising ecological concerns. Fish populations and aquatic biodiversity can be negatively impacted by changes in the water flow, which necessitates careful planning and environmental assessments before project implementation. Furthermore, tidal energy is geographically limited, as only coastal regions with strong tidal activity can harness it effectively. This means that inland countries or those with weaker tides may not benefit from this energy source. Technological maturity also poses a challenge, as many tidal energy systems are still in the experimental phase, requiring further research and innovation. Without advancements in engineering and cost reduction, widespread deployment of tidal energy remains a distant goal. [4]

Future developments in tidal energy are expected to focus on enhancing efficiency and reducing costs through advances in engineering, materials science, and computational modeling. New materials and design innovations could lead to more efficient turbines that generate higher amounts of energy while minimizing environmental damage. The integration of tidal energy with other renewable sources, such as offshore wind farms, is also being explored to create hybrid energy systems that maximize electricity production. Improved environmental assessments and mitigation strategies may facilitate broader acceptance and implementation of tidal energy projects. For example, new research aims to develop fish-friendly turbine designs that reduce harm to marine life. As the world transitions toward sustainable energy solutions, continued research, policy support, and international collaboration will be crucial in unlocking the full potential of tidal energy. If governments and private investors commit to further development, tidal energy could become a major contributor to the global renewable energy landscape. [5]

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ARTIFICIAL INTELLIGENCE AS A FOUNDATION FOR SOCIAL TRANSFORMATION

Стаття аналізує вплив штучного інтелекту на різні сфери життя, зокрема освіту, медицину та соціальні системи, а також підкреслює важливість етичних аспектів і міждисциплінарних зусиль у його розвитку.

Ключові слова: *штучний інтелект, інформаційні технології, людство, соціальне життя.*

The article analyzes the impact of artificial intelligence on various spheres of life, including education, medicine and social systems, and also emphasizes the importance of ethical aspects and interdisciplinary efforts in its development.

Keywords*: artificial intelligence, information technologies, humanity, social life.*

Modern information technologies and intellectual capital have become the determining factors of the progress of civilization. The rapid development of technical progress, including digital media, artificial intelligence and the Internet of Things, is significantly transforming human activities and social systems. It is important to be aware of these changes, their concepts and the main characteristics of artificial intelligence, as they have a direct impact on our daily lives and the future of society.

Humanity has always sought change, but at the same time felt fear of it. The transition from hand tools to machines, the replacement of steam with electric or nuclear energy, as well as the latest scientific and technological developments have significantly transformed the labor process. Although these changes promised to expand productive opportunities, they have caused concern among a part of the population. Today, humanity is again on the verge of new discoveries, especially in the field of artificial intelligence, which, although exciting, also cause serious concerns.

Artificial intelligence as a scientific direction arose with the advent of digital computers. In 1950, the English mathematician Alan Turing, in his article “Computing Machines and Intelligence,” noted that interest in “thinking machines” arose thanks to digital computers. He described the basic structure of a digital computer, the interaction of its components, and proposed the use of a binary number system. Turing proved that computing machines can solve problems of any complexity, and since all digital computers are logically the same, he called them universal machines. [2]

People often tend to intellectualize their goals, believing that thinking is exclusively an attribute of the human brain. However, over the past fifty years, we have increasingly realized that many unconscious processes can imitate conscious thinking.

Artificial intelligence has the potential to radically change the world, opening up new horizons in education, medicine, and social life, adapting to the needs of modern society. The use of AI in education provides individualized curricula and interactive methods that help each student develop at a comfortable pace. In medicine, AI contributes to the diagnosis of diseases, the development of new