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Cultural sciences

ADDRESSING GENDER AND EQUITY ISSUES IN KAZAKHSTAN: PATHWAYS TO INCLUSIVE PROGRESS

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Abstract

Gender and equity issues generate profound and multiple difficulties, which hinder both social development and economic progress in Kazakhstan, due to this reason. These challenges are entwined with ingrained cultural traditions, unequal distribution of economic resources, as well as institutional discrimination perpetuating gender inequalities across various aspects of society. Women's access to education, employment opportunities, and decision-making roles is limited by cultural norms that impose rigid gender roles on them. For instance, women tend to be disproportionately found in low-paying jobs because these practices discriminate against women as well as limit their access to finance. Institutional biases range from hiring practices that favor men over women to a lack of support systems for working mothers. Nevertheless, there have been encouraging developments meant to promote gender parity in Kazakhstan including the Gender Equality Strategy 2020-2030 formulated by the government which sets out comprehensive measures designed towards narrowing the gap between genders in educational attainment, job openings, and political participation. Additionally, non-governmental organizations (NGOs) and community-based initiatives have also played an integral role in devising programs that empower women economically, lobby for legislative reforms, and offer crucial support services to survivors of gender violence.

This article explores the present situation concerning gender and equity issues in Kazakhstan by examining cultural, economic, and institutional obstacles limiting progress towards gender equality. The study identifies some of the successful interventions through which inclusivity and gender equity have been effectively promoted. In conclusion, this article provides a detailed examination of the current state of gender and equity issues in Kazakhstan. Its purpose is to offer a comprehensive analysis with actionable recommendations geared toward equipping policymakers, educators, and stakeholders with the necessary tools for a more equitable society. Through joint efforts aimed at achieving gender equality permanently, these challenges can be overcome by Kazakhstan thereby using its entire population as agents for sustainable development as well as social cohesion.

Keywords: Gender, equity, Kazakhstan, barriers, discrimination, governmental policies.

Introduction

Gender equity is indeed an indispensable ingredient for social progress as well as economic growth since it ensures equal opportunities for all people irrespective of their gender to partake in various spheres of life such as education, employment, or even governance. In Kazakhstan, despite notable advancements, significant gender disparities persist. Addressing these issues is essential for achieving the country's broader development goals.

Socio-economic disparities in gender roles and opportunities characterize the landscape of Kazakhstan. Gender inequalities are perpetuated by traditional societal norms, economic constraints, and institutional prejudices. These gaps exist in various fields like education, the labor market, and political representation. Knowledge about these dilemmas is crucial as they help to advocate for inclusive societies that provide equal opportunities for all its citizens.

The purpose of this article is to examine the current status of gender and equity issues in Kazakhstan; identify some barriers that hinder it; give examples of successful projects aimed at promoting gender equity. The article also presents practical recommendations for policy-makers, teachers as well as stakeholders who aim to establish a more equitable society.

Gender and Equity Concepts

Gender equity refers to the principle that everyone should be treated fairly regardless of their sex to eliminate any differences between them concerning access to resources and opportunities. In contrast, gender equality entails an even distribution of resources among all people without reference to their circumstances however, gender equity takes note of the varying needs and challenges faced by different sexes. To obtain gender equity, these differences must be addressed by interventions and policies that are meant to reduce the gap, level up playing fields, and create fairness in societies in relation to education, employment, health care, and social participation. The approach is rooted on the need for tailored support and affirmative action that can enable marginalized genders to fully participate and contribute towards the development of society which will ultimately result into the prosperity of all. Society can have a more just world if it embraces inclusive practices and policies that ensure justice within any society regardless of one's gender thus allowing everyone to thrive while achieving their dreams.

Current State of Gender and Equity in Kazakhstan

In Kazakhstan alone, recent data has shown that there are significant gender disparities across multiple sectors. Women are less likely than men to hold high-paying jobs or positions of leadership in various industries (World Bank 2022). Gender differences also persist in the field distribution despite relatively equal enrollment rates between males and females in schools as well as colleges (Science, Technology, Engineering, and Mathematics) (OECD, 2021).

Kazakhstan needs to do better in treating men and women fairly. A report by the World Economic Forum (2021) says that out of 153 countries, Kazakhstan ranks 80th in gender equality. This means there are still big differences in how men and women take part in the economy, do in school, stay healthy, and have power in politics. This report shows where Kazakhstan can do more to make things equal for men and women. It says that Kazakhstan needs plans and actions that focus on fixing the gaps and making things fair for everyone.

Barriers to Achieving Gender Equity

In Kazakhstan, what people think men and women should do, and how they should act, has a big impact on making things equal. The rules set by culture can keep women from getting education and jobs. For instance, people might think it's more important for women to stay home and take care of the family than to have a career. This stops women from joining the workforce and moving up in their jobs (UNDP, 2021).

It's also about money. Women in Kazakhstan often work in jobs that pay less and are not part of the official economy, so they make less money than men. Because of money problems and what culture says, girls might have to leave school early to help their families, so they miss out on a good education and job opportunities (Asian Development Bank, 2020).

More rules and practices in businesses make it hard for women to be leaders. This keeps the inequality going. And there's not enough help for moms who work, like cheap places to leave their kids and rules that help moms at work. This makes it tough for women to go up in their jobs and have more money (OECD, 2021).

To fix these big issues, Kazakhstan needs plans that change the laws, make things better for women in money matters, and change the way people think about men and women. This would help to make things more equal for everyone, so anyone can do well and help the country grow.

Successful Initiatives and Policies

The Gender Equality Strategy 2020–2030, which is a key document that outlines extensive strategies to eliminate gender inequities across multiple sectors, is one of the many initiatives the Kazakh government has launched to promote gender equity (Government of Kazakhstan, 2020). Initiatives to increase women's labor market involvement through the adoption of laws that support equal job opportunities and close wage discrepancies are important parts of this strategy. Additionally, the approach highlights the significance of gender-sensitive education and pushes curriculum revisions that dispel prejudices and foster inclusive learning settings. In addition, legislative changes and victim-centered support programs that hold offenders accountable are key components of the fight against gender-based violence.

In addition, community-based initiatives and non-governmental organizations (NGOs) are essential for improving gender parity in Kazakhstan. The "Empowerment of Rural Women" program by UN Women is one example of an initiative that aims to improve the social and economic results for women living in rural regions. It does this by offering networks of support, resources, and training that help women become economically independent and develop their leadership skills (UN Women, 2021). By questioning

conventional gender norms and encouraging women's active engagement in decision-making processes, these programs not only empower women but also contribute to larger societal reforms.

Education establishments play a critical role as early adopters of gender equity policies. Schools that incorporate gender-sensitive curricula and encourage boys and girls to participate equally in all activities play a major role in promoting inclusive attitudes toward gender diversity and dismantling social obstacles. In order to eliminate gender gaps in education and prepare young women for successful employment in traditionally male-dominated areas, programs that support girls' engagement in STEM courses and offer mentorship and career guidance have a particularly positive impact (UNICEF, 2020). Kazakhstan can create a more equal society where everyone has the chance to reach their full potential and make a positive contribution to the advancement of the country by funding these programs and creating an atmosphere that is supportive of gender equity.

Case Studies

Numerous success stories highlight the positive effects of gender equity programs in Kazakhstan, highlighting observable results and opportunities brought about by focused efforts. One noteworthy example is the international organizations-backed "Girls in STEM" campaign, which has encouraged many young women to choose professions in STEM fields (science, technology, engineering, and mathematics). In addition to gaining useful skills and information, program participants have reached important professional and academic milestones, which have aided in innovation and economic growth (World Bank, 2021).

Furthermore, companies and educational institutions that have adopted best practices for advancing gender parity provide an example for others to follow. Businesses that prioritize hiring women equally and create welcoming settings for working mothers, for example, have shown increases in productivity, employee happiness, and retention. These organizations show how, through valuing diversity and establishing policies that support it, they may improve organizational effectiveness while simultaneously advancing more general social objectives related to gender equality and inclusion (International Labour Organization [ILO], 2021).

These triumphs highlight how crucial it is to implement inclusive laws and practices throughout society's many spheres. Kazakhstan can expedite progress towards gender parity by recognizing and implementing such initiatives, thereby utilizing the ability of all persons to contribute to social cohesion and economic development successfully. In addition to helping people and organizations, these initiatives support the development of a more prosperous and equitable future for the country as a whole.

Addressing Gender-Specific Challenges

While it is appropriate to focus a great deal of effort on removing obstacles that prevent females in Kazakhstan from completing their education, it is equally critical to recognize and solve the unique difficulties that boys in the educational system confront. The higher dropout rates among boys, particularly in rural regions, are a serious problem that calls for focused measures to keep them interested in and enrolled in school (OECD, 2021). In order to effectively address these issues, programs like mentorship programs and vocational training can be extremely helpful in equipping boys with the knowledge and abilities they need to complete their schooling successfully.

At the same time, girls in Kazakhstan face unique challenges that prevent them from pursuing higher education, such as early marriage, cultural expectations, and insufficient support for pursuing higher education. Policies and programs designed to mitigate these barriers are essential. This includes initiatives that offer scholarships, mentorship opportunities, and flexible learning pathways to empower girls and enhance their access to quality education (UNESCO, 2020). Moreover, raising awareness within communities about the transformative impact of girls' education is crucial for shifting cultural norms and fostering supportive environments that prioritize girls' academic aspirations.

By adopting a comprehensive approach that addresses the unique challenges faced by both boys and girls in the education system, Kazakhstan can foster an inclusive learning environment where all students, regardless of gender, have equal opportunities to thrive and contribute to national development. These efforts not only promote educational equity but also lay the foundation for a more equitable and prosperous society, where every individual can fulfill their potential and contribute meaningfully to the country's future.

In order to further improve gender parity in Kazakhstan, several policy suggestions are essential. First and foremost, the state ought to emphasize fortifying legal frameworks through the adoption and enforcement of legislation that aggressively advances gender equality and guards against violence and discrimination based on gender. Furthermore, establishing family-friendly workplace practices and increasing access to reasonably priced daycare will assist working mothers in successfully juggling their

obligations to their families and careers. Including gender equity concepts in school curricula and giving teachers thorough training on gender-sensitive teaching techniques are other crucial steps. The main goals of educational strategies should be to guarantee that boys and girls participate equally in all school activities, to create mentorship programs that support students of all genders, and to run awareness campaigns that question conventional gender norms and promote an inclusive learning environment. Community engagement plays a vital role in achieving these goals by educating parents about the importance of gender equity, collaborating with NGOs to implement targeted programs addressing gender-specific challenges, and promoting role models who have successfully navigated gender-related barriers to inspire others. These integrated efforts aim to create a more equitable society where all individuals, regardless of gender, have equal opportunities to thrive and contribute to national development.

Conclusion

In Kazakhstan, gender and equity concerns pose serious difficulties that call for careful analysis and preemptive action. In spite of these obstacles, they also offer chances for revolutionary advancement in the direction of a society that is more egalitarian and inclusive. Kazakhstan can strategically execute focused actions to solve these concerns by recognizing and comprehending the many institutional, cultural, and economic constraints that impede gender equity.

Agendas for gender equity must be advanced through cooperation between legislators, educators, civil society organizations, and other stakeholders. Systemic change across multiple sectors will be facilitated by sustained advocacy and dedication to gender-sensitive policies, such as those articulated in the Gender Equality Strategy 2020–2030. These policies include encouraging women to enter the workforce, improving educational possibilities by implementing gender-sensitive curricula, and preventing violence against women based on their gender (Government of Kazakhstan, 2020).

Putting into practice the suggestions made throughout this article—such as bolstering legislative frameworks, assisting working mothers, and encouraging gender-sensitive education—will be crucial to establishing a more welcoming atmosphere in which people of all genders can prosper and make significant contributions. These initiatives support social justice and fairness ideals while also having significant long-term advantages for Kazakhstan's growth.

Not only is achieving gender equity morally required, but it is also a calculated investment in the future of the country. It promises stronger social cohesiveness, faster economic growth, and a more equitable society where everyone has an equal chance at success. Kazakhstan can fully use the potential of its varied population and set the path for future generations to enjoy prosperity and sustainable development by placing a high priority on gender equity. Kazakhstan can set the standard for inclusive growth and social progress by leading by example in promoting gender equity agendas regionally and internationally via coordinated effort and steadfast commitment.

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Economic sciences

ADAPTING JAPANESE INDUSTRIAL STRATEGIES FOR ENHANCING INDUSTRIAL DEVELOPMENT IN UZBEKISTAN

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Abstract

This paper explores the potential application of Japan's successful industrial strategies to enhance Uzbekistan's industrial development. Drawing from Japan's historical experience of rapid industrial growth driven by strategic government intervention, innovation, and quality enhancement, the study assesses how these elements can be adapted to the Uzbek context. The analysis emphasizes the need for tailored industrial policies, capacity building in government institutions, focused support for strategic industries, and international collaborations to transfer technology and skills. The paper proposes a phased implementation strategy and continuous economic policy evaluation to adapt to dynamic global and local economic conditions.

Keywords: *Industrial development, Japan's economic model, innovation, technology transfer, strategic planning.*

Introduction

As Uzbekistan stands at a pivotal juncture in its economic development, the country is actively seeking pathways to industrial modernization and diversification. This initiative aims not only to reduce its historical dependence on commodities like cotton and gold but also to position itself as a competitive player in the global industrial arena. The transformation of the industrial sector is crucial for achieving sustainable economic growth, increasing employment opportunities, and enhancing the overall quality of life for its citizens.

In this context, the experiences of nations that have successfully navigated similar economic transitions can provide invaluable lessons. Japan, in particular, with its remarkable history of rapid post-war industrialization and ability to foster innovation and technological advancement, stands out as a compelling model. The Japanese experience is characterized by strategic government policy, robust industrial planning, and a strong culture of continuous improvement and innovation—elements that could be strategically adapted to the Uzbekistani context.

Literature Review

Understanding Industrial Development: A Comparative Approach

The literature on industrial development is extensive and encompasses various models and theories that have been applied across different contexts globally.

A seminal work in understanding Japan's industrial success is Chalmers Johnson's "MITI and the Japanese Miracle" (1982). Johnson describes how the Ministry of International Trade and Industry (MITI) guided Japan's post-war recovery and industrial ascendancy through deliberate and strategic interventions that promoted industries deemed strategically important. This model highlights the role of government-led initiatives in industrial policy, a concept that might be adaptable for Uzbekistan's industrial strategy.

Further, Robert Fitzgerald's "The Competitive Advantages of Far Eastern Business" (1995) analyzes how Japanese businesses gained a competitive edge through innovation, quality management, and export-led growth. This work provides insights into the corporate strategies that drove Japan's industrial engine.

Regarding the adaptation of Japanese industrial strategies to other contexts, studies like Weiner's analysis in "The Japanese Model and Developing Countries" (1997) offer a critical view of the challenges and opportunities associated with transplanting these strategies. Weiner argues that while the Japanese model is distinctive, elements such as fostering a culture of innovation, strategic alignment between government and industry, and focus on education and training can be effectively adapted by developing countries, including Uzbekistan.

On the topic of sustainable industrial development, which is increasingly critical in today's globalized world, Kojima and Michida's "Environmental Management in Japan: Applications and Implications for Developing Countries" (2010) provide a thorough analysis of Japan's environmental policies within its industrial sectors. This study is particularly relevant for Uzbekistan as it seeks to integrate sustainability into its industrial growth trajectory.

Analysis and Results: Adapting Japan's Industrial Strategies to Uzbekistan

The analytical approach involves evaluating the applicability of Japan's industrial strategies within Uzbekistan's context, considering economic, cultural, and political differences. This analysis leverages the literature on industrial development strategies and their outcomes in various economies, emphasizing the critical success factors from Japan's experience.

Key Findings from the Japanese Model

1. **Government Leadership and Coordination:** Japan's economic success was significantly driven by strong government direction, particularly through entities like MITI, which not only facilitated but also directed industrial growth. This centralized approach allowed for strategic allocation of resources and guided the private sector toward national goals.

2. **Innovation and Technology:** Japan's focus on continuous innovation and technology adoption has been crucial. This was supported by significant investment in research and development, which fostered a competitive edge in technology-intensive industries.

3. **Quality and Efficiency:** Techniques like Kaizen (continuous improvement) and other quality management practices were integral to enhancing productivity and maintaining high standards in manufacturing, which were key to Japan's export success.

4. **Education and Workforce Development:** A well-educated and skilled workforce enabled Japan to excel in complex, skill-intensive industries. Lifelong learning and vocational training were pivotal.

Adaptation to Uzbekistan

Economic and Institutional Reforms: For Uzbekistan, instituting similar centralized economic planning might require substantial reform of existing institutions and policies. This involves enhancing government capabilities in strategic planning and execution, which could be facilitated through the development of a dedicated industrial development agency.

Cultural Adaptations: While the strong work ethic and group harmony in Japan are well-noted, Uzbekistan may need to cultivate a similar culture in its industrial workforce, focusing on quality, teamwork, and continuous improvement.

Technological and Educational Adaptations: Adapting Japan's approach would mean significantly boosting STEM education and vocational training to supply the skilled labor needed by new and expanding industries. Additionally, fostering a local culture of innovation through government incentives for R&D and startup incubation can help transition the industrial base to more high-tech outputs.

Environmental Considerations: Given the growing importance of sustainability, adopting Japan's strategies on environmental management could benefit Uzbekistan. Implementing strict environmental regulations and supporting industries in adopting cleaner technologies will be essential.

The adaptation of Japanese industrial strategies in Uzbekistan could potentially lead to several outcomes:

- **Enhanced Industrial Competitiveness:** By adopting focused industrial policies and fostering a culture of continuous improvement and innovation, Uzbekistan can enhance its competitiveness in the global market.

- **Increased Foreign Investment:** Clear and strategic industrial policies could attract more foreign direct investment into priority sectors, particularly from companies looking to diversify their manufacturing bases outside of traditional markets.

- **Sustainable Development:** Incorporating environmental management into industrial strategies could ensure sustainable growth, aligning with global standards and attracting partnerships from environmentally conscious economies.

Conclusion

The examination of Japan's industrial strategies provides valuable insights for Uzbekistan's industrial development. While Japan's methods highlight the effectiveness of coordinated government action and innovation in achieving industrial growth, applying these strategies in Uzbekistan necessitates a nuanced approach tailored to local conditions.

General Implications:

1. **Institutional Strengthening:** The success of these policies hinges on Uzbekistan's ability to enhance the capacity and transparency of its institutions. This includes training for civil servants,

fostering a culture of accountability, and ensuring that governmental operations align with industry needs.

2. Selective Industry Focus: Mirroring Japan's model of concentrating resources on potential growth sectors, Uzbekistan could identify and nurture industries with competitive advantages or strategic importance. This targeted support could catalyze significant economic dividends.

3. Leveraging International Partnerships: By engaging in international collaborations, Uzbekistan can facilitate technology transfer and managerial expertise, much like Japan did during its period of rapid growth. These partnerships could also help Uzbekistan integrate more deeply into global value chains.

Prospective Pathways

Looking ahead, Uzbekistan's strategic implementation of these insights should consider:

- Phased Implementation: Implementing changes gradually will allow for the adjustment of strategies based on initial outcomes and help in managing the transition more effectively.*

- Ongoing Monitoring and Adaptation: It is crucial to establish frameworks for continuously monitoring the impact of implemented policies and adapting them in response to both domestic and international developments. In sum, while direct replication of Japan's approach is impractical, Uzbekistan can draw on its strategic principles to foster a conducive environment for sustainable industrial growth.*

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Geological and mineralogical sciences

MEASURES TAKEN TO USE ZEOLITE MINERAL IN INCREASING SOIL FERTILITY IN NAKHCHIVAN MR

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Abstract

Introduction and Purpose: 7% or 954 mln. hectare of saline and salinized soils. Based on the calculations, it has been determined that every year approximately 1 million hectares of land is left out of cultivation due to salinization and salinization processes. The mentioned environmental problems (salinization, desiccation, and other negative factors) are observed in our country, in the territory of the autonomous republic, including in the lands belonging to the Demirchi village municipality located in the western part of the Sharur plain and the sloping plain of the same name in the Sadarek administrative district, which is our research object. From this point of view, it is urgent to carry out research on zeolite mineral to protect and increase soil fertility in Sadarak administrative region.

The purpose of the research: To implement necessary measures to ensure seasonal and long-term regulation of soil properties and regimes in the Sadarak administrative region, the objectives include: 1. Making salinized soils useful. 2. Providing normal nutrition for plants.

3. Facilitating their growth and development.

4. Obtaining high-quality products from plants using zeolite mineral.

Materials and Methods: When using zeolite mineral under cultivated plants in the administrative region of Sadarak, the results of the research conducted by the scientists of foreign countries, Azerbaijan and the autonomous republic in this direction, maps, literature and methodical materials compiled by them were collected, analyzed and used in the research work. From foreign scientists (Dzh. Hanwell, M. Newson 1977, V. Volobuev 1945-85, S. Babayev 1977-2000, G. Azizov 1990-2004, A. Guliyev 1977-2020, S. Hajiyev 1976-2023, N. Bababeyli 1995-2021, R. Amirov, P. Fatullayev 2012, etc. In field experiments, they were also collected from various villages of Nakhchivan MR for many years and included in the gene pool and received from the leading research institutes of the country, as well as from ICARDA, an international scientific organization. seed material was used.

Results: In the research object, the potential possibilities and positive results of the zeolite mineral for improving the soil structure, absorption capacity, meliorative properties, as well as increasing the productivity of agricultural plants were studied and revealed.

Discussion and Conclusion: The potential opportunities and positive results of the zeolite mineral in improving soil structure, absorption capacity, meliorative properties, as well as increasing the productivity of agricultural plants were discussed and analyzed in the research facility. The positive results obtained in our research were recommended for the efficient use of the soil environment under cultural crops in the agricultural areas of the Sadarak administrative region and at the same time the autonomous republic.

Keywords: Zeolite, mineral, eco-geography, soil, salinity

Introduction and Purpose: 7% of our planet or 954 mln. hectare of saline and salinized soils. Based on the calculations, it was determined that every year approximately 1 million hectares of land is lost from the cropping cycle due to salinization and salinization processes (Ahmedzadeh, Hashimov 2016).

The mentioned environmental problems (salinization, salinization, swamping and other negative factors) have a great impact on the loss of soil fertility in our country, including in the territory of the autonomous republic. Every year, for various reasons, about 2 thousand hectares of land in the autonomous republic lose their fertility and leave the crop cycle.

As a result of natural degradation processes in Nakhchivan MR, a part of the soil left from the crop cycle is also observed in the lands belonging to Demirchi village municipality located in the western part of the sloping plain of the same name and the Sharur plain in the Sadarek administrative district, which is our research object.

It is almost impossible to use it effectively under cultivated plants in the area. As a result of soil salinization in these areas, it leads to a change in the landscape along with lowering the productivity of natural and cultivated plants.

At the same time, the processes of salinization and salinization occur as a result of river water filling the depressions in the hot, arid, semi-desert, desert and semi-humid areas of the research object.

As a result of the conducted observations, studies and collected literature materials, it was determined that the deterioration of soil fertility is also caused by human factors in the area. As a result of natural degradation processes and incompetent activities of people, the physical and chemical properties of soils are completely changed and rendered completely harmless.

For this purpose, there are many measures to increase soil fertility in the areas where research has been conducted, one of which, and the most important one, is the provision of organic and mineral fertilizers to the soil, which is of great scientific and practical importance.

Organic and mineral fertilizers ensure seasonal and long-term adjustment of soil properties and regimes, normal nutrition of plants, their growth and development. Also, it is of great importance in obtaining high and quality products from plants. The territory of the Nakhchivan Autonomous Republic is a region rich in natural minerals. One of the useful minerals with large reserves in our area is zeolite mineral. Zeolites are a group of minerals belonging to the class of aluminosilicates. These are porous crystalline materials formed from volcanic glass and occupy a large surface area. They can be used in various fields, for example, in saline soils, water and air purification, as well as catalyzing processes in industry (Figure 1).



Figure 1. Natural zeolite

Despite the existence of many materials, scientific studies, suggestions and recommendations in the indicated directions, problems that are still not solved or require clarification remain on the agenda. From this point of view, it is urgent to carry out research in the indicated directions for the protection of soil fertility in Saderak administrative region.

Zeolite is a natural rare mineral raw material, widely used in many fields of national economy, especially in agriculture.

The first written information about zeolite was given in 1756 by the Swedish researcher A. Kronsted. He named the mineral he was researching as zeolite, which means "boiling stone" in Greek.

The absorption of vapors and gases by solids was known even before Christ. However, fundamental scientific research works were started only at the end of the 17th century. In 1909, F. Grange observed that chabazite (a type of zeolite) captures air, hydrogen, sulfur gas, iodine, bromine and even mercury vapor at high temperatures.

In the first half of the 20th century, zeolite deposits were discovered in the USA, Japan, France, Germany and other countries, and its widespread use began immediately. In the middle of the last century, high-sand mordenite and clinoptilolite zeolite were found in the Tovuz region of Azerbaijan, and research work was carried out on it, and its application areas were determined.

Zeolite mineral has large reserves in the low-altitude mountains in the northern part of Dize village, which is located in the administrative territory of Julfa district. Deposits of high-quality zeolite with a total reserve of more than 8 million tons have been discovered. In the autonomous republic and neighboring Republic of Turkey and Islamic Republic of Iran, zeolite has been widely used in many fields of national economy, especially agriculture, for a long time.

The purpose of the study: To regulate the properties and regimes of the soil in the Sadarak administrative region over a seasonal and long term, to make the salinized soil useful, to carry out the necessary measures to ensure the normal nutrition of plants, their growth and development, as well as to obtain high and quality products from plants.

Materials and Methods: Using zeolite mineral in the administrative region of Sadarak, seasonal and long-term regulation of soil properties and regimes, making salinized soils usable, normal nutrition of plants, their growth and development, as well as obtaining high and quality products from plants, taking necessary measures. The results of the research conducted by the scientists of foreign countries, Azerbaijan and autonomous republics in this direction, maps, literature and methodical materials compiled by them were collected, analyzed and used in the research work. From foreign scientists (Dzh. Hanwell, M. Newson 1977, V. Volobuev 1945-85, S. Babayev 1977-2000, G. Azizov 1990-2004, A. Guliyev 1977-2020, S. Hajiyev 1976-2023, N. Bababeyli 1995-2021, R. Amirov, P. Fatullayev 2012, etc. In field experiments, they were also collected from various villages of Nakhchivan MR for many years and included in the gene pool and received from the leading research institutes of the country, as well as from ICARDA, an international scientific organization. seed material was used.

At the same time, the theoretical and experimental work conducted in 2017 by G. Mammyadov, A. Hashimov and X. Jafarov for the first time in Azerbaijan in the direction of the formation of the reclamation regime of salinized and salinized soils, the movement of water-salt rules and the determination of their management principles. Based on the analysis of the studies, the methodology of the ecomeliorative assessment, which was accepted as the main indicators of the soils, was also used.

In the plains and sloping plains of the research object, it is mainly alluvial-subasar, swamp-meadow, grass-gray, gray-meadow, gray, dark-gray, gray-brown, and in the mountainous and foothills, it is brown, mountain-brown, mountain gray-brown, steppe. and steppe mountain-brown, steppe mountain-meadow, etc. lands are spread.

First of all, the article provides information about the use of natural zeolite-rare mineral raw materials for the protection of soil fertility in the administrative region and its efficient use under cultivated plants.

Results: Based on the conducted researches, it was determined that zeolite, which is a valuable natural mineral, has a high absorption capacity, and when applied to agricultural plants, it prevents the fertilizers given to crops from being washed into the deep layers of the soil and pollution of groundwater. Zeolite absorbs mineral and organic fertilizers applied to the soil, as well as water, and gradually transfers them to agricultural plants in the amount they need. This process creates favorable conditions for efficient use of applied fertilizers and water without loss. When adding zeolite to heavy clay and granular soils, it prevents the soil particles from sticking together and ensures that it is always soft. In such soils, aeration improves, as a result of which favorable conditions are created for the respiration of the root system in plants. This property of zeolite is widely used in agriculture and greening of cities.

Many studies have been conducted at the Azerbaijan Institute of Agrochemistry and Soil Science and the Scientific-Research Institute of Hydromelioration and Mechanization regarding the improvement of the soil structure, absorption capacity, meliorative properties of zeolite, as well as increasing the productivity of agricultural plants, and positive results have been obtained.

Despite the fact that zeolite deposits were discovered in the 60s of the last century in the Nakhchivan Autonomous Republic, and several scientific research institutions operate there, this

valuable mineral has not been involved in scientific research. In order to improve the structure of the soil, starting from 2006, in the Laboratory of Cereals, Legumes and Technical Plants of the Bioresources Institute of the Nakhchivan Department of the Azerbaijan National Academy of Sciences, complex scientific-research works on this precious mineral were started and many successful results were obtained (R. Amirov, S. Hajiyev). 2006).

Based on our research, it was determined that zeolite really improves the physical and mechanical properties of the soil, prevents soil particles from sticking together, and ensures that it is always soft. When zeolite is applied to heavy clay and granular soils, aeration improves there, which results in favorable conditions for the respiration of the root system in plants. It prevents the formation of cracks in the soil after watering, as well as its premature drying and salinization. It ensures the long-term retention of moisture in the soil, absorbs applied nitrogen, phosphorus, potassium fertilizers and generally mineral substances, as well as microelements, and gradually transfers them to the plants. Zeolite prevents these substances from being washed into the deep layers of the soil and away from the plant's feeding area. It captures and stores up to 40-70% of water in the root zone and gradually transfers it to the plants at the required time and in the required amount, thus meeting the plants' water needs during periods of drought.

In soils without zeolite, 30-40% of applied nitrogen is washed away, goes to the deep layers of the soil, mixes with groundwater and pollutes it. It makes the spring water that originates here dangerous for human health. Also, a large part of the nitrogen fertilizer given to the soil turns into ammonia during irrigation and evaporates due to the effect of heat. Not only nitrogen fertilizer given in zeolite-applied soils prevents the loss of all nutrients. Natural zeolite is non-toxic, does not have a negative effect on human health and the growth and development of plants. Many studies have been conducted on the improvement of the soil structure, absorption capacity, meliorative properties of zeolite, as well as its role in increasing the productivity of agricultural plants, and positive results have been obtained. Zeolite retains its effectiveness in the soil for 4-5 years.

At the same time, Zeolite mineral helps to clean the salty soil. Thus, zeolites can be useful in combating soil salinization. Soil salinity occurs due to the accumulation of salts in the soil, which can negatively affect plant growth due to excess salt that holds water, making it less available to plants and causing stress. In addition, Zeolites can help in this situation due to their ability to adsorb and retain water. They have the ability to absorb excess salts, thus helping to reduce the salt concentration in the soil and making it more favorable for plant growth. As mentioned above, when used in saline soil, zeolites can help improve soil structure, retain moisture and also reduce salt content, which in turn improves plant health. However, the effectiveness of this method can depend on the degree of soil salinity and other factors, so consultation with agronomists or soil scientists is helpful in determining the best salinity control methods.

The rate of zeolite application to the soil: As mentioned, the high-quality zeolite mineral, which has more than 8 million tons of reserves in Nakhchivan MR, has not been used either in scientific research or in agriculture.

We have also used zeolite mineral in our research since 2006 to increase soil fertility and plant productivity under several crops (alfalfa, winter wheat, grapes, vegetables, legumes and corn).

For this purpose, with the advice of agricultural specialists, humus with 1.4%, total nitrogen with 0.09%, total potassium with 1.4% of the physico-chemical indicators necessary to accurately study the optimal amount of zeolite in the planting layer of gray soils in laboratory conditions. with total phosphorus 0.13%, $N/NO_3+N/NH_4$ 14.2 mg/kg, mut. P_2O_5 16.5 mg/kg, available K_2O 197 mg/kg, porosity 51.4%, hygroscopic moisture 4.4%, total absorbed bases 16.8 mg. eq. 100 g, in % of the total, Ca 84.9, Mg 8.7, Na 6.4, the degree of salinity in % of dry residue is 0.25-0.50, PH 7, etc. was analyzed.

Taking into account the low amount of Ca, Mg and porosity, hygroscopic moisture, and relatively high amount of Na and salts in the soil samples taken based on the analysis, it was recommended to give 7-8 tons of sialite per 1 ha of cultivated land.

The amount of zeolite required to treat 1 hectare of soil environment may vary depending on several factors such as soil salinity, soil type, physicochemical properties, analysis objectives and other agrotechnical aspects.

On our part, such issues are discussed with agricultural specialists or agronomists who conduct soil research in a specific area, taking into account the characteristics of the soil, improvement goals and other factors, as a result of the soil analyzes taken, the optimal amount of zeolite in gray soil per unit area (1m², 100m², 1000m²) and how has been determined to be applied.

In order to effectively use the zeolite mineral, it is recommended to give it to the soil in the following forms. Primarily, the zeolite mineral is usually applied in powder or amorphous form, sometimes mixed with other fertilizers or planting materials, and must be applied to the soil in a variety of ways.

1. Spreading of zeolite: Zeolite should be evenly distributed over the soil surface by applying and internal mixing.

2. Application to the soil at planting: When planting trees or seeds, it is useful to add zeolite to the hole to improve the soil structure around the root zone.

3. Use in irrigation systems: Zeolites are sometimes used as part of the soil mix in drip or drip irrigation systems to retain water and improve its use by plants.

These techniques maximize the properties of zeolite, helping to improve soil structure, retain moisture and reduce salinity, which ultimately promotes plant health and growth.

The use of zeolite depends on the purpose of soil cultivation, in most cases zeolite can be given both before plowing the soil and after plowing (Figures 2, 3, 4, 5).



Figure 2.



Figure 3.



Figure 4.



Figure 5.

Applying Nakhchivan zeolite to the soil

Discussion and Conclusion: *The potential opportunities and positive results of the zeolite mineral for improving the soil structure and increasing the productivity of agricultural plants were discussed and analyzed in the research facility, and since 2006, in the Laboratory of Soil Resources and Cereals, Legumes and Technical Plants of the Bioresources Institute of the Nakhchivan Department of ANAS field experiments on this precious mineral have been started. All field experiments were carried out in the conditions of ancient irrigated gray soils of Nakhchivan MR. The effect of zeolite mineral in the medium development phase of vegetables, potatoes, mung beans, beans and beans is reflected in the following pictures (Figures 6, 7, 8, 9, 10, 11).*



Figure 6.



Figure 7.



Figure 8.



Figure 9.



Figure 10.



Figure 11.

Effect of zeolite mineral on the mid growth phase of vegetable, potato, mung bean, bean and bean plants

The field experiments also used seed material collected from various villages of Nakhchivan MR and included in the gene pool and purchased from the country's leading scientific and research institutes, as well as from ICARDA, an international scientific organization. In all experiments, 5-8 s/ha yield increase due to zeolite was recorded.

The following pictures show some results of field experiments on the precious mineral since 2006 at the Laboratory of Soil Resources and Cereals, Legumes and Technical Plants of the Nakhchivan Department Bioresources Institute of ANAS (Figures 12, 13, 14, 15, 16, 17).



Figure 12.



Figure 13.



Figure 14.



Figure 15.



Figure 16.



Figure 17.

Cereal, barley and maize gene pool

In the field experiments, 750 varieties of potato, 33 of beans, 20 of lentils, 5 of soybeans, 5 of corn, 146 of peas, 120 of barley, and 750 varieties of four varieties of soft wheat were used, and it was recommended for the efficient use of the soil environment under cultivated plants in the farms of the autonomous republic.

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Mathematical sciences

CONTROLLABILITY AND OPTIMAL PERFORMANCE OF LINEAR SYSTEMS WITH PHASE CONSTRAINTS

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Abstract

The paper proposes a method for solving the optimal speed problem for linear systems of ordinary differential equations in the presence of phase and integral constraints, when the initial and final state of the system are elements of given convex closed sets, taking into account the limitation of the control value. The presented work relates to the mathematical theory of optimal processes by L.S. Pontryagin and his students and the theory of controllability of dynamical systems by R.E. Kalman.

The basis of the theory of optimal performance in the form of the maximum principle was created by L.S. Pontryagin and his students. The optimal speed, taking into account the intensity of control, is considered in, and the principle of maximum at limited phase coordinates is given in. The solution to the optimal performance problem under uncertain conditions is considered. Application of the maximum principle for solving various particular problems is set out. The maximum principle is considered one of the best achievements of mathematics and is the source of many scientific studies on the theory of extreme problems.

Introduction

Consider a controlled process described by a linear ordinary differential equation with integrand control of the following form

$$\dot{x} = A(t)x + B(t)u(t) + C(t) \int_a^b K(t, \tau) \mathcal{N}(\tau) d\tau + \mu(t), \quad t \in I = [t_0, t_1] \quad (1)$$

$$\tau \in I_2 = [a, b]$$

with curved conditions

$$(x(t_0) = x_0) \in S_0, \quad (x(t_1) = x_1) \in S_1 \quad S_0 \subset R^n \quad S_1 \subset R^n \quad (2)$$

with constraints on control values

$$u(t) \in U(t) = \{u(\cdot) \in L_2(I_1, R^m) \mid u(t) \in U_1(t) \subset L_2(I_1, R^m), \text{ a.e., } t \in I_1\} \quad (3)$$

$$v(\tau) \in V(\tau) = \{v(\cdot) \in L_2(I_2, R^{n_1}) \mid v(\tau) \in V_1(\tau) \subset L_2(I_2, R^{n_1}), \text{ a.e., } \tau \in I_2\} \quad (4).$$

Initial data: $A(t)$, $B(t)$, $C(t)$, $t \in I_1$ - given matrices of orders respectively $n \times n$, $n \times m$, $n \times m_1$, with piecewise continuous elements; $K(t, \tau)$ - a known order matrix $m_1 \times n_1$ with elements from L_2 , $\mu(t) \in L_2(I_2, R^n)$ - a given function $S_0 \subset R^n$, $S_1 \subset R^n$ - given convex closed sets that determine the constraints on the initial and final state of phase variables $U_1(t) \subset L_2(I_1, R^m)$, $V_1(\tau) \subset L_2(I_2, R^{n_1})$ - given convex closed sets. In particular, sets

$$S_0 = \{x_0 \in R^n \mid |x_0 - \bar{x}_1| \leq r\}, \quad S_0 = \{x_0 \in R^n \mid c_i \leq x_{0i} \leq d_i, i = \overline{1, n}\}$$

$$S_1 = \{x_1 \in R^n \mid |x_1 - \bar{x}_1| \leq R\}, \quad S_1 = \{x_1 \in R^n \mid \bar{c}_i \leq x_{1i} \leq d_i, i = \overline{1, n}\}$$

where $\bar{x}_0 \in R^n$, $\bar{x}_1 \in R^n$ are fixed vectors, r, R are given numbers, $x_0 = (x_{01}, \dots, x_{0n}) \in R^n$, $x_1 = (x_{11}, \dots, x_{1n}) \in R^n$, $c_i, d_i, i = \overline{1, n}$ are fixed numbers;

Plenty

$$U_1 = \{u(\cdot) \in L_2(I_1, R^m) \mid \|u - \bar{u}\| \leq r, \text{ a.e., } t \in I_1\}$$

$$U_1 = \{u(\cdot) \in L_2(I_1, R^m) \mid \alpha_i(t) \leq u_i(t) \leq \beta_i(t), \text{ a.e., } i = \overline{1, n}, t \in I_1\}$$

$$V_1(\tau) = \{v(\cdot) \in L_2(I_1, R^n) \mid \|v - \bar{v}\| \leq R, \text{ a.e.}, \tau \in I_1\}$$

$$V_1(\tau) = \{v(\cdot) \in L_2(I_1, R^n) \mid \bar{\alpha}_i(\tau) \leq v_i(\tau) \leq \bar{\beta}_i(\tau), \text{ a.e. } i = \overline{1, n}, \tau \in I_2\}$$

where $r > 0, R > 0$ are given numbers, $u(t) = (u_1(t), \dots, u_m(t))$, $v(\tau) = (v_1(\tau), \dots, v_n(\tau))$, $\alpha_i(t), \beta_i(t), t \in I_1, \alpha_i(\tau), \beta_i(\tau), \tau \in I_2$ are given continuous functions, a.e. - almost everywhere.

Two cases are considered: 1) When the moments are fixed; 2) t_0 - fixed, find the lowest value $t_1, t_1 > 0$ when the edge problem (1) - (4) has a solution. The edge problem (1) - (4) is called the optimal performance problem in the second case.

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Political sciences

PERFECT PRINCIPLE OF ORGANIZING A COUNTRY

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СОВЕРШЕННЫЙ ПРИНЦИП УСТРОЙСТВА СТРАНЫ

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Abstract

The collapse of empires in the 20th century will continue with the collapse of countries and the world order in the 21st century. To prevent destructive processes, the article shows the perfect principle of the structure of countries. The uniqueness of the new principle lies in its simplicity, efficiency, does not require investment for implementation, and is applicable to any organization of people. For justification, the principles of uniting people throughout human history are shown. Disclosure of the topic became possible thanks to a new method of cognition, in combination with static and dynamic approaches to system analysis. Changing basic approaches opens up new opportunities, thanks to which it is possible to simplify all social processes. This will allow every inhabitant of the planet to get a real chance to fulfill all their dreams.

Аннотация

Крушение империй в XX веке продолжится крушением стран и миропорядка в XXI веке. Для предотвращения разрушительных процессов, в статье показан совершенный принцип устройства стран. Уникальность нового принципа состоит в простоте, эффективности, для внедрения не требует инвестиций, применим для любой организации людей. Для обоснования показаны принципы объединения людей на протяжении истории человечества. Раскрытие темы стало возможным благодаря новому методу познания, в совокупности со статическим и динамическим подходами в системном анализе. Изменение базовых подходов, открывает новые возможности, благодаря которым возможно упростить все общественные процессы. Это позволит каждому жителю планеты получить реальный шанс исполнения всех мечтаний.

Keywords: republic, empire, state, civil society, missionary, mediation, sustainable development, millennium.

Ключевые слова: республика, империя, государство, гражданское общество, миссионерство, медиация, устойчивое развитие, золотой век.

Введение.

Существует мнение о демократии, что это не самая лучшая форма правления, но за неимением лучшего мы должны довольствоваться ею. Исторический же опыт говорит, если формы правления не совершенствуются, они уходят в прошлое. Другими словами, человечество периодически оказывается на пороговых этапах развития, когда жить по старым правилам становится невозможным. Перемены происходят не по доброй воле. Растущее количество бедствий, катаклизмы и войны приводят к разрушению существующих организационных структур, и на основе некоей новой идеи начинается новый эксперимент, вплоть до следующего порога. В основе всех идей лежит трактовка идеи свободы. Например, у американских колонизаторов была идея независимости от старого света на новых территориях. Коммунисты создавали СССР на старых территориях. Они пытались освободиться путем воспитания нового человека, свободного от старых нравов и предрассудков. Неспособных перестроиться под новые реалии граждан уничтожали, поэтому эта система оказалась самой кровавой.

Первая четверть 21-го века стала очередным витком роста напряжения во всех странах. Мы все являемся свидетелями кризиса государственного устройства во всех странах. В итоге,

многие страны потеряют свою государственную идентичность. Точно также в 20-м веке идентичность потеряли империи. Основой нового мироздания станут страны, основанные по принципу устойчивости. Данная статья является обоснованием идей, изложенных в статье «Декларация Свободы Человека и Человечества». Задача статьи – показать стратегические ошибки управления в существующих системах, искоренить их путем внедрения более совершенной и простой системы общественных отношений. Экономическое обоснование в статье «Универсальный метод управления» в открытом доступе. В призме нового метода познания старое станет слишком очевидным, и не останется места для споров и спекуляций в защиту их существования. Это вопрос нашего выживания.

История.

Образная картина событий. Каждый имеет свои интересы и цели, и у любых двух людей они не совпадают. Однако, кратковременное появление общей цели способно их объединить, вплоть до достижения этой цели, например, когда необходимо выжить или приобрести некие блага. Более устойчивые, а значит и длительные отношения, требуют объединения как минимум 3х человек. На протяжении веков, наиболее устойчивым объединением стала семья. Ценность ее в способности объединить людей разных по сути, возрасту и по целям, такими как выживание, накопление благ и развитие. Множество семей образовывали общины, отношения в которых основывались на жестких обычаях и непреложных истинах. Нарушение обычаев влекло за собой изгнание из данной общины. Структура общин подобна семье, также состоит из трех составляющих, это рядовые жители, лидер и жрецы. К ним причисляются деревни, хутора, племена, и другие родовые объединения. Цель – выживание в природе. В результате увеличения количества общин во всем мире, произошло усложнение процессов жизнедеятельности. К задаче выживания в природе прибавилась задача выживания в среде себе подобных. Появилась необходимость объединения в более крупные общины для защиты себя от других сообществ и угроз. Внутри таких объединений появились организации людей, объединенных задачей приобретения добычи и защитой от внешних угроз, а именно воинские отряды. Их деятельность оказывала влияние на правила жизнедеятельности общины. Например, воинский устав является прародителем обязательных к исполнению законов, нарушение которых грозит полной гибелью, как групп, так и общины. Именно задача выживания породила карательную функцию закона. Удовлетворение потребностей выживания требовало нового вида труда, - необходимость изготовления амуниции, оружия, дополнительных продовольственных запасов. Таким же образом, как появились воинские отряды, появились другие группы людей с новыми типами поведения и выработанными под них правилами поведения. Далее, для обеспечения существования этих групп потребовалось создание производств и коллективов со своей спецификой поведения. Появились новые трудовые отношения, которые также меняли картину общественных отношений. Таким образом, появилось множество групп со своими уставами. Усложнение задачи выживания общин породило необходимость создания городов-государств, как центра регулирования отношений между множеством окружающих город общин. Для упорядочивания жизнедеятельности формировались единые законы и религии. Города-государства стали прообразом современных стран-государств и республик. Сначала несколько таких городов-государств для выживания стали образовывать различные союзы, унии, империи. В результате борьбы за выживание появились образования более высшего порядка – Империи со своими атрибутами, сводами законов и доминирующей религией. Главной целью империй образований был захват новых территорий в целях обогащения, и усиления своей духовной, военной и государственной мощи, по принципу слабый поглощается сильным. К началу 20-го века весь мир был поделен между империями. Управлялись империи единолично Государем с помощью государственного аппарата, власть передавалась по наследству. В некоторых странах до сих пор чисто формально сохранились монархические семьи и их почитание. Даже формальное наличие монарха есть конкретным примером того, как один гражданин, на первый взгляд ничего не делая, на самом деле играет очень важную роль в общественной жизни страны. Все империи по достижении пика своих возможностей, когда отсутствовал прирост территорий, вступали на полосу испытаний, начинался процесс разложения. Триединство власти государства, власти религии и власти народа сопровождалось нарушением устойчивости, а именно, ради сиюминутных выгод происходило слияние государства с религией. В результате происходило обнищание народа, и в начале 20-го века все империи стали рушиться.

Современный мир. Логика событий.

Итак, к 20-м веку наиболее распространенной стала модель империи, основанной на взаимодействии трех фундаментальных сил, а именно сила граждан, государства, и единой религии. Всех объединяло служение императору, проводнику божьей воли на земле. Модель подобна общинам с вождями, жрецами и жителями. Слияние религии с государством нарушало невидимую устойчивость, которое проявлялось в обнищании граждан, нарастании противоречий, что в итоге вело к крушению империй. Параллельно крушению старого мира, шло становление идей демократии в Новом Свете. Абсолют власти одного правителя сменило взаимодействие трех фундаментальных сил – силы государства, религии и силы народа в виде гражданского общества. Америку основали не обычные граждане из старого мира, а наиболее пассионарная, активная их часть. Движимые одной целью, преодолевая неимоверные трудности на своем пути они создали страну, которая также к чему-то стремится. Целью стала идея свободы, выраженная в Декларации независимости, Билле о правах и Конституции. Появилось понятие страна и ее конституция, как выработанный веками свод законов, способствующих целям сохранности, достойному существованию и развитию данной страны и всех ее граждан. Признаком страны является ее название, язык и нация, действующие в границах занимаемой гражданами территории. Конституция - это правовой акт, обладающий высшей юридической силой в границах территории данной страны. На основе конституции строится свод законов. Благодаря развитию научной мысли появилось современное понятие Права – свод правил поведения, способствующих согласованию действий граждан, в соответствии с принятыми устоями социально-экономической, политической и духовной жизни, а также развитию всех общественных отношений страны и мира в целом.

Фактически в США была реализована классическая республиканская форма правления. В ней подразумевается, что все высшие органы государственной власти либо избираются народом, либо формируются общенациональным представительным учреждением на четко ограниченный срок. В условиях существования других стран, осуществлением правомочного существования данной страны занимается Государство в лице граждан, наделенных полномочиями, то есть властью. Государство обладает законодательной, судебной и исполнительной функциями, теоретически независимыми друг от друга ветвями власти. Гражданин, наделенный строго определенными государственными полномочиями, и функциями для их осуществления, называется чиновником. Совокупность чиновников называется бюрократическим аппаратом. Все остальные граждане делятся на тех, кто приближен и тех, кто далек от власти и денег. В общем, каждый гражданин обладает властью свободы действий, для реализации своих интересов, в рамках, очерченных конституцией, законами, общественными нормами. В частности, каждый гражданин обладает меньшей властью. Она ограничивается рамками добровольно принятых на себя обязательств при осуществлении частной деятельности, при заключении трудового или иного договора.

У старого Света в отличие от нового не было объединяющей большинство граждан идеи. Причина в наличии многовековой традиции поклонения властителю, как олицетворению божественной справедливости на земле. Появилась потребность создания новой идеологии и новой модели государства. Появились две доминирующие идеи национал-социализма и коммунизма в виде Республик. Роль религии исполняла единая политическая партия с единой идеологией. Время показало недееспособность этих образований по причине слияния сил государства и партии.

В наши дни отсутствие объединяющей идеи стало основой проблем во всех странах, мире и в любых объединениях людей. К США это также относится, потому что идея свободы и богатства, в сравнении с остальным миром, была относительно достигнута. Это привело к уменьшению набожности прихожан, понятие гражданское общество также потеряло свою силу. Все эти факторы вместе незаметно стали основой для скрытой узурпации власти государством. Гражданское общество это небольшая и при этом наиболее активная и созидательная часть граждан страны. В тоталитарных странах оно прямо подавляется, в демократических вынуждены с нею считаться. Её сила явно проявляется перед угрозой голода или уничтожения в период испытаний и ведет за собой пассивное большинство к спасительному будущему. Отсутствие таких прямых угроз, бесцельность жизни привели к внутреннему разложению всех объединений людей во всем мире. Произошла поляризации мира на автократии-демократии, стран на запад-восток, север-юг, партий и политиков на правых-левых, консервативных-либеральных, республиканцев-демократов, религий (между собой и

внутри самих себя по исконности). Очевиден системный кризис дуального мировосприятия всех граждан мира. Он подкрепляется дуализмом всех накопленных человечеством знаний, подтверждается увеличением противоречий в любых объединениях людей, даже в семье и в гендерных вопросах. Делаются попытки объединить всех умных людей, например, с помощью концепции устойчивого развития, но и здесь не может быть единства, так как любые 2 умных человека не способны объединяться априори.

Практическое решение.

«Когда ход событий в мире угрожает самому существованию человечества», важно понять необходимость объединения граждан между собой на более высоком духовном, интеллектуальном и правовом уровне. Понятие гражданского общества присуще стране, странам, поэтому оно не может спонтанно проявиться в масштабах человечества. Для этого следует создать условия в рамках страны, то есть условное понятие «гражданское общество» перевести в разряд конкретного. Религии и верования раздроблены, разобщены, недееспособны и, единственно в чем они может быть едины, это в покорности государству. Фактически, начиная с элементарных общественных объединений людей, вплоть до масштабов страны, в каждой административной или территориальной единице существует два вида граждан: управляющий и управляемый, тот, кто имеет власть и тот, на кого эта власть распространяется. Только конкретное наличие третьего элемента сможет дать этим отношениям устойчивость, подобно тому как в судебной системе работает медиация. Такой общественный медиатор не требует подготовки. Во всех реформаторских проектах, известных в истории требовалась серьезная подготовка миссионеров, потому что им предстояла задача переформатирования сознания (мировоззрения) у местного населения, чтобы сделать его более сознательным, просвещенным, образованным. Они использовали принцип – сознание определяет бытие. В данном случае стоит задача не реформирования страны или форматирования сознания граждан, а жизненно важная необходимость изменения никем невидимого принципа общественного устройства вообще. Напрямую менять сознание людей, как это делали миссионеры или тоталитарные системы в 20-м веке, очень опасное авантюрное предприятие с плохим финалом. Закон: когда меняется принцип бытия, сознание само автоматически приспосабливается под него без отрицательных последствий. Используемый принцип - бытие определяет сознание, а потом новое сознание определит новое бытие в рамках единой цели. Изменение принципа организации бытия на местах, должно стать полигоном подготовки кадров нового типа сроком до 3-х лет. Все граждане с 18-ти лет, в виде всеобщей общественной обязанности, должны получить такой новый опыт жизни. Это не касается граждан, которые подлежат выполнению всеобщей воинской обязанности. Другими словами, противоречия между людьми начинаются с самых низовых общественных структур поднимаются выше, совершенствуются до проблем, и никто на их пути не стоит. Все в мире преступления происходят, потому что их никто не видит, а когда все запущено, никто на них не обращает внимания. Когда проблема коснется кого-то лично...тогда уже поздно. Да, для противодействия создаются многочисленные организации, фонды, форумы, но любой чиновник обязан заниматься исполнением своих обязанностей, своих проблем. Каждый чиновник прежде всего бюрократ. По большому счету, у бюрократов нет времени и желания заниматься массой проблем общества, какими-то гуманистическими ценностями или тем более отдельными гражданами. Тех, кто пытается что-то изменить, убирают со сцены жизни и про них снимают героические фильмы. Нужен независимый человек на месте, который изначально аккумулировал бы возникающие противоречия. Большинство противоречий находили бы свое решение просто по причине того, что они на виду или на них обратили внимание. Нет противоречий – нет подпитки проблем, «нет корня – нет дерева». Для этого не нужны власть, деньги, полномочия, возраст, авторитет. Такая работа по выявлению, аккумулированию и решению противоречий на местах в течении 2-3 лет даст уникальный опыт, который совершенствуясь будет подниматься выше по лестнице социальной иерархии. В итоге, мы получим новый тип граждан, реально существующее единое гражданское общество и новый принцип общественного устройства. Общеизвестно: гражданин, имеющий опыт независимого проживания в разных местах, многократно более эффективен в любой деятельности любого среднестатистического гражданина. Такое преимущество можно и нужно использовать в кадровой политике государственных организаций. В массе своей такие граждане, а не государство сможет стать надежной основой для существования, опорой для развития всех негосударственных и некоммерческих организаций. Объединение гражданских обществ на

уровне стран, создаст реальные условия для объединения в гражданское общество мира, прообразом которого сейчас является ООН. Мы находимся на пороге «Золотого Века».

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Technical sciences

DEVELOPMENT OF ALTERNATIVE POWER GENERATION

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Abstract

One of the urgent problems of our time is the environmental problem associated with carbon emissions and as a consequence of climate change. The development of civilisation is inextricably linked to the increasing impact of mankind on the environment. The use of renewable energy sources is a real way to protect against climate change without creating new threats for present and future generations.

Keywords: renewable energy sources, alternative energy

In the modern world, the energy sector is the basis for the development of basic industries that determine the progress of social production. In all industrially developed countries, the rate of development of the energy sector outstripped the rate of development of other industries. Also, the energy sector is a serious source of unfavourable impact on humans and the environment. This impact affects the atmosphere through high oxygen consumption, carbon dioxide emissions, particulate matter and moisture. To a large extent, the goal of reducing greenhouse gas emissions has initiated the development of renewable energy sources (RES), opening up opportunities for advanced technologies, facilitating access to energy infrastructure, and reducing impacts on climate change and the environment. Energy derived mainly from burning fossil fuels and nuclear power plants is being replaced by energy from sunlight, water, wind, tides, biofuels and geothermal heat, and new ways of generating energy are being developed. Electrical, thermal and mechanical energy is generated from renewable sources.

In addition to the environmental reason for switching to alternative energy and finding new solutions, there are a number of other reasons. First of all, there is a social reason. Nowadays, in conditions of population growth, it becomes impossible to find a place for the construction of plants operating on traditional non-renewable energy sources, which would not pose a danger to the surrounding people. As research results have shown, people living near these plants have been confirmed to have a high percentage of severe diseases. Another reason is economic. The cost of renewable energy is lower in value than that obtained from traditional sources, which will allow redistribution of fuel resources for industrial development.

Renewable energy is energy derived from natural sources that are replenished at a rate faster than the rate at which they are consumed. Examples of such constantly replenishing sources are sunlight and wind.

Obtaining energy from renewable sources involves much lower emissions than burning fossil fuels. Switching from fossil fuels, which currently account for a huge share of emissions, to renewable energy is key to overcoming the climate crisis.

Alternative energy, based on renewable energy sources as well as nuclear and volcanic energy, is showing great growth rates all over the planet. In the last four years, its share of global electricity consumption has doubled to 20 per cent. Fossil fuels still account for more than 80% of global energy production, but cleaner energy sources are gradually gaining ground. Currently, about 30 per cent of electricity comes from renewable sources.

About 79% of the world's population lives in net fossil fuel importing countries - that's about 6 billion people dependent on fossil fuels from other countries and therefore vulnerable to geopolitical shocks and crises.

Unlike fossil fuels, renewable energy is available in all countries and its full potential has yet to be utilised. The International Renewable Energy Agency (IRENA) estimates that 90 per cent of the world's electricity can and should come from renewable sources by 2050 [1].

Renewable energy provides a way out of import dependency, enabling countries to diversify their economies and protect them from unpredictable fluctuations in the price of fossil fuels, while stimulating inclusive economic growth, job creation and poverty alleviation.

Today, the use of renewable energy is actually the cheapest energy supply option in most parts of the world. The cost of renewable energy technologies is falling very quickly. Between 2010 and 2020, the cost of electricity from solar panels fell by 85 per cent. The cost of onshore and offshore wind power fell by 56 and 48 per cent respectively.

Falling prices make renewable energy more attractive to all, including low- and middle-income countries, which will account for much of the additional demand for new electricity. With falling costs, a significant proportion of new electricity supply in the coming years may well come from low-carbon sources.

By 2030, cheap electricity from renewable sources could provide 65 per cent of the world's electricity supply. This would decarbonise the energy sector by 90% by 2050, significantly reducing carbon emissions and helping to mitigate climate change.

According to the World Health Organisation (WHO), about 99 per cent of the world's population breathes air quality parameters that exceed the maximum permissible values and threaten human health, and more than 13 million annual deaths worldwide are attributed to preventable environmental causes, including air pollution.

Harmful levels of fine particulate matter and nitrogen dioxide are mainly caused by the combustion of fossil fuels. In 2018, air pollution from fossil fuels resulted in health and economic costs of \$2.9 trillion. This was equivalent to approximately \$8 billion per day. This is equivalent to an estimated \$8 billion per day.

Thus, switching to clean energy sources such as wind and solar helps to address not only climate change, but also air pollution and declining public health.

In addition, efficient and reliable renewable energy technologies can create a system less vulnerable to market shocks and increase resilience and energy security by diversifying energy supply.

Improving secure energy supply provides access to energy infrastructure for people in remote regions, creating decentralised networks and reducing the share of interruptions in electricity supply. Renewable energy becomes competitive with the costs of conventional power plants. By the end of 2022, electricity from RES and SES has become economically more favourable than conventional electricity. The use of RES for heating and cooling in buildings and industrial facilities developed slowly, while the use of biofuels for transport increased moderately during the year.

Renewable thermal energy accounts for the largest share of modern renewable energy (4.2 per cent of total final energy consumption), followed by hydropower (3.6 per cent), wind and solar (2 per cent), and transport biofuels (about 1 per cent)

Decarbonisation of the oil and gas industry continued to progress through 2023. The EU announced that the European long-term climate strategy will be carbon neutral by 2050. A growing number of countries have also adopted plans to phase out the use of coal for electricity generation or economy-wide fossil fuel consumption. Additionally, countries have adopted carbon pricing policies, indirectly supporting renewable energy in all sectors.

By the end of 2021, carbon pricing initiatives covered about 13 per cent of global greenhouse gas emissions. Due to increased fossil fuel consumption, global energy-related carbon dioxide emissions increased by about 1.7 per cent during the year.

Today, when talking about the trend of alternative energy development in the world, approximately one third of countries under the UN Framework Convention on Climate Change refer to RES as tools for climate change mitigation, and more than half set targets for sustainable development. Energy production and consumption remains key to global efforts to address climate change. Technologies have received both direct and indirect support through policies aimed at mitigation and adaptation.

As a result of all of the above, we can assume that more renewable capacity is going to be added globally in the next five years (Figure 1) [2].

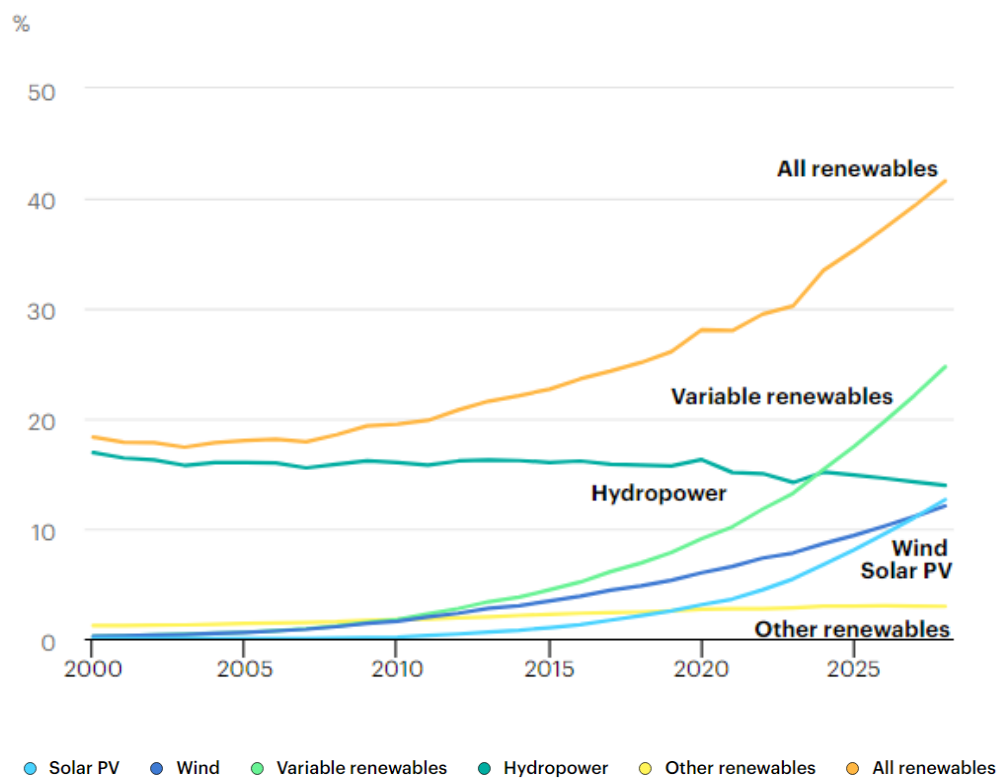
Development of renewable capacities

Fig. 1

Some 3,700 GW of new renewable capacity is planned to come online between 2023 and 2028, thanks to supporting policies in more than 130 countries. Over the next five years, several important renewable energy milestones are expected to be achieved:

1. Together, solar and wind energy will produce more electricity than hydropower.
2. Renewable energy is projected to become the largest source of electricity generation by 2025.
3. Nuclear power generation is expected to lose ground to wind and solar photovoltaics in 2025 and 2026.
4. Renewable energy will account for more than 45% of global electricity production in 2028, with the share of wind and solar power doubling to 25%.

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TECHNOLOGICAL APPROACHES TO INCREASING THE ENERGY CHARACTERISTICS AND QUALITY OF PLASMA CUTTING ON DIRECT AND REVERSE CURRENT POLARITY

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Abstract

The work is devoted to testing the efficiency of plasma cutting on reverse polarity of carbon steels with a thickness of 5-200 mm using air or oxygen as a plasma-forming gas with or without the addition of water vapor. It has been established that reverse polarity plasma cutting technology without and with the addition of water can double the productivity of cutting carbon steels compared to traditional air plasma cutting and significantly improve the quality of cut edges, which allows it to be considered more effective than air plasma cutting.

Keywords: plasma cutting, steel, energy characteristics, edge quality, polarity, reverse, direct.

Increasing the efficiency of plasma cutting can be achieved by using water vapor in plasma-forming gas mixtures [1]. To do this, the working fluid (water) is transformed into a gaseous state for the steam cutting process directly in the cutting device, in which a corresponding approximately constant evaporation temperature of the liquid used for the cutting process is created. To form water vapor, water is supplied directly to the area of action of the electric arc with a flow rate that varies within 0.035...0.055 l/min depending on the change in the thickness of the metal being cut and, when converted into steam, makes up approximately 20% of the flow rate of the plasma-forming gas. Water is supplied at a set rate to the area of action of the electric arc through one or more capillaries, which are made in the electrode of the plasma torch. Cutting is carried out with reverse polarity, and compressed air is used as a plasma-forming gas [2].

The purpose of the work is to test the effectiveness of plasma cutting on reverse polarity of carbon steels with a thickness of 5-200 mm using air or oxygen as a plasma-forming gas with or without the addition of water vapor.

Plasma cutting of sheet metal using water vapor is realized through the use of a plasma torch with copper hollow and nozzle electrodes, which are separated from each other by an insulator-swirler [3]. An electric arc in operating mode burns between the internal electrode and the metal being cut. Plasma-forming gas (air) is supplied through tangential holes in the swirler. The vortex supply of plasma-forming air contributes to the elongation of the electric arc and its "binding" inside the cavity part of the electrode. A capillary hole was made in the upper part of the electrode, through which water was supplied at fixed flow rates ranging from 0.035 to 0.055 l/min, depending on the thickness (5...200 mm) of the metal being cut. The internal and nozzle electrodes were cooled with running water. During operation of the plasma torch, one pole of the power source was connected to the electrode, and the other to the metal being cut, and through a ballast resistance and a circuit breaker to the nozzle electrode.

When starting the plasma torch, after supplying cooling water and plasma-forming gas, an arc was

first ignited in the minimum gap between the electrodes by electrical breakdown of the interelectrode gap using an oscillator. The auxiliary arc created in this way was carried out by the flow of plasma-forming gas from the interelectrode gap and stretched along the axis of the discharge chamber. At the same time, water began to flow through the capillary at the required flow rate and its instant evaporation occurred under the influence of the arc temperature. A vortex flow of plasma-forming air mixed with water vapor, creating a gas mixture with ~20% water vapor. As soon as the plasma flow leaving the nozzle electrode reached the metal, a working arc arose, the auxiliary arc was turned off by a circuit breaker and the cutting process began.

The effectiveness of the proposed method was tested in two stages by cutting carbon steel sheets with a thickness of 5...200 mm. At the same time, the cutting results were compared using air as a plasma-forming gas, as well as mixtures of air with 20% water vapor and oxygen with 20% water vapor.

It was found that the addition of approximately 20% water vapor in the plasma-forming air improves the quality of the cut edges and reduces their non-perpendicularity. The cut surface had a silver color, and the roughness decreased from $R_z=0.12\ldots0.09$ mm to $R_z=0.020\ldots0.010$ mm, that is, 6...9 times. An admixture of 20% water vapor allows one to avoid the formation of a nitrated layer, reduce the size of the HAZ and the effect of hardening the cut edges.

Plasma cutting of sheet metal is carried out with the reverse polarity of the electric arc due to the supply of a plasma-forming gaseous medium to the cutting plasma torch, consisting of a mixture of 4 parts air (or oxygen) with one part water vapor. To generate the required amount of water vapor, the liquid is transformed into a gaseous state in the cutting device (plasma torch) by creating in it and maintaining during operation an approximately constant evaporation temperature of the liquid used for the cutting process. The source of creating and maintaining such a temperature is the cutting electric arc generated by the plasmatron. To form water vapor, water is supplied directly to the area of action of the electric arc with a flow rate that varies within the range of 0.035...0.055 l/min. The choice of water flow rate depends on the thickness of the metal being cut and is made in such a way that when water is converted into steam, the share of steam is approximately 20% of the plasma-forming gas flow rate. Water is supplied at one or another set flow rate into the area of action of the electric arc through one or more capillaries, which are made in the electrode of the plasma torch.

It has been established that the addition of about 20% water vapor to the plasma-forming gaseous medium (air or oxygen) can approximately double the cutting productivity of carbon steels, as well as significantly improve the quality of cut edges compared to traditional air plasma cutting. This makes the proposed innovative method of plasma cutting significantly more effective than existing traditional ones.

To carry out experimental studies of the proposed method, a cutting plasmatron of a new design was created, as well as a laboratory stand, which included a three-coordinate plotter for moving this plasmatron relative to the table with cut samples of rolled carbon steel located on it. Plates made of steel type Q235 with dimensions of the order of $600\times400\times\delta$ mm, where $\delta=5\ldots200$ mm, were used as samples. The movements of the carriage with the cutting plasmatron mounted on it were controlled using a numerical control system.

According to the design of the cutting plasma torch created for the experiments, water was supplied to the working chamber at fixed flow rates using a flow meter. To reduce the intensity of water injection into the working chamber, a filter element was located at the point of its introduction. This prevented intense ingress of water, which could lead to disruption of the generation of the cutting arc.

When starting the plasma torch, after supplying cooling water and plasma-forming gas (air or oxygen), an arc was first ignited in the minimum gap between the internal and nozzle electrodes by electrical breakdown of the interelectrode gap produced by an oscillator. The auxiliary arc created in this way was carried out by the flow of plasma-forming gas from the interelectrode gap and stretched along the axis of the discharge chamber. At the same time, through the capillary (fitting with a filter element), water began to be supplied at the required flow rate into the working chamber of the plasma torch and its evaporation under the influence of the arc temperature.

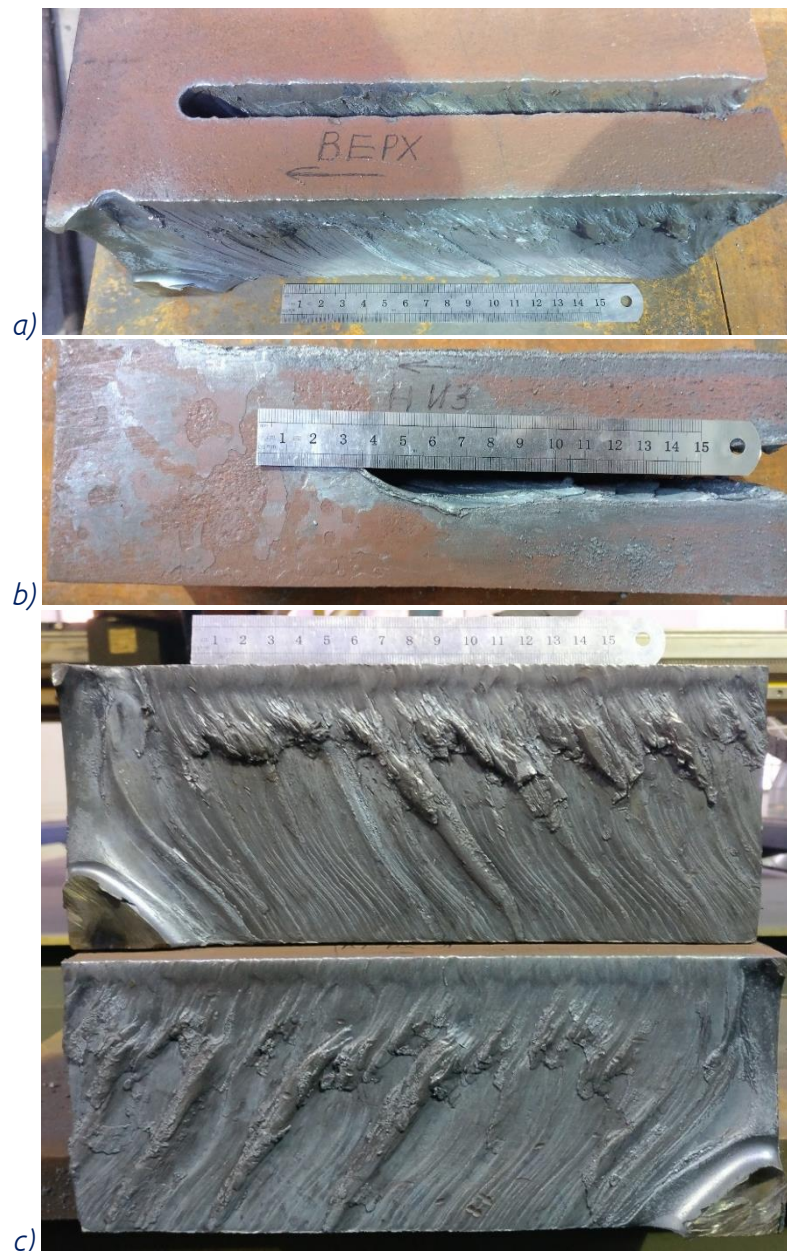


Fig. 1. Appearance of the cut of a steel sheet with a thickness of 100 mm, obtained by the developed method of water-air plasma cutting: a) – top view; b) – bottom view; c) – type of cut edges.

A vortex flow of plasma-forming gas (air or oxygen) was mixed with water vapor, creating a gas mixture with ~20% water vapor. As soon as the plasma flow leaving the nozzle electrode reached the metal of the sample being cut, a working arc arose, the auxiliary arc was automatically turned off and the cutting process began. The results obtained allow us to consider the quality of the cut edges to be satisfactory, and the process of water-air plasma cutting is approximately twice as productive as traditional air plasma cutting (Fig. 1).

Thus, the proposed innovative method of plasma cutting of rolled sheets using water steam makes it possible to approximately double the productivity of cutting carbon steels compared to traditional air plasma cutting and significantly (6-9 times in terms of roughness) increase the quality of cut edges, which allows it considered more efficient than air plasma cutting.

Conclusions.

1. It has been established that reverse polarity plasma cutting technology without and with the addition of water can double the productivity of cutting carbon steels compared to traditional air plasma cutting and significantly improve the quality of cut edges, which allows it to be considered more effective than air plasma cutting.

2. It has been established that the addition of approximately 20% water vapor to the plasma-forming air allows one to avoid the formation of a nitrated layer, reduce the size of the HAZ and the

hardening effect of the cut edges, leads to an increase in the quality of the cut edges, reduces their non-perpendicularity, and the roughness of the edges decreases by 6-9 times, t.e. from $R_z=0.12...0.09$ mm to $R_z=0.020...0.010$ mm.

3. An experimental technique has been developed and studies have been carried out on the characteristics of the electric arc and thermal processes at direct and reverse current polarities. It has been revealed that under the same gas-dynamic situation during plasma cutting, the arc with reverse polarity tends to lengthen, in contrast to the arc with direct polarity.

Gratitude

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