EMPRESS CATHERINE II
SAINT PETERSBURG
MINING UNIVERSITY

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Centre
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International Competence Centre
for Mining-Engineering Education
under the auspices of UNESCO

INTERNATIONAL FORUM-CONTEST OF YOUNG RESEARCHERS FROM THE BRICS COUNTRIES "TOPICAL ISSUES OF RATIONAL USE OF NATURAL RESOURCES"

INTERNATIONAL FORUM "MINERAL RESOURCES AS THE BASIS OF NATIONAL SOVEREIGNTY – PERSONNEL AND INNOVATION ENVIRONMENT"

BRICS 2024 RUSSIA

15.10.2024 – 20.10.2024

EMPRESS CATHERINE II SAINT PETERSBURG MINING UNIVERSITY

Empress Catherine II Saint Petersburg Mining University is the first higher technical education institution in Russia. The decree on its establishment was signed by Empress Catherine II, and the majestic architectural ensemble decorated with twelve-column porticoes and designed especially for students of the Mining Cadet Corps, as the university was then called, was created by Andrei Voronikhin. Among the graduates of the university, who discovered hundreds of deposits and designed production facilities, are world-famous geologists Alexander Karpinsky, Vladimir Obruchev, Dmitry Nalivkin, the founder of oil science Ivan Gubkin and many others.

Today the university is an advanced scientific and educational centre of technical education, which trains engineering personnel for mineral resources sectors in the fields of mining and oil and gas engineering, construction and architecture, electronics and nanoelectronics, mechanics, energy and materials science, metallurgy and chemical technologies, geology and geoecology, information technologies, economics and management.

The university's property complex with a total area of over 280,000 m^2 includes 3 training centres located in the historical centre of St. Petersburg on Vasilievsky Island and 7 training and research sites located in the Leningrad and Novgorod regions. The instrumentation and laboratory facilities are among the best in Russia, and both scientists and students, including those from other countries, can use these facilities.

The first higher technical education institution of Russia has unique research and teaching traditions, the continuity of which is ensured through a multi-stage system of training and retraining of highly qualified specialists.

In 2023 according to the results of the authoritative international rating agency QS World University Rankings (UK), Empress Catherine II Saint-Petersburg Mining University was ranked 3rd in the world in Engineering – Mineral and Mining and is among the top 20 best engineering and technical universities

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In the period from **15 to 20 October 2024**, Empress Catherine II St. Petersburg Mining University hosted the **International Forum-Contest of Young Researchers from the BRICS Countries 'Topical Issues of Rational Use of Natural Resources' and the International Forum 'Mineral Resources as the Basis of National Sovereignty – Personnel and Innovation Environment'**.
The event was attended by more than **800 participants** from **42 countries**, including participants from BRICS member countries, countries that have applied to join the association, as well as countries interested in co-operation, primarily countries of the African continent. The most representative delegations were from the following countries:

- China – 81 persons
- Belarus – 28 persons
- Iran – 27 persons
- India – 17 persons
- Nigeria – 17 persons

The programme of events included panel discussions and round tables, as well as a discussion platform for students and young scientists

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ABOUT THE EVENT

In accordance with the Action Plan of the Russian Federation BRICS Chairmanship, the International Competence Centre for Mining Engineering Education under the auspices of UNESCO hosted two major forums at Empress Catherine II Saint Petersburg Mining University: the International Forum-Contest of Young Researchers from the BRICS Countries 'Topical Issues of Rational Use of Natural Resources' and the International Forum 'Mineral Resources as the Basis of National Sovereignty – Personnel and Innovation Environment'.

The main objective of the activities is to raise the prestige of engineering education and scientific activity among young people to lay a scientific and technological groundwork for solving key problems of the mineral resources complex; to create an effective system to ensure innovation and technological research in promising areas of development of the mineral resources complex.

The programme included strategic panel discussions, during which representatives of relevant ministries and heads of universities discussed a wide range of topical issues, including technological and scientific and educational aspects of international relations in the raw materials and energy spheres and ways of their further development:

- Mineral Resources as the Basis of National Sovereignty – Personnel and Innovation Environment.
- Impact of international organizations on sustainable development of economic systems in multipolarity: transformation of geopolitics.
- Engineering education and advanced engineering personnel as a foundation for the development of the mineral resources sector.
- Improving the system of higher professional education: experience and perspectives.

At the end of the programme, three breakout sessions were organised for students and young scientists:

- Innovative technologies for exploration of the Earth and mining of minerals.
- Mineral processing, resource-saving and digital technologies for the energy and commodities sector.
- Economic and environmental problems of subsoil use, solutions for sustainable development.

Young researchers from 16 countries – participants of the International Forum-Contest were presented their ideas, developments and projects in the field of mineral raw materials and power engineering to the world's leading experts. The best speakers were awarded diplomas and memorable prizes.

The initiatives outlined by experts and participants during the events formed the basis of the Declaration adopted unanimously by all participants.


АГРО

WELCOME SPEECHES OF THE GUESTS OF HONOUR

«To consolidate approaches to the realisation of the interests of our states in all areas, such events as this forum are not just useful, but vital».

Chairman of the Federation Council
of the Federal Assembly of the Russian Federation
V.I. Matvienko

Welcome speech by V.I. Matvienko

I am pleased to welcome you at the opening of the International Forum 'Mineral Resources as a Basis for National Sovereignty – Personnel and Innovation Environment', which is taking place on the eve of the XVI BRICS Summit in Kazan, a key event in the year of Russia's chairmanship in the organisation. For many years, the BRICS countries have been effectively co-operating in a variety of areas, including political, economic, cultural, humanitarian and, of course, scientific and educational spheres. It is obvious that the role of the association as a global centre of power and a bulwark of a multipolar world is steadily growing, and its membership is expanding. In order to consolidate approaches to realising the interests of our States in all areas, events such as this forum are not just useful, but vital.

Today and in the following days, at the venue of Empress Catherine II Saint Petersburg Mining University , one of the world's best specialised universities, the topical issues of development of the mineral resources and fuel and energy complexes will be discussed. The programme of the forum provides for substantial panel discussions and round tables, raises the topics of improving the systems of higher education and training of qualified engineering and technical specialists, introduction of innovations in subsoil use, prospects and trends in the activities of international organisations in modern conditions. Thought leaders from BRICS countries, Africa, South-East Asia and Latin America will actively participate in the consideration of the stated problems, which guarantees pluralism of opinions and productive exchange of best practices.

I am confident that the forum will be held in a constructive atmosphere, and the proposed solutions will be in demand in practice and will help to bring international co-operation to a new level.

I wish everyone a fruitful and interesting communication!

«I am confident that the BRICS International Forum-Contest of Young Researchers will give an additional impetus to BRICS co-operation in education and geological science».

Minister of Foreign Affairs
of the Russian Federation
S.V. Lavrov

Welcome speech by S.V. Lavrov

I cordially welcome the organisers, participants and guests of the International Forum-Contest of Young Researchers from the BRICS Countries 'Topical Issues of Rational Use of Natural Resources'.

The theme of the forum is more relevant to the association than ever before. The concept of our country's BRICS chairmanship, approved by the President of the Russian Federation, defines the development of cooperation in this area as one of the priorities of our 'watch' this year. The BRICS countries have enormous natural resources. In particular, they account for over 44% of oil reserves and over 75% of aluminium and palladium production. We are key producers and consumers of energy resources.

A major success of the current year was the start of work on the establishment of the BRICS Geological Research Platform, as well as the launch of a dialogue between relevant agencies. We traditionally pay close attention to enhancing co-operation in the field of academic mobility. A significant achievement was the agreement to strengthen the capacity of the Network University by expanding the number of participating universities from each country and area of specialisation. A good tool for the promotion of young scientists has been the competition of innovative projects, which helps to identify young talents and put promising projects and initiatives into practice.

I am confident that the International Forum-Contest of Young BRICS Researchers will give an additional impetus to BRICS cooperation in education and geological science.

I wish you interesting discussions, success and all the best.

WELCOME SPEECHES OF THE GUESTS OF HONOUR

«I am convinced that the wide audience of the forum will allow you to exchange experience, outline new approaches to the development of the system of training highly qualified personnel. And, of course, it will serve to launch joint mutually beneficial projects, strengthen international ties and personal human contacts».

Assistant to the President of the Russian Federation A.A. Fursenko

Welcome speech by A.A Fursenko

I am pleased to welcome you in one of the oldest technical universities in Russia, Empress Catherine II Saint Petersburg Mining University, on the occasion of the opening of the International Forum 'Mineral Resources as the Basis of National Sovereignty - Personnel and Innovation Environment'.
The organisers of the forum set themselves a serious, time-demanding task - to discuss, together with partners from Africa, Latin America and South-East Asia, topical issues of personnel training and scientific support for the development of the mineral resources and fuel and energy sectors of the economy on the eve of the XVI BRICS summit in Kazan.

In Russia, special attention is paid to the issues of engineering personnel training. Over the last 10 years, the volume of engineers' training at the expense of the state has been significantly increased, the practical part of their training has been significantly strengthened, and the teaching and laboratory equipment of specialised universities has been updated. Today Russia is setting itself large-scale tasks to achieve technological sovereignty. On the instructions of the President of the Russian Federation V.V. Putin, new national programmes are being prepared for implementation, aimed at ensuring our independence in all key areas, developing critical cross-cutting technologies, and creating new global competitive products. Undoubtedly, the system of personnel training must respond quickly to new demands and meet the needs of industrial enterprises both in specialists directly engaged in production and in design engineers and managing engineers capable of developing and introducing new knowledge-intensive products and technologies.

I am convinced that the wide audience of the forum will allow you to exchange experience, outline new approaches to the development of the system of training highly qualified personnel. And, of course, it will serve to launch joint mutually beneficial projects, strengthen international ties and personal human contacts.

I wish you fruitful work, informative discussions and bright, positive emotions.

Welcome speech by V.N, Falkov

«With the rapid transformation of scientific progress, the innovation environment and workforce have been identified by our country as critical factors in developing technological independence and leadership».

On behalf of the Ministry of Science and Higher Education of the Russian Federation, I welcome the participants of the international forum 'Mineral Resources as the Basis of National Sovereignty – Personnel and Innovation Environment' held in the northern capital of Russia – the city of Saint Petersburg.

It is gratifying to note that the event was organised during the Russian Chairmanship in BRICS. This reflects the national interests of the BRICS countries and provides an opportunity to enhance co-operation in this area. The BRICS countries have rich reserves of natural resources that satisfy not only domestic needs, but also become an important export item that affects economic growth and stability. Joint efforts in this interaction have great potential, providing a basis for sustainable development, strengthening national sovereignty, international stability and co-operation.

Today, Russia is forming a system that meets the most modern requirements, not only in the management of mineral resources, but also in training and research, with scientific, educational and technological achievements contributing to the development of integration processes. We are ready to share the best practices with our partners, to assist in training the necessary personnel to meet the needs of the national economy, to create and implement joint major research and infrastructure projects in the field of mineral resources, geology, mining and ecology.

Dear colleagues, I am convinced that the forum will serve as an effective platform for sharing experience and demonstrating achievements, and the results of discussions will be transformed into concrete initiatives for joint implementation both in Russia and in other countries of the world.

I wish you fruitful work and success in achieving your goals!

Minister of Science and Higher Education
of the Russian Federation
V.N. Falkov

WELCOME SPEECHES OF THE GUESTS OF HONOUR

«Co-operation in training personnel for the mineral sector will give a new impetus to technological independence».

Governor
of Saint Petersburg
A.D. Beglov

Welcome speech by A. D. Beglov

I am glad to welcome the participants of the International Forum 'Mineral Resources as the Basis of National Sovereignty – Personnel and Innovation Environment' to St. Petersburg!

Our city is the largest innovation and scientific and educational centre of Russia. Here the most important research is carried out in a wide range of areas, developments are carried out, which are successfully applied in practice. We pay great attention to supporting young talents, realising the abilities of student youth.

The formation of a powerful sector of knowledge economy is the main strategic guideline for the development of the Northern Capital. Saint Petersburg universities train qualified personnel for many sectors of the national economy. The Mining University is a leader in training specialists for the mineral resources sector. On the instructions of the Russian President Vladimir Putin, the oldest technical university in the country is at the forefront of the pilot project to reform higher education.

It is important that the forum is attended by young researchers from the BRICS countries, as well as countries that would like to join the promising association, which already includes 10 countries. Today, in the context of external pressures aimed at dividing people and fuelling conflicts, strengthening partnerships between the BRICS countries is of particular importance. Cooperation in personnel training for the mineral sector will give a new impetus to technological independence.

I am confident that your forum will become an influential platform for discussing effective solutions to strengthen national sovereignty and sustainable development of the association, which has already become a global brand.

I wish you all successful and efficient work!

Welcome speech by Luo Zhaohui

«We are very pleased that many Chinese specialists and experts are participating in the forum today, which is an example of China-Russia co-operation in the field of education».

On behalf of the Consulate General of the People's Republic of China, I would like to welcome the organisers and all participants of the International Forum-Contest of Young Researchers from the BRICS Countries "Topical Issues of Rational Use of Natural Resources"'.

Today's forum is important not only because it is organised on the eve of the XVI BRICS Summit in Kazan, but also because we will be discussing very important issues. China believes that economic development is impossible without human capital, and it is impossible to pursue a policy of reform and openness without an innovative approach, relying on rapidly growing human capital and the spirit of investment.

This year marks the 75th anniversary of the establishment of diplomatic relations between China and Russia. This year is also the year of culture between the two countries. In recent years, under the strategic leadership of the Heads of State, Honourable President Mr Xi Jinping and Honourable President of the Russian Federation Mr Vladimir Vladimirovich Putin, our relations have developed very rapidly, and cooperation in various fields, including education, has blossomed in all directions, bringing tangible benefits to the peoples of our countries.

Empress Catherine II Saint Petersburg Mining University, being a world-famous university, has a high reputation in our country. The university has established co-operation with many leading Chinese universities. We are very pleased that many Chinese specialists and experts are participating in the forum today, which is an example of China-Russia co-operation in the field of education. We sincerely wish that experts and scholars from our countries will use this forum as a great opportunity to fully exchange views and give a new impetus to the China-Russian strategic partnership in the new era.

Thank you for your attention. I wish you success!

Consul General
of People's Republic of China
in Saint Petersburg
Luo Zhaohui

WELCOME SPEECHES OF THE GUESTS OF HONOUR

«Mineral resources play a key role in ensuring national sovereignty and developing an environment of innovation, underpinning economic growth and providing a base for a variety of industries».

Head of the Federal Agency for Subsoil Use
E.I. Petrov

Welcome speech by E.I. Petrov

On behalf of the Federal Agency for Subsoil Use and on my own behalf, I am pleased to welcome the organisers and all participants of the International Forum 'Mineral Resources as a Basis for National Sovereignty – Personnel and Innovation Environment'.

Mineral resources play a key role in ensuring national sovereignty and developing the innovation environment, serve as the basis for economic growth and provide a base for various industries. However, the effective utilisation and development of the mineral resource base requires highly qualified personnel and advanced technologies.

Human capital is one of the main factors in the successful development of the mineral resource complex. The innovation environment also plays an important role in the effective utilisation and development of mineral resources complex. It is necessary to stimulate the development and introduction of new technologies, equipment and methods of mining and mineral processing. There is also a need to introduce a system for managing the development of deposits using artificial intelligence.

Rosnedra is actively transforming the state system of subsoil management in the country. It is about collecting, structuring and providing open access to high-quality consistent data, creating a unified infrastructure for their storage and analytics of geological information on the subsoil. The process of transformation of subsoil use regulation is not yet complete, and in the conditions of the transition period there is a need for an established feedback between the regulator and subsoil users. Such data exchange is possible, including in public dialogue at conferences and forums. I would like to express my gratitude to Empress Catherine II Saint Petersburg Mining University for hosting the Forum, which provides an opportunity to discuss strategic industry issues within the framework of the BRICS alliance.

Vladimir Stefanovich Litvinenko

RAW MATERIALS AND EDUCATION – THE BASIS OF SOVEREIGNTY

Before analysing the main challenges, it is important to recall that many of the countries represented in this room are economies in transition. For the global south – Africa, Asia and Latin America – transition is a reality in which they have to live and work with hope for future development. The leading expert speaking at the UN session on sustainable development described the transition economy as an environment permeated by administrative rampantism, demagoguery and economic ruin. These factors need to be taken into account when analysing current economic conditions

There are a number of contemporary challenges related to the use of resources. Many countries that formerly co-operated with the USSR choose a path based on the transfer of resources to foreign companies through non-transparent concession mechanisms. This creates the problem of underestimating the role of the state in regulation. The main difficulty is that work in geological exploration requires not only financial investment, but also the availability of qualified specialists. To date, there is a shortage of professionals in the field of geology, which seriously hampers effective resource management

Education and experience play a key role, but many countries face a lack of basic understanding of legal and administrative regulatory mechanisms. It must be stressed that the neo-liberal ideology that dominates the world is contributing to the increase of class inequality and the deterioration of working conditions. Offshorisation and the erosion of tax systems lead to systemic inequalities, where the global north benefits greatly, while countries with huge resource bases remain dependent.

> *Monetisation of the resource base of developing countries in modern conditions is difficult, as contracts of various forms between the state and the subsoil user, relating to civil law acts, must take into account the global trend towards sustainability, including social relations within the state. The governments of these countries have to strengthen their influence on extractive companies by introducing social licenses.*

The state should fulfill the role of regulator and protector of citizens' interests. However, under neoliberalism, the role of the government is often seen as hindering business development. This leads to a situation where state instruments are used to oppress rather than support citizens.

The consequences of this circumstance are now reflected both in the physical extraction process and in the valuation of the mineral resource complex by local communities, which is not unequivocal. At the same time, all major countries are now heavily dependent on the production of fossil fuels and metals, and some of them on imports of raw materials.

The geopolitical struggle intensifies competition for access to raw materials, which also highlights the importance of government regulation. Examples of countries like China show how effective resource management can lead to economic growth and minimize dependence on external players.

> *Thus, there is a need to rethink the approach to subsoil management, focusing on the importance of public policy and regulation. In a context of global inequality and economic dependency, it is important to develop our own strategies to ensure sustainable development and protect the interests of citizens.*

In the context of the discussion of topical problems of education in the 21st century, special attention should be paid to the peculiarities of the African region. Analyses show that a new colonial system, more devastating in scale and consequences than in the 19th century, is taking shape today. Decisions made nowadays concern access to resources and population change, which affects all of us.

Modern technology has shifted society from logical to digital thinking. Many people spend four to eight hours in a digital environment, making it difficult to understand what is happening around them. Studies show that Western countries' investments in Africa often go unutilised to create meaningful educational institutions.

Natural resources have become an instrument of economic bondage, where countries that possess valuable materials lose the ability to use them effectively. For example, important resources for medicine and technology, such as californium, are under the control of only a few countries. This jeopardises the development of health care and technology.

> *The higher education system needs to be overhauled. It is critical that education is aligned with the worldview and needs of the state. Many of the BRICS and African countries lack a holistic education strategy, resulting in a loss of continuity and ineffective learning. The current system is centred on exam results rather than developing a complete worldview in students.*

Practical skills should form a significant part of the learning process. It is important that educational institutions ensure that theory and practice are matched. In most cases, training does not include a sufficient amount of practical training, and this results in inadequately prepared graduates.

The state strategy for the development of higher education should not be limited to the elite sector of higher education, but should be available to every member of society on a competitive basis.

There is a need to create a diversified system that ensures consistency and logic in education, responding to the different needs of society. There is a clear need for a return to analysis and critical thinking, which implies a move away from an exclusively digital approach to learning. In conclusion, it is worth noting that

> *training in official languages, providing new knowledge, transformation and education for the benefit of society is the foundation of any state's sovereignty.*

To ensure sustainable development, it is necessary to create a clear ideology and strategic approach to the educational process, which will make it possible to train qualified personnel capable of coping with modern challenges.

PANEL DISCUSSION №1

Mineral Resources as the Basis of National Sovereignty – Personnel and Innovaton Environment

Moderator

Prof. Litvinenko Vladimir Srafanovich, Rector, Empress Catherine II Saint-Petersburg Mining University

Participants

- Linskaya Yulia Vladimirovna, Deputy Head of the Office of the President of the Russian Federation for Science and Education Policy, Russian Federation
- Afanasiev Dmitry Vladimirovich, Deputy Minister for Science and Higher Education, Russian Federation
- Karin Kneissl, Head of the Geopolitical Observatory for Russia's Key Issues G.O.R.K.I., St. Petersburg State University, Russian Federation
- Huang Fang, Director of the Office of International Affairs, China Petroleum University (East China), People's Republic of China
- Mishra Sukumar, Rector of the Indian Institute of Technology (Indian School of Mines), Republic of India
- Tweya Tjekero, Chairman of the Kavanga Institute of Engineering, Mining and Agriculture, Republic of Namibia
- Haba Niankoye, Ambassador Extraordinary and Plenipotentiary of the Republic of Guinea to the Russian Federation, Republic of Guinea
- Morira Silva Adalene, Representative of the Rector of the University of Brasilia, Federative Republic of Brazil

Experts in the room

- Omaji Paul Omodjo, President of the Consortium of African Universities "Subsoil Africa", Federal Republic of Nigeria
- Ivanets Sergey Vladimirovich, Director for Science, International Competence Centre for Mining Engineering Education under the auspices of UNESCO, Russian Federation
- Zyrin Vyacheslav Olegovich, Executive Director, National Association of Mining Engineers, Russian Federation

EXPERT OPINIONS

Africa is the world's richest continent in natural resources, despite historical challenges including neocolonialism and mercantilism. The narrative about the continent needs to be changed, with emphasis on education as a key element of development. Today's Africans, especially the young people, are not willing to accept the status quo ante. Africa aims to develop the whole chain from research to production, becoming a full participant in the new world order.

Omaji Paul Omodjo,
President of the Consortium of African Universities "Subsoil of Africa", Federal Republic of Nigeria

EXPERT OPINIONS

Africa is experiencing unique demographic growth, which will require economic development and industrialisation. The human capacity of African universities is growing, but still insufficient to produce the skills needed in the mineral sector. Scientific activity is also increasing, but African science is only 3.61 per cent of the world total. Countries in the global North are offering assistance, but their projects are primarily for their own interests, which limits the ability of African countries to utilise their own resources. The need to create a highly skilled workforce for economic growth is critical. A key aspect is the shift from human resources to human capital to enable effective project management and development of countries.

Ivanets Sergey Vladimirovich,
Director for Science, International Competence Centre for Mining Engineering Education under the auspices of UNESCO, Russian Federation

EXPERT OPINIONS

The African countries control a significant share of oil and gas resources and rare earth metals, which imposes a responsibility to extract and process minerals in a safe and environmentally friendly manner. There is a need to increase access to education and improve the link between curricula and labour market needs, especially in the oil, gas and mining sectors. Inequality in access to education needs attention, and joint efforts between business, universities and stakeholders are important to address challenges such as artificial intelligence and the Internet of Things. It is necessary to cultivate leadership, organise competitions for young professionals and create programmes to develop knowledge about mineral resources.

Zyrin Vyacheslav Olegovich,
Executive Director, National Association of Mining Engineers, Russian Federation

The uneven distribution of natural resources requires a combination of three components for their effective utilisation: high technology, quality education and public policy. Russia possesses significant resources, but but to make them effective it is necessary to combine human capital and educational initiatives. Higher education should be adapted to modern requirements and standards. Also important is the openness of the national education system for international co-operation – network universities and projects that promote integration and exchange of experience should be developed. The goal is to create a comfortable educational environment and effective interaction, contributing to the development of both Russia and other countries.

Afanasiev Dmitry Vladimirovich,
Deputy Minister for Science and Higher Education, Russian Federation

Improvement of the higher professional education system requires adaptation to external conditions and restructuring of the economy. Education changes constantly, and every 15-20 years important decisions are made to adapt it to the stages of the state development. At the current stage, the education system should combine conservatism and adaptability to modern technologies and demands. There is a growing need for practical training and close links with employers, while it is important to ensure the possibility of updating qualifications throughout life. Co-operation and joint activities in research and education play a key role, which makes university consortia an important tool for exchanging information and creating new co-operative processes.

Linskaya Yulia Vladimirovna,
Deputy Head of the Office of the President of the Russian Federation for Science and Education Policy, Russian Federation

The BRICS Association, established in the early 2000s, has transformed from a trade platform into a full-fledged international policy actor. It is important to remember that BRICS is not only a market, but also the potential for creating a legal structure, which requires discussion. Countries' workforce capacity should be focused on developing human talents, rather than being seen as a resource. Education should go beyond the traditional approach and develop skills and character that foster innovation. It is important to encourage young engineers to understand the economic picture, given the impact of financial services on resource extraction. Real education must develop leadership and intelligence, abandoning outdated teaching methods.

Karin Kneissl,
Head of the Geopolitical Observatory for Russia's Key Issues G.O.R.K.I., St. Petersburg State University, Russian Federation

Natural resources play a key role in the country's economy and sovereignty. China imports 70 per cent of oil, but 90 per cent of rare earth metals are exported to the global market. It is important to establish an equitable system of access to resources. To effectively utilise natural resources, attention must be paid to education and training. Young professionals with cross-cultural skills are the foundation of global development and international co-operation. Chinese universities are actively promoting international co-operation, including associations with African and Russian universities. Education reform in China emphasises the integration of undergraduate and postgraduate education, allowing graduates to move straight into the workplace using the theoretical and practical knowledge they have gained.

Huang Fang,
Director of the Office of International Affairs,
China Petroleum University (East China),
People's Republic of China

Namibia has huge potential – the mineral base includes gold, uranium, diamonds, copper and fisheries. Namibia is the world's third largest producer of uranium, but 60 per cent of the energy resource is imported, creating an imbalance. Exported unprocessed gold earns only small royalties, while agriculture suffers from drought. Tourism attracts people due to the wealth of wildlife. Despite the resources, youth unemployment remains high - more than 40 out of 71 per cent of the population. Namibia hopes to develop skills through a consortium to transform mineral resources into benefits for the people. Discovered oil reserves can improve the situation, but exploitation has not yet begun. Partnerships are needed to create jobs and improve the quality of life of the people

Tweya Tjekero,
Chairman of the Kavanga Institute of Engineering,
Mining and Agriculture, Republic of Namibia

Brazil exports 10% of its mineral resources, especially gold and iron ore, which has a significant impact on the trade balance. With the change in government policy, there is an increasing flow of investment in higher education, a focus on industrial objectives and the development of links between universities and exploration. The search for new raw materials, the development of geophysics and resource processing technologies are underway. International exchange programmes are needed, returning students to promote the country's wellbeing. Expanding the range of commodities includes lithium, niobium and nickel. It is important to actively develop co-operation with Russian and BRICS universities and create bilateral ties to improve the quality of education and research.

Morira Silva Adalene
Representative of the Rector of the University of Brasilia,
Federative Republic of Brazil

The Republic of Guinea possesses strategic natural resources that should be the basis for the country's development, but many of them are extracted as raw materials and processed abroad, hampering economic growth. The current authorities are renegotiating resource extraction contracts to ensure fairer terms for Guinea. The training of professionals for the local economy is acute: young people are educated abroad but do not get jobs when they return home. Previously built factories and plants have been closed, which exacerbates the situation. Clear policies are needed to create jobs and support vocational training that will enable young people to develop their skills and benefit the country.

Haba Niankoye,
Ambassador Extraordinary and Plenipotentiary of the Republic of Guinea to the Russian Federation, Republic of Guinea

The production centre in Africa must be based on green principles. Green steel and alternative energy sources are important for the international market. Human capital formation starts at an early age by introducing sustainable development principles in education. India is investing in basic universities and research centres, which can strengthen cooperation in BRICS. Our Institute is introducing a new digital mining course incorporating modern technologies such as augmented reality. India is realising the philosophy of 'Made in India' by striving for independence in manufacturing. The circular economy concept includes recycling of critical materials, which supports the sustainability of the mining industry. In education, national policies are evolving to increase horizontal linkages and internationalisation, opening doors to students from the global south.

Mishra Sukumar,
Rector of the Indian Institute of Technology (Indian School of Mines), Republic of India

PANEL DISCUSSION №2

Impact of International Organizations on Sustainable Development of Economic Systems in Multipolarity: Transformation of Geopolitics

Moderator

Komarova Natalia Vladimirovna, First Deputy Chairperson of the Federation Council Committee on Social Policy, Russian Federation

Participants

- Omaji Paul Omodjo, President of the Consortium of African Universities "Subsoil of Africa", Federal Republic of Nigeria
- Yakovenko Alexander Vladimirovich, Rector of the Diplomatic Academy of the Ministry of Foreign Affairs, Russian Federation
- Zacheus Opafunso, Director General of the Council of Mining Engineers and Geologists (COMEG), Federal Ministry of Development of Solid Minerals, Federal Republic of Nigeria
- Molodtsov Kirill , Member of the Public Council under the Ministry of Energy of the Russian Federation, Chairman of the Editorial Board of the 'Oil and Gas Vertical' Magazine, Russian Federation
- Gerbi Kebede Regassa, President of the Ethiopian Defence University, Federal Democratic Republic of Ethiopia
- Ly Hadi, Vice-President of the Association of Professionals GEOPRIM, Republic of Mali
- Aghamiri Seyyed Mahmud Reza, President of the Shahid Beheshti University, Islamic Republic of Iran

Expert in the room

Kandjii-Murangi Itah, Minister of Higher Education, Technology and Innovation, Republic of Namibia

EXPERT OPINIONS

Namibia is not a member of BRICS, but participation in the conference is important for the development of higher education in Africa. The future depends on the development of co-operation, which is supported by the Consortium "Subsoil Africa". Africa consists of 54 sovereign states with different laws and policies at different levels of development. Support for universities and research institutes is needed to transform the educational system. Technical colleges and universities should focus on key areas such as oil, gas and hydrogen. Innovation and research must go hand in hand; knowledge sharing and goal matching are needed. It is important to utilise resources that support ancestral traditions and future generations. The younger generation must be trained in resource extraction technologies. High youth unemployment requires co-operation with Russian and African universities to activate local capacity.

Kandjii-Murangi Itah,
Minister of Higher Education, Technology and Innovation, Republic of Namibia

The specialists who have come to the forum are a bridge between Russia and Africa. We are here because of the desire to join forces to achieve common success. It is important to note that we should strive to localise training to prevent brain drain by conducting part of the courses on the African continent. The Consortium intends to actively develop exchange programmes for mentors and teachers - this will strengthen ties and share experiences, which in turn will enrich educational processes in Africa. Mobilising intellectual resources and building alliances will ensure effective management of natural resources and strengthen sovereignty.

Omaji Paul Omodjo,
President of the Consortium of African Universities "Subsoil of Africa", Federal Republic of Nigeria

Independence does not mean sovereignty, as resources often continue to be exported abroad, such as oil from Nigeria. It is necessary to create conditions for the use of resources for the benefit of the people. The consortium established with Russia provides real tools for development. Not only university education is important, but also the opportunity for young people to build their professional careers. Political solutions and long-term strategies are needed to turn the tide. With united efforts, Africa can capitalise on its natural wealth and become one of the leading continents in the world.

Zacheus Opafunso,
Director General of the Council of Mining Engineers and Geologists (COMEG), Federal Ministry of Development of Solid Minerals, Federal Republic of Nigeria

Most international organisations established after the Second World War are losing their functionality and influence. Even the UN Secretary General recognises this. The dysfunction of the WTO, blocked by the US, also confirms this process. Organisations created since 1945 are under the influence of Western countries. The economic leadership of Western countries is weakening, and new countries are taking their place, shaping the current agenda. A new level of dialogue is provided by the creation of such associations as the African Consortium "Subsoil of Africa", which is of great importance for both Russia and African countries. The concept of the Consortium fits into the paradigm shift in world relations, based on the equality of states. The degradation of classical diplomacy on the part of Western countries is manifested in ultimatums and sanctions, making the dialogue difficult. The world majority, including BRICS and SCO, is in favour of international law and traditional values, respect for private property, which distinguishes these countries from the West.

Yakovenko Alexander Vladimirovich,
Rector of the Diplomatic Academy of the Ministry of Foreign Affairs, Russian Federation

Traditional values, not just Russian ones, are shared by the bulk of people on the planet. Participants from Ethiopia, Nigeria, Congo and other African countries, as well as Brazil and China, make up at least half of the world's population, which is about 40 per cent of the world's GDP and a similar land area. Many of the countries have already joined BRICS or are showing interest in joining it, everyone realises that the ultimate goal is to improve the quality of life. The Khanty-Mansiysk District produces about 350 million tonnes of oil a year - an example of successful management. We have experience and values that can be offered to other countries, especially in Africa and South America. It is important for us to develop self-sufficiency in future generations. Joint projects should be discussed. Russia's proposals can contribute to the development and young professionals can implement them to create a future based on co-operation.

Molodtsov Kirill ,

Member of the Public Council under the Ministry of Energy of the Russian Federation, Chairman of the Editorial Board of the "Oil and Gas Vertical"Magazine, Russian Federation

In Ethiopia, the sun shines 13 months a year and I am proud that we are the BRICS member state. It is important for us that young people have the opportunity to work, but we need to create jobs and develop technology. We strive for innovation, but we must also remember to protect our sovereignty in the face of modern challenges. I doubt that international organisations work for the benefit of Russia or Africa; they serve the interests of companies and instil Western values. Africans value their culture and we need to preserve our traditions. International organisations, including the UN, are ignoring Africa and hindering the efficient use of resources. We want to develop our subsoil and cannot continue to sponsor organisations that do not act in our interests. Pan-Africanism must manifest itself in training specialists in partnership with Russia. We must fight for our resources. Every project must benefit local communities. I see a bright future in BRICS and I will never forget those who supported Africa.

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Gerbi Kebede Regassa,

President of the Ethiopian Defence University, Federal Democratic Republic of Ethiopia

Our company Geoprim of Mali is a non-profit organisation with 3000 geologists working in the extractive industry. Being part of a consortium opens up a new future. New leaders and governments are changing the narrative, as they did in Mali in the last two years with the support of civil society. Associations, such as women in mining, are shining a light on sensitive issues. The involvement of government and universities in these processes is essential. In the 1960s, the Soviet Union assessed mineral resources and many young people studied in Russia. Now again, support for education is needed to unlock the potential of specialists. BRICS is an attempt at a new multipolarity. Bringing together universities, business and civil society will turn the tide. Coordination and constant work on joint projects are necessary. It is important for foreign companies to be socially responsible. Mali has resources, but electricity is not available everywhere. Co-operation with Russia and BRICS countries is an opportunity to ensure the country's development with respect for values and sovereignty.

Ly Hadi
Vice-President of the Association of Professionals GEOPRIM, Republic of Mali

Today, a new window is opening for rethinking the world order, with changes in many areas around the world: investment, education and science. Multipolarity is losing importance, and new forces are emerging to influence the development of countries. The power of the atomic bomb, demonstrated in 1945, is now being rethought - energy is being supplied to homes and offices. If we fail to adapt to the new phenomena, work in education will become difficult. The BRICS and SCO can be agents of new approaches, but we need to consider the influence of other forces. As a university lecturer, it is obvious to me that unmanaged media can have a negative impact on education. There is a need to work with digital systems and artificial intelligence to improve university processes.

Aghamiri Seyyed Mahmud Reza,
President of the Shahid Beheshti University, Islamic Republic of Iran

PANEL DISCUSSION № 3

Engineering Education and Advanced Engineering Personnel as a Foundation for the Development of the Mineral Resources Sector

Moderator

Yazev Valery Afanasievic, Chairman of the Association 'Russian National Committee of the World Petroleum Council'

Participants

- Hossene Ben Bamba, General Director of the Private University of Management and Tropical Technology, Republic of Mali
- Mundia Muya, Vice-Chancellor of the University of Zambia, Republic of Zambia
- Nkurunziza Joseph, Ambassador Extraordinary and Plenipotentiary of the Republic of Burundi to the Russian Federation, Republic of Burundi
- Aleksey Igorevich Grachev, Deputy General Director for Strategic Development and Corporate Governance of the JSC BELAZ, Republic of Belarus
- Laila Abubakar, Vice Chancellor of the Mombasa Technical University, Republic of Kenya
- Ochefu Yakubu, Secretary-General of the Chancellors Committee of Nigerian Universities, Federal Republic of Nigeria
- Lucy Sakala, Director of the Institute of Engineering, Bindura University of Science Education, Republic of Zimbabwe

Expert in the room

Dushin Alexey Vladimirovich, Vice-President of the NPO "Russian Miners", Russian Federation

EXPERT OPINIONS

Consumption of mineral resources doubles every 20 years, while the mineral resource base continues to grow, albeit with deteriorating quality due to advances in technology and education. Mineral resources, perceived as a constraint to economic growth, are in fact substitute goods, with the exception of rare earth elements on which certain technologies depend. The issue of substitution and substitute goods is a matter of science, education and technology The Russian experience shows that industrial development relies on education. Engineering education is the key to economic growth and development. Corporations are engaged in the development of corporate culture, but the quality of engineering education is the cornerstone of the economy and social institutions.

Dushin Alexey Vladimirovich,
Vice-President of the NPO "Russian Miners", Russian Federation

Training of highly qualified engineering personnel is critical for technological innovation and adaptation to the rapidly developing labour market. To meet these demands, it is necessary to adapt educational programmes by introducing modern methodologies and approaches. Mali has the potential to attract students and introduce new technologies. It is not enough to bring the best engineers to the country to train students; a real transformation of teaching approaches is needed. The analysis of programmes at leading universities has shown that the emphasis on practical skills is critical: in classes of 8-10 students, 90% of the time is devoted to practice - this is exactly what is needed to improve the quality of education in Mali.

Hossene Ben Bamba,
General Director of the Private University of Management and Tropical Technology, Republic of Mali

Zambia has a rich mining history and recognises the need for a change in technology. To achieve success, it is important to train a workforce that can efficiently utilise the natural wealth. In this regard, an innovation hub has been established for skills development and technology adoption. It is necessary to introduce new approaches to training, including automation and modern systems such as unmanned systems for geological mapping, use of drones for monitoring and resource management. It is important to integrate technology into educational programmes so that students can already be involved in companies during their studies. Zambia is committed to continuously improving the quality of education and is actively seeking partners, including local companies, to enhance learning and develop practical skills.

Mundia Muya,
Vice-Chancellor of the University of Zambia, Republic of Zambia

Burundi is a francophone country and mineral resource development plays a key role in engineering education and workforce development. Our country has abundant mineral resources, including gold, nickel and tantalum, making investment in engineering education important for further exploration of reserves and resource extraction. The structure of engineering education in Burundi requires change: before the pandemic, many professionals had no practical experience with minerals. Existing training programmes are theory-based, but practical skills in mining and metallurgy need to be introduced. Partnerships with Russia and other countries such as China should help develop programmes that bring together educational institutions and companies in the resource sector. The creation of summer schools and technical retraining programmes will help train specialists by introducing modern and safe technologies. It is also important to invest in infrastructure to improve access to fields and increase efficiency. Government support is needed to create a clear regulatory framework for responsible resource management, which will allow for more efficient development of Burundi's mineral sector.

Nkurunziza Joseph,
Ambassador Extraordinary and Plenipotentiary of the Republic of Burundi to the Russian Federation, Republic of Burundi

The main objective is to pool resources to ensure collective progress. This idea permeates the work and co-operation, especially in the area of co-operation with Russia. The Committee of Vice Chancellors of Nigerian Universities, established in 1964, combines resources and initiatives to ensure the progress of Nigeria's higher education system. Consortia and partnerships to address existing challenges are perceived as important opportunities. Engineering education and work with mineral resources essential to national development. It is important to seek strong partnerships for mutually beneficial co-operation, as reciprocity is becoming a key formula for modernity. The ambitious goals set out in this forum must be realised, moving from these halls to practicalities to bring about positive change for the younger generation who expect rapid progress.

Ochefu Yakubu,
Secretary-General of the Chancellors Committee of Nigerian Universities, Federal Republic of Nigeria

Kenya Technical University, founded in 1948, is undergoing a transformation in education. The main emphasis is on moving towards competency-based education. In this regard, it is important to develop co-operation between universities, industry and government. For example, partnerships with international companies such as Lafarge allow students to undertake internships and projects, which helps them adapt to the company's current requirements. Research and development should be conducted locally, which strengthens the link between educational institutions and industry. Our university has established innovation hubs and incubation centres, as well as industrial parks, which opens up new opportunities for research. Co-operation with Russian universities helps to develop a network of contacts and share experience, which will be beneficial for further development and support of educational initiatives.

Laila Abubakar,
Vice Chancellor of the Mombasa Technical University, Republic of Kenya

Bindura University of Science Education is engaged in science and education, training scientists and engineers. There have been significant changes in recent years, especially with the introduction of Model 5.0 put forward by the Minister. This has led to a greater understanding of the need for innovation and industrialisation. Today, there is an emphasis on the importance of utilising our own resources for the development of the country. The goal is to become a medium-sized economy by 2030. Despite existing equipment problems, development continues. Over the last five years there has been a growth in industrial parks, and cooperation with the National University and other educational institutions is promoting engineering education programmes. It is also important to consider the impact of mining on society and ecosystems. Modern technology is necessary to ensure the preservation of human and animal health. Our development plans include co-operation with universities and sharing experience in advanced technologies such as artificial intelligence and virtual reality, while keeping health and ecology in mind.

Lucy Sakala,
Director of the Institute of Engineering,
Bindura University of Science Education,
Republic of Zimbabwe

BelAZ has preserved the best traditions of the Soviet engineering school, which allows the company to remain leaders in the production of quarry equipment - the company's machinery is represented in 80 countries. A modern engineer lacks practice, which is a consequence of his training within the Bologna education system. In cooperation with the St. Petersburg Mining University and the UNESCO Competence Centre, the BelAZ Competence Centre was created, where education, science and practice are harmoniously combined. Here, engineers see how mechanisms function, which enhances their qualification and reinforces their acquired skills in practice. Modelling of any hazardous production situations with the help of the latest simulators allows to effectively train specialists ready to solve any tasks.

Aleksey Igorevich Grachev,
Deputy General Director for Strategic Development
and Corporate Governance of the JSC BELAZ,
Republic of Belarus

PANEL DISCUSSION № 4

Improving the system of higher professional education: experience and perspectives

Moderator

Novikov Sergey Vladimirovich, Deputy Chairman of the Presidium of the Consortium of Universities 'Nedra', Director of the Institute of Academic and Industrial Skills, Empress Catherine II Saint-Petersburg Mining University, Russian Federation

Participants

- Zhukovsky Yury Leonidovich, Director of the Institute for Development of Interdisciplinary Competences, Empress Catherine II Saint Petersburg Mining University, Russian Federation
- Vladimirov Dmitry Yaroslavovich, Deputy General Director for Relations with Mining Industry and Authorities of the GC "Tsifra", Russian Federation
- Peter Kwasi Kodjie, Head of the All Africa Students' Union (AASU), Republic of Ghana
- Tekla Mutero, President of the Namibian Emerging Mining Companies Association, Republic of Namibia
- Djibril Diallo, President of the Association for the Promotion and Valorisation of Mineral Resources, Republic of Mali
- Demidov Alexey Vyacheslavovich, Rector of the Saint Petersburg State University of Industrial Technologies and Design, Russian Federation
- Aginey Ruslan Viktorovich, Rector of the Ukhta State Technical University, Russian Federation

Expert in the room

Dushin Alexey Vladimirovich, Vice-President of the NPO "Russian Miners", Russian Federation

EXPERT OPINIONS

Building relationships with large manufacturing organisations is often difficult. When it comes to technology development and long-term research budgets, the main challenge is what results will be achieved. Scientific and technological co-operation with large companies faces the problem of trust, when corporations have to believe in the results of research projects. Saint Petersburg Mining University is implementing a number of innovations to address the issue of staff shortages in the labour market. Manufacturers are interested in earlier availability of specialists, at the same time there is a decline in the level of schoolchildren's education in engineering disciplines, which forces universities to deepen engineering education.

Dushin Alexey Vladimirovich,
Vice-President of the NPO "Russian Miners", Russian Federation

The development of digital technologies has led to the digital transformation of mining enterprises, which requires the creation of new dispatching and analytical centres, leading to the emergence of new specialties, such as mining engineers – robotics dispatchers. New specialists, of course, must be proficient in digital solutions, including artificial intelligence and big data. Students are eager to get involved in this work, the learning process. Competition for highly qualified personnel in the industry is intense, so it is important not only to train but also to retain specialists.

Vladimirov Dmitry Yaroslavovich,
Deputy General Director for Relations with Mining Industry and Authorities of the GC "Tsifra", Russian Federation

University ranking systems, both in Africa and the Global North, appear to be rather mediocre. There are institutions that are active and producing significant numbers of staff. However, rankings often do not reflect this work, which calls into question their objectivity. It is important to realise that the choice of a university should not only be based on its place in the rankings, but also on its ability to provide a quality education. Upon graduation, it is necessary to have the skills and competences to get a job or start your own business. Universities should improve students' professional skills so that they can successfully enter the labour market. In the context of intense global competition, it is important to strive to maintain a high level of educational quality. It is important to identify those universities that really help students rather than blindly follow the rankings. It is necessary to join efforts to obtain reliable information about the real value of education.

Peter Kwasi Kodjie,
Head of the All Africa Students' Union (AASU),
Republic of Ghana

Namibian entrepreneurs and managers demonstrate excellence in their field. However, when talking about qualifications in the resource industry, it is observed that most of the workers are non-African. Many local professionals do not have the necessary skills to meet the demands of the industry. This highlights the importance of developing modern curricula written by and for Africans that better reflect the realities of the continent. What is needed is an educational system that will develop the skills and confidence of the indigenous population. The endeavour to create learning modules that reflect the local context is a key step towards progress. Technological development must keep pace with training. Higher education must be inclusive, based on the needs of the continent and contribute to its prosperity. Natural resources offer many opportunities to address existing challenges and this direction offers hope for true development. Africans can make a significant contribution to a common future if adequately trained.

Tekla Mutero,
President of the Namibian
Emerging Mining Companies
Association, Republic of Namibia

Mali has significant potential resources, including minerals, which already contribute significantly to the country's GDP. There are reserves of lithium, aluminium, bauxite and other minerals, but there is a lack of quality management in their exploitation. The associations play an important role in creating the conditions for training to facilitate the efficient utilisation of mineral resources. The work of the associations is aimed at establishing partnerships between foreign investors and Malian resource professionals. In this regard, we are very grateful to Russia for helping to train the many engineers working in this field in Mali today. There are now 14 gold mines operating in the country, but there is still an urgent need for highly skilled engineers, which emphasises the importance of investing in education and training for successful mining and resource management.

Djibril Diallo,
President of the Association for the Promotion and Valorisation of Mineral Resources, Republic of Mali

At the meetings of the Council of Rectors of Higher Education Institutions of St. Petersburg and the Leningrad Region the decree of the President of Russia concerning the improvement of the higher education system was actively discussed. The main provisions of this decree envisage a change in the levels of higher education: engineering education will be considered as basic, while Master's and postgraduate studies will be specialised. Six Russian universities were selected for the pilot project, including St. Petersburg Mining University, which has made significant progress in the implementation of the decree to date. It is important to note that the curriculum developed at the university includes at least ten months of internship at high-tech enterprises, which is essential for personnel training. It is important that from 2026 the education system in Russia should switch to new levels of higher education. Training of engineers should take at least five years, including compulsory internship. Development of the higher education system and introduction of new levels is a real necessity for the Russian educational system.

Demidov Alexey Vyacheslavovich,
Rector of the St. Petersburg State University of Industrial Technologies and Design, Russian Federation

Today it is worth mentioning several problems in engineering education, which have already been mentioned, including the low prestige status of engineering professions. Over the last 30 years there has not been a single film that would glorify engineering labour - engineering education. There are complexities in the study of core subjects such as maths, physics and chemistry, which causes additional difficulties. In this regard, co-operation with industrial partners becomes especially important. For example, together with Lukoil, we have developed a project to train specialists. The project involves selecting young people in small communities, who are then included in the educational process. The curriculum has been developed jointly with the refinery and takes into account specifics and modern technologies. Several groups of students have already successfully worked at the plant as part of the programme. In the last ten years, the situation in the industry has changed: industrial partners willingly take students for internships, realising the importance of their own personnel reproduction - the number of offers for internships exceeds the number of students.

Aginey Ruslan Viktorovich,
Rector of the Ukhta State Technical University,
Russian Federation

During my studies there was a reform of the Bologna system. It was explained why a bachelor's degree was needed when getting engineering education. The bachelor's level forms the understanding of the 'language' required to work in an enterprise, and the engineer's level forms the ability to optimise technological processes. In the current environment, interdisciplinarity is important: a modern engineer needs to understand mechanical, hydraulic, electrical and IT systems simultaneously. Creating efficient processes require knowledge of digital technologies as well as understanding of global challenges. Education should provide tools for mastering digital competences. An engineer creates not just machines, but works of art that must be harmonious and functional. This requires a creative approach. Education shapes the personality and provides an opportunity for self-development. Conditions are needed to unleash creative potential. Creating such opportunities will help to attract quality specialists to universities and enterprises, to form creators, not just consumers.

Zhukovsky Yury Leonidovich,
Director of the Institute for Development of Interdisciplinary Competences, Empress Catherine II Saint-Petersburg Mining University,
Russian Federation

INTERNATIONAL FORUM-CONTEST OF YOUNG RESEARCHERS FROM THE BRICS COUNTRIES 'TOPICAL ISSUES OF RATIONAL USE OF NATURAL RESOURCES'

For over 15 years, the International Forum-Contest of Young Researchers 'Topical Issues of Rational Use of Natural Resources' has been a scientific, educational and discussion platform for young scientists to address topical issues of development of mineral resources and fuel and energy complexes in many countries of the world. In 2024, the forum-competition was held at Empress Catherine II Saint Petersburg Mining University within the framework of the Russian BRICS Chairmanship and became one of the key youth events in the field of engineering and technology. The competition provided for the presentation of papers by young scientists – graduate students, masters, postgraduates and young researchers from 16 countries of the world to authoritative international expert committees. Based on the results of the presentations in three thematic breakout sessions:

- Innovative technologies for mining and deep processing of minerals.
- Energy-efficient, resource-saving and digital technologies for energy and raw materials sector.
- Economic and environmental challenges of subsoil use, solutions for sustainable development.

17 best papers were selected, and their authors were awarded diplomas and souvenirs.

YOUTH SESSION №1

Innovative technologies for mining and deep processing of minerals

Chairman of the expert committee
Tananykhin Dmitry Sergeevich, Dean of Oil and Gas Faculty, Empress Catherine II Saint-Petersburg Mining University, Russian Federation

Expert committee:

- Starshaya Valeria Vladimirovna, Assistant of the Department of General Electrical Engineering Empress Catherine II Saint-Petersburg Mining University, Russian Federation
- Dien Le Quang, Dean, Faculty of Petroleum and Energy, Hanoi University of Mining and Geology, Socialist Republic of Vietnam
- To Xuan Ban, Dean, Faculty of Earth Sciences and Geoengineering, Hanoi University of Mining and Geology, Socialist Republic of Viet Nam
- Naderi Hassan, Deputy Director General for Exploration and Production Technology, Petroleum Research Institute of Iran, Islamic Republic of Iran
- Gerami Shahab, Vice-President for Technology and International Relations, Petroleum Research Institute of Iran, Islamic Republic of Iran
- Yacouba Daou, Director General, School of Technical Education, Republic of Mali
- Zacheus Opafunso, Director General, Council of Mining Engineers and Geophysicists, Federal Ministry of Solid Minerals Development, Federal Republic of Nigeria
- Wadiou Traoré, President, Association of Women in Mining, Republic of Mali
- Hao Xuedi, Associate Professor, China University of Mining Engineering and Technology (Beijing), People's Republic of China

A number of topical subjects were considered and marked by the expert commission during the presentation of the papers, among them oil systems and hydrocarbon potential of the basins of African countries, analysis of destruction of precious minerals by means of silent chemical blasting agents, desulphurisation of gas condensates by accelerated oxidation, fluidisation stability and periodic oscillations in the fluidised bed of gas-solid separation, influence of modern internal stresses on the distribution of deep and ultra-deep dolomite cuttings, characteristics of effective destruction in deep-super-deep debris rocks, etc. The following winners were selected by the expert committee based on the results of the presentations:

- **Sitembile Ncube**, Copperbelt University, Republic of Zambia Presentation «Analysis of gemstone rock breakage with soundless chemical demolition agents – a case study of small-scae mines in Zambia»
- **Sanogo Seko**, University of Engineering Sciences and Technology of Bamako, Republic of Mali Presentation «Lithineferouspegmatites (Li-Cs-Ta) and plutonic rocks from Bougouni (Southern Mali, West African Craton): Petrographic, structural, geochemical and geochronological approaches»
- **Li Baiqian**, Anhui University of Science and Technology, People's Republic of China Presentation «Influence of present-day in-insitu stress on the distribution of deep and ultra-deep dolostone reservoirs: a case study from the upper member of yingshan formation in the s area of tahe oilfield, Tarim Basin, China»
- **Yan Na**, China Petroleum University (East China), People's Republic of China Presentation «Reservoir-forming mechanism of «Sourcemigration-accumulation» in buried hill of Weixinan Depression in Beibuwan Basin»
- **Zhang Xixue**, China Petroleum University (East China), People's Republic of China Presentation «Characterization of effective fracture in deepultra-deep clastic rock reservoirs and influencing factors on gas reservoir productivity»

YOUTH SESSION №2

Energy-efficient, resource-saving and digital technologies for energy and raw materials sector

Chairman of the expert committee

Zhukovsky Yury Leonidovich, Director, Institute for Development of Interdisciplinary Competences, Empress Catherine II Saint- Petersburg Mining University

Expert committee

- Zyrin Vyacheslav Olegovich, Executive Director, National Association of Mining Engineers, Russian Federation
- Khong Cao Phong, Dean, Faculty of Electro-Mechanical Engineering, Hanoi University of Mining and Geology, Socialist Republic of Vietnam
- Matandirotia Electdom, Principal Researcher, Centre for Education, Innovation and Research Development, Republic of Zimbabwe
- Mohammad Hossein Sheikhi, Professor, Shiraz University, Islamic Republic of Iran
- Ghasemi Farid, Director, International Innovation Park, Shahid Beheshti State University, Islamic Republic of Iran
- Wu Jianbo, Deputy Director, Office of Science and Technology, China University of Mining and Technology, People's Republic of China
- Bi Guangli, Professor, Nonferrous Metal Processing Laboratory, Lanzhou University of Technology, People's Republic of China

During the presentations a number of topical subjects were considered and marked by the expert committee: the influence of non-penetrating compounds on mechanical properties of samples, modelling of segregation of coal particles in an industrial fluidised bed, production of high-strength claydite from coal rock and sludge, electric field-enhanced leaching of rare earth elements, detection of smart-contract vulnerabilities using neural networks with multiple viewing graphs, the use of artificial intelligence for exploration of mineral resources, the use of neural networks with multiple viewing graphs, and the use of artificial intelligence for exploration of mineral resources. Based on the results of the presentations, the expert committee selected the following winners:

- **Peng Xi**, China University of Mining Engineering and Technology, People's Republic of China Presentation «Artificial intelligence assisted urban design: (de) composing urban form patterns»
- **Bocharov Nikita**, Gomel State Technical University named after P.O. Sukhoi, Republic of Belarus Presentation «Determination of complex geomechanical properties of rock formations by indentation method»
- **Mastop de Oliveira Junni Kaili**, University of Brasilia, Federative Republic of Brazil Presentation «Artificial intelligence for mapping mineral potential for critical minerals – An example of copper in the Carajas mineral province»
- **Valeria Vorobyeva**, Empress Catherine II Saint-Petersburg Mining University, Russian Federation Presentation «Forecast of technological development of the fuel and energy and mineral resource complexes of the BRICS and CIS countries»
- **Yin Hong**, Northeastern University, People's Republic of China Presentation «The effect of non-penetrating joints on the uniaxial compressive mechanical properties of rock-like specimens»
- **Moradi Javad**, Shiraz University, Islamic Republic of Iran Presentation «Smart Contract Vulnerability Detection Using Multi-View Graph Neural Networks»

YOUTH SESSION №3

Economic and environmental challenges of subsoil use, solutions for sustainable development

Chairman of the expert committee
Golovina Ekaterina Ilyinichna, Deputy Head of the Department of Sectoral Economics, Empress Catherine II Saint Petersburg Mining University, Russian Federation

Expert committee:

- Stroikov Gennady Alekseevich, Associate Professor, Department of Organisation and Management, Empress Catherine II Saint-Petersburg Mining University, Russian Federation
- Lucy Sakala, Dean, Faculty of Engineering, Bindura University of Science Education, Zimbabwe
- Jiang Lili, Professor, Nonferrous Metal Processing Laboratory, Lanzhou University of Technology, People's Republic of China
- Nasrolahi Ali, Associate Professor, Shahid Beheshti State University, Islamic Republic of Iran
- Deng Jiushuai, Professor, China University of Mining and Technology (Beijing), People's Republic of China
- Moreira Silva Adalene, Rector's Representative, University of Brasilia, Brasília
- Emmanuel Chanda, Dean, Faculty of Engineering, University of Zambia, Zambia

During the presentation of papers a number of topical subjects were considered and marked by the expert commission: resource support of technological chains of industrial enterprises in the conditions of sanctions restrictions, peculiarities of harmonisation of trade and industrial policies of enterprises of the mining industry, strategy of sustainable development of enterprises of the electric power complex, ecological recycling of active materials of electrodes from used lithium-ion batteries, influence of international relocation of production facilities on global carbon emissions, analysis of the factors influencing world oil prices, economic and environmental problems of subsoil use in BRICS countries, etc. Based on the results of the presentations, the expert committee selected the following winners:

- **Su Chengcheng**, Anhui University of Science and Technology, People's Republic of China Presentation «Response of groundwater to different water resource allocation patterns in the Sanjiang Plain, Northeast China»
- **Chen Shanshan**, China University of Mining and Technology, People's Republic of China Presentation «Under the interconnection of human demand and nature supply of urban green spaces for sustainable development»
- **Braimah Daniel Elikem**, Barnor-Arthur Jason, TCC International Centre for Innovation, Manufacturing, Technology Transfer and Entrepreneurship, Republic of Ghana Presentation «Strategic Pathways to Resource Sovereignty: A Value Chain Framework for Africa's Subsoil Development»
- **Slobodin Viktor**, Empress Catherine II Saint Petersburg Mining University, Russian Federation
- Presentation «Forecast of sustainable development of the fuel and energy and mineral resource complexes of the BRICS and CIS countries»
- **De Melo Loredo Giovanna**, University of San Paulo, Federative Republic of Brazil Presentation «Economic and environmental issues related to the use of natural resources»
- **Lopes de Figueiredo Marco Tulio**, Federal University of Minas Gerais, Federative Republic of Brazil Presentation «Economic and Environmental problems of natural resources use, solutions to ensure sustainable development»

EXCURSION TO THE TRAINING AND RESEARCH FACILITY "SABLINO"

At the end of the forum events, the participants were able to get acquainted with the approach of Empress Catherine II Saint Petersburg Mining University to the development of students' practical skills, as well as to the creation of a world-class educational and scientific infrastructure.

> *As a result of significant investments, the Saint Petersburg Mining University has created a modern technological training and scientific ground 'Sablino' in the field of subsoil use, which demonstrates how mineral resources, i.e. natural capital, can be transformed into human, social and physical capital with professional state management,* – Professor Vladimir Stefanovich Litvinenko.

Today 'Sablino' is not only the most modern equipment and specialised machinery. It is a huge complex on the territory of 14 hectares, including an industrial site for exploration, development and production of hydrocarbons, an administrative and production building with computer classes and simulators of well operation and development. Training at the complex site allows students to gain industrial experience in a wide range of working professions, among which the main ones are Drilling Rig Operator, Driller's Assistant, Reservoir lab assistant, Oil and Gas Production Operator and Logging Assistant.

DECLARATION

We, the participants of the Forum – representatives of the BRICS Member States and other interested countries, heads of technical and profile research centers, public and professional associations and industrial companies,

Based on the UN General Assembly resolution on the inherent sovereignty of peoples and nations over their natural wealth and resources,

Realizing that mineral assets form the basis of national economies and sovereignty of states, and that their rational management strengthens industry, develops high technologies, maintains energy security and enhances the position of countries in the global economy,

Recognizing that the development and use of natural resources located on national territory must be managed with the participation of the State as the national regulator,

Realizing that engineering education, highly qualified national personnel and own innovative technologies, primarily in the mineral sector, are the key conditions for sustainable development of the state,

Expressingt the need for active international cooperation on the terms of trust and equality in the sphere of subsoil use within the framework of the BRICS association with active involvement of all interested countries to solve urgent problems of the industry,

HAVE UNANIMOUSLY RESOLVED AS FOLLOWS:

1. To confirm the importance and effectiveness of the open ***dialogue*** among the BRICS and other interested countries on strategic issues of the mineral and raw materials complex and to note the great contribution and initiative of Empress Catherine II Saint Petersburg Mining University and the International Competence Centre for mining engineering education under the auspices of UNESCO in the implementation of this project.

2. ***To ensure priority development and quality improvement of the BRICS and other interested countries' higher engineering education system*** as a basis of technological sovereignty by forming a common approach to educational and professional standards, methods of assessing specialists' competences, taking into account the current economic challenges.

3. Taking into account the dynamically developing integration processes within BRICS, based on the long and successful experience of bilateral raw materials dialogues and recognizing this format as the most effective, to support the initiative to establish a permanent ***BRICS Raw Materials Dialogue (hereinafter referred to as the Dialogue)*** with the involvement of other interested countries, ***including the African region***, which would include an annual forum, as well as the establishment of working groups for bilateral meetings and the organization of individual events aimed at the development of the countries.

4. ***To establish an international working group*** on the basis of the International Competence Centre for Mining Engineering Education under the auspices of UNESCO to organize the Dialogue.

5. To promote the creation and stimulate thedevelopment of ***large national and interstate scientific and technical centers*** in the field of subsoil use, with the state support of stakeholders.

6. To overcome the shortage of personnel in the industry, train highly qualified managers capable of effectively managing both production and business processes in the mineral resources sector, and support the development of an international ***specialized higher education programme "Subsoil Management"***, to be implemented within the framework of the Network University established on the basis of Empress Catherine II Saint Petersburg Mining University.

7. To identify talented young specialists, to stimulate their professional growth, develop innovative ideas and raise the level of competences, as well asorganize an international competition for young engineering leaders from all regions of the world – ***"The Future of the Mining Industry"***.

8. To obtain an objective assessment of university activities and develop criteria for creating ***a rating of technical universities in the BRICS countries and other interested countries***, taking into account the specifics of their activities.

9. To encourage the governments of the BRICS Member States and other interested countries, heads of relevant universities, research centers, public and professional communities and companies in the mineral resources sector to join mutually beneficial cooperation in the field of mineral resources and take an active part in the implementation of the projects proposed in the Resolution.

Unanimously adopted on 18 October 2024

MEDIA ABOUT THE FORUM

ФОРПОСТ СЕВЕРО-ЗАПАД

More than 300 young scientists came to Saint Petersburg Mining University to participate in the prestigious International Forum-Contest of Young Researchers from the BRICS Countries 'Topical Issues of Rational Use of Natural Resources'. Young researchers, mainly from the BRICS member states and the African continent, had the opportunity to present their scientific findings aimed at improving the sustainability of the mineral resource complex to experts in an open discussion platform, as well as to exchange experience with their peers from other countries. Bryma Daniel Elikem and Barnor-Arthur Jason work at the Kwame Nkrumah University of Science and Technology in Ghana. Their research interests are primarily concerned with finding the best path to resource sovereignty. This is a very sensitive topic for Africa. For many decades, the rights to explore and exploit mineral deposits on the mainland were delegated to Western transnational companies, which took the bulk of the profits, with only a small amount of royalties going to national budgets. The continent did not and does not have the manpower and technology of its own to change the situation. 'Africa is often described as a paradox - a continent rich in natural resources that provide little or no benefit to its people. Kwame Nkrumah, in his seminal work Neocolonialism: The Last Stage of Imperialism, emphasises the absurdity of the current conjuncture. He points out that the vast quantities of minerals that are extracted from our subsoil continue to enrich external actors but have little impact on the quality of life of indigenous peoples,' says Brima Daniel Elikem. He and co-author Barnor-Arthur Jason presented their study 'Strategic Pathways to Resource Sovereignty: Structuring the Value Chain for African Subsoil Development' at the panel on 'Economic and Environmental Challenges of Subsoil Use, Solutions for Sustainable Development'. The young people said that their goal is 'to develop a model that will make it possible to select, on a case-by-case basis, the optimal strategies needed to build a sustainable and reliable economy by realising resource potential'. The interests of Chinese young scientists are understandably quite different. For example, Yin Hong, a student at Northeastern University, is working on improving the reliability of underground construction. More than 34 billion tonnes of various minerals were extracted in China last year, so the topic of improving the safety of miners is one of the leading topics in the academic community of the Celestial Empire. It should be noted that the International Forum-Contest of Young Researchers from the BRICS Countries 'Topical Issues of Rational Use of Natural Resources' has been held at the Empress Catherine II Saint Petersburg Mining University since 2005. For the last seven years it has been organised by the International Competence Centre for Mining Engineering Education under the auspices of UNESCO, established at the oldest technical university in Russia. The current intellectual competition was included in the calendar of events of the Russian Federation's BRICS

ФОРПОСТ СЕВЕРО-ЗАПАД

Saint Petersburg Mining University hosted a major International Forum ‘Mineral Resources as the Basis of National Sovereignty - Personnel and Innovation Environment’, included in the calendar of events of the Russian Federation's BRICS Chairmanship, which will culminate in a meeting of top officials in Kazan. The opening ceremony of the event took place on 16 October 2024. It brought together over 800 participants from 42 countries. Among them are rectors of leading technical universities, scientists, heads of transnational energy companies, heads of federal ministries and agencies responsible for the mineral resources complex, education and science. The delegates were sent to the City on the Neva not only by the member states or candidates for membership, but also by other states interested in constructive, mutually beneficial co-operation in the international arena and increasing the sustainability of their development. First of all, due to the increase in the efficiency of extraction and utilisation of natural resources, which is impossible without competent engineers capable of introducing new technologies and ensuring their smooth operation. Rector Vladimir Litvinenko, opening the meeting, noted that it ‘takes place on the eve of a fundamental event in Kazan, the outcome of which will largely determine the future dynamics of the world economy’ and will make it possible to find optimal answers to many challenges of our time. Among them, of course, are the collapse of the global market and the emergence of many of its local segments, the need to increase labour productivity, and the need to strengthen national currencies through dedollarisation. ‘We will have to discuss a narrowly specialised but extremely important topic. We must understand what the resource potential is and what tools can make it possible to maximise its use to improve the sustainability of our countries' socio-economic development. How to train and educate national personnel interested in staying in their homeland and making a worthy contribution to its progress and prosperity,’ Vladimir Litvinenko set the tone for the discussion. The panel sessions held on the first day of the forum were attended by high-profile politicians, representatives of the academic and business communities. In particular, Yulia Linskaya, Deputy Head of the Russian President's Office for Science and Education Policy; Karin Kneissl, former Austrian Foreign Minister and Head of the G.O.R.K.I. Centre at Saint Petersburg State University; Tekiero Tweya, Chairman of the Committee of Natural Resources of Namibia; Mishra Sukumar, Rector of the Indian Institute of Technology; Natalia Komarova, First Deputy Chairman of the Federation Council Committee on Social Policy; Dmitry Vasilenko, First Deputy Chairman of the Federation Council Committee on Science, Education and Culture. The delegates were greeted by the Chairman of the Federation Council of the Russian Federation Valentina Matvienko, Minister of Foreign Affairs Sergey Lavrov, Minister of Science and Higher Education of the Russian Federation Valery Falkov, Head of the subsoil use agency Rosnedra Evgeny Petrov, Governor of St. Petersburg Alexander Beglov, Consul General of China Luo Zhanhui on the start of the forum.

MEDIA ABOUT THE FORUM

More than a thousand people from the BRICS countries gathered at the International Forum ‘Mineral Resources as the Basis of National Sovereignty – Personnel and Innovation Environment’. The forum opened at the Saint Petersburg Mining University. The participants included heads of relevant research centres, rectors of major universities, government members, top managers of transnational companies from Belarus, Brazil, India, Iran and other countries. The first strategic discussion was moderated by Rector of the Saint Petersburg Mining University Vladimir Litvinenko. The topic was to ensure a balance between the interests of the state, business and society in the use and development of mineral resources, training of qualified personnel, introduction of innovative technologies. ‘For India, the mining and geological theme of this forum is very important, because India has reserves of so-called critical minerals, and they are extremely important for the development of the country. The most promising area of cooperation between the two countries is the application of digital technologies in mining and the application of such things as artificial intelligence to traditional methods of mechanised mining,’ – Director of the Indian Institute of Technology Mishra Sukumar.

РОССИЯ 1

Almost a thousand people from 42 countries participate in the forum ‘Mineral Resources as the Basis of National Sovereignty - Personnel and Innovation Environment’ at the Saint Petersburg Mining University. The forum is being held as part of Russia's BRICS chairmanship. Rectors and professors of leading universities from Brazil, India, Iran, China, Nigeria, South Africa and many other countries will get acquainted with the national experience of training specialists for various sectors of the economy and the experience of modernising higher education. The forum will also discuss the experience of state regulation in the sphere of natural resources. ‘It is very important for us to join forces in order to work out some mechanism of consolidation of efforts for more efficient use, first of all, of raw materials for the economic development of our countries, and also for ensuring the sustainability of development of all BRICS countries,’ - Rector of Empress Catherine II Saint Petersburg Mining University Vladimir Litvinenko.

ЛЕНТВ24

More than a thousand participants from BRICS countries and candidate states have come to Saint Petersburg for a forum dedicated to mineral resources. The forum 'Mineral Resources as the Basis of National Sovereignty - Personnel and Innovation Environment' kicked off in Saint Petersburg. The programme will include panel discussions of rectors of leading profile universities of Belarus, Brazil, India, Iran, China, Russia and other states. ‘Mineral resources are the basis of a country's independence, so I think that today there will be a very serious work that has been prepared over the past months to ensure that within the BRICS framework all these situations, all these programmes, all these things that were conceived earlier will be implemented nowadays,’ - Dmitry Vasilenko, Senator of the Russian Federation from the Leningrad Region. The forum will be held in accordance with the action plan of the Russian Federation's BRICS Chairmanship in 2024. The event will be concluded on 20 October.

Санкт-Петербург
Телеканал

More than a thousand participants from the BRICS countries came to Saint Petersburg for a forum dedicated to mineral resources. It is being held at the Saint Petersburg Mining University. The agenda includes innovations and human capital. In particular, they discussed a pilot project to improve personnel training for various sectors of the national economy. Rectors of leading profile universities of Belarus, Brazil, India, Iran, China, South Africa and a dozen more countries took part in the discussion. ‘Ideology is the goal of education both school education, and higher education. And what is higher education in Africa and the BRICS countries - this is what we want to talk about. This is the global problem, the root problem that ensures sovereignty in general, whether it will be there or not,' said Vladimir Litvinenko, rector of Empress Catherine II Saint Petersburg Mining University.

Andrey Maximov, Chairman of the Committee for Science and Higher Education of Saint Petersburg, read out a welcoming address by Governor Alexander Beglov at the forum's opening ceremony. ‘Our city is the largest innovation and educational centre of Russia. Here the most important research is being conducted in a wide range of areas. Developments are carried out, which successfully find practical application. We pay great attention to supporting young talents. To realise the abilities of student youth’. In addition to the heads of leading BRICS universities and young scientists, the forum is attended by representatives of transnational companies and heads of relevant ministries and agencies.

ОТР
Общественное телевидение России

More than a thousand mining professionals from different countries gathered in Saint Petersburg to discuss the problems and challenges of the industry both in their respective countries and globally. The Mineral Resources as a Basis for National Sovereignty Forum brought together mining experts, scientists and engineers from the BRICS countries. The event is being held as part of the programme of Russia's chairmanship in this association. Special emphasis is placed on human capacity issues. Participants share their experience in training qualified specialists who will be able to effectively manage the mineral base. Anna Carolina Russo, representative of the Rector of the University of Sao Paulo: ‘Raising the level of researchers from Brazil and Russia in this field, exchanging information on their developments and projects, co-operating with each other - these are the ways of our interaction’.

Rector of Empress Catherine II Saint Petersburg Mining University Vladimir Litvinenko: ‘It is very important for us to join efforts to work out some mechanism of consolidation of efforts for more efficient use of raw materials, first of all for the economies of our countries, and including for ensuring the sustainability of development of all BRICS countries.’ Educational institutions are represented at the Forum at the level of rectors of leading higher education institutions from Russia, Belarus, Brazil, India, Iran, China, South Africa, as well as from other countries that have applied to join BRICS or are currently considering such an opportunity’.

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