

Empress Catherine II Saint Petersburg Mining University



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

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



Saint Petersburg 2024



We are pleased to establish this Centre as it will strengthen cooperation between Russia and UNESCO. In addition, it will contribute to the realisation of the UN Sustainable Development Goals. I believe that our joint efforts will steadily improve the quality of education in mining universities, as well as its accessibility.

> Audrey Azoulay Director-General of UNESCO



The establishment of the Centre has become a clear proof of the authority of the scientific schools of Saint Petersburg Mining University and opened new opportunities for solving problems in the field of science and education. The high level of teaching staff and rich traditions formed at the university allow it to actively integrate into the global educational space. Its powerful intellectual potential is extremely important for the expansion of interaction between states and universities, sustainable growth of economies at the regional, national and global levels.

#### Valentina Matvienko

Chairperson of the Supervisory Board of the Centre, Chairperson of the Federation Council of the Federal Assembly of the Russian Federation



Sustainable development of the economy of any state is impossible without the progress of the mineral and raw materials complex. Therefore, the technologies that are introduced at mining and processing enterprises are becoming more and more complex year by year. And this, naturally, requires constant growth in the quality of labour resources. The deficit of qualified engineers today is one of the factors restraining economic growth. And the essence of the Centre is to create a new system of personnel training that meets the challenges of today and is in demand all over the world.

Vladimir Litvinenko

Chairman of the Governing Board of the Centre, Rector of the Empress Catherine II Saint Petersburg Mining University The INTERNATIONAL COMPETENCE CENTRE FOR MINING ENGINEERING EDUCATION UNDER THE AUSPICES OF UNESCO was established to promote the development of competencies and dissemination of knowledge and technologies in the fields of mineral resources sector, energy and mining education for global sustainable development



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## HISTORY OF CREATION OF THE INTERNATIONAL COMPETENCE CENTRE FOR MINING ENGINEERING EDUCATION UNDER THE AUSPICES OF UNESCO



### December 15, 2015

The Director-General of UNESCO Irina Bokova and the Rector of Saint Petersburg Mining University Vladimir Litvinenko signed a Communiqué on the establishment of the Centre at Saint Petersburg Mining University.

### September 28, 2016

The First International Council of Rectors of Universities with a mining education profile, bringing together 380 rectors and top-level executives from 70 countries of the world, unanimously supported the concept of establishing the Centre.

## During the UNESCO field mission, experts Rovani Sigamoney and Jean-

Paul Ngome Abiaga conducted studies on the feasibility and possibility of establishing the Centre at the Saint Petersburg Mining University.

### October 13, 2017

June 26, 2017

At the 202nd session of the Executive Board of UNESCO, a positive decision was taken for establishment of the Centre.

### **September 22, 2017**

The Second International Council of Rectors of Universities with a mining education profile discussed organisation of the Centre and agreed submission of the application to UNESCO for its establishment.

### November 6, 2017

Approved decision of the Executive Board of UNESCO at the 39th session of the General Conference of UNESCO.

### March 7, 2018

Minister of Energy of the Russian Federation Alexander Novak and Director-General of UNESCO Audrey Azoulay signed an Agreement between the Government of the Russian Federation and the United Nations Educational, Scientific and Cultural Organization at UNESCO Headquarters in Paris, France, on the establishment of an International Competence Centre for Mining Engineering Education in Saint Petersburg, Russian Federation, under the auspices of UNESCO.



### October 18, 2018

The State Duma of the Russian Federation adopted a resolution on the drafting of the Federal Law on Ratification of the Agreement.

### October 24, 2018

The Federation Council of the Russian Federation approved the draft Federal Law "On Ratification of the Agreement".

### October 30, 2018

President of the Russian Federation Vladimir Putin signed the Federal Law "On Ratification of the Agreement" (No. 372-FZ).

### January 14, 2019

The Ministry of Foreign Affairs of the Russian Federation has received official notification from UNESCO of entry into force of the

Agreement.



# **MISSION OF THE CENTRE**

- Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- Promoting sustainable development and poverty eradication.







- Science, technology and innovation systems and policies strengthened at national, regional and global levels.
- Promote international scientific co-operation on key issues in the field of sustainable development.

### MAIN OBJECTIVES OF THE CENTRE

- Influencing policy-making in the field of mining education and development of mineral resources complex at national and interstate levels, elaboration of recommendations and proposals, promotion of global dialogue between states and universities (SDGs #4, 10, 17).
- Development of higher, technical and vocational education systems for the mining industry (as part of lifelong learning), providing mining professionals with the full range of knowledge, skills and experience required for integration into the international professional environment (SDGs #4, 8).
- Creation of an effective system to ensure innovation and technological research in promising areas of development of the mineral and raw materials complex (SDGs #7, 9, 13).
- Creation of a common educational space to ensure **global mobility** of students, postgraduates, teachers and scientists at national and international levels (SDGs #4, 10, 17).
- Raising the prestige of education and professions in the mineral resources sector, popularisation of natural sciences (SDGs #4, 7, 9).
- Creation of a unified system of **professional attestation and certification** of engineering personnel of mineral resources companies (SDGs #7, 12, 13).

## **GOVERNANCE STRUCTURE OF THE CENTRE**





## SAINT PETERSBURG MINING UNIVERSITY



The International Competence Centre for Mining Engineering Education under the auspices of UNESCO was established on the basis of the Empress Catherine II Saint Petersburg Mining University, the first higher technical education institution in Russia, founded in 1773.

Saint Petersburg Mining University is a scientific and educational centre of technical education, providing training in mining, 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 for mineral and raw materials industries. Russia's first higher technical education institution has unique research and teaching traditions, the continuity of which is ensured through a multi-stage system of training and retraining of higher qualified specialists at the world level.

According to the results of the authoritative international ranking agency QS World University Rankings (UK), Saint Petersburg Mining University in 2023 ranked 3rd in the world in the subject Engineering - Mineral and Mining and is among the TOP-20 best engineering and technical universities in the world, as well as one of the hundred best universities in Russia.







- More than 70 countries of the world annually send students and postgraduates to Saint Petersburg Mining University for higher education, internship and scientific research.
- 314 thousand square metres is the total area of the property complex of Saint Petersburg Mining University, among which more than 100 thousand square metres were built or underwent major repairs and renovation in the last 10 years.
- 60 laboratories and 7 scientific grounds are part of one of the best research facilities among Russian universities, equipped with advanced state-of-theart equipment.





# THE CENTRE'S AREAS OF ACTIVITY



### **COMMON EDUCATIONAL SPACE**

- **Involving initiative talented young people into the industry**, training and creating conditions for self-realisation of the new generation of specialists to develop the competitiveness of the mineral and raw materials complex in modern realities.
- Creation of conditions for global mobility of students, postgraduates and teaching staff of the world's universities of raw materials profile and expansion of interuniversity cooperation.
- Development of joint educational programmes using modern teaching methods, including distance learning, online courses, summer and winter schools, scientific practices and internships.



## PROFESSIONAL CERTIFICATION OF SPECIALISTS AND TEACHERS

- Creation of a unified international system of competence assessment of mineral and raw materials teachers.
- Creation of a unified system of international professional certification of specialists of the mineral and raw materials complex on the basis of already existing systems of engineers' competence assessment in the world.
- Formation of an international competence council and international centres for retraining, certification and qualification assessment, creation of systems of professional development and lifelong learning.





## **INTERNATIONAL EVENTS:**

**Holding major socially significant international events:** dialogues, conferences, lectures and round tables to promote natural sciences and mining education, attract talented young people, strengthen international and regional cooperation and coordinate joint work in the field of mineral resources.

## **RESEARCH & INNOVATION:**

- Creation of model laws on subsoil management, using the experience of subsoil use of the world's leading mineral and raw materials producing countries.
- **Conducting joint innovative research** on priority scientific areas of the mineral and raw materials complex development and elaboration of promising proposals and recommendations in the field of extraction, transport and processing of natural resources.
- Search for environmentally safe green technologies, development of the mineral and raw materials complex taking into account modern environmental requirements.
- Creation of working groups and creative scientific teams of leading specialists, integration of advanced innovative developments and technologies.
- **Development of a grant system** to encourage scientific developments and technological start-ups.
- Publishing specialised collections of articles in international publishing houses.



## **CORE CENTRES AND UNIVERSITIES:**

- Creation of core educational and research centres on the basis of leading universities, raw materials and energy companies around the world.
- Searching, analysing and creating a joint database to promote the best educational and scientific practices in the international arena, primarily in the countries of Africa, Asia, and Latin America.
- Acting as a laboratory of ideas and innovations in science and engineering education system.
- **Providing equitable access to educational and scientific infrastructure**, including existing scientific centres, laboratories, unique plants and instruments for fundamental and applied education.



## IMPROVING THE SYSTEM OF HIGHER ENGINEERING EDUCATION

Higher education for every country acts as the foundation of state sovereignty and humanisation of society, but today national economies face the problem of **deficit of highly qualified engineering personnel** capable of creating and improving technologies, implementing and operating advanced technical and technological solutions.

Saint Petersburg Mining University in cooperation with the Centre, as well as foreign partners and leading companies of the mineral and raw materials complex, **analysed the main trends in the development of higher education in the world** and, based on modern requirements for its quality, **developed fundamental proposals for improving the system** of higher technical and vocational education.

In May 2023, **President of the Russian Federation Vladimir Putin** signed a **Decree on improving the higher education system**, which aims to qualitatively improve the process of training personnel to meet the long-term needs of various sectors of the economy.

Saint Petersburg Mining University, as one of the initiators of the process, has been identified as the main coordinator of the project.





#### UNIFIED APPROACH TO THE STRUCTURE OF HIGHER ENGINEERING EDUCATION

CONTENT OF EDUCATIONAL MODULES OF DISCIPLINES			Number of units	Study period, year						
CONTENT OF EDUCATIONAL MODULES OF DISCIPLINES		- 1		2	3	.4	5	6		
EDUCATIONAL MODULES	1. "Core" of higher engineering education 12. General technical education (6 disciplines)	1.1. General education (7 disciplines)		32 credits						
		1.2. General technical education	General engineering disciplines							
		Humanitarian disciplines	48 credits							
		Basic scientific competence (14 disciplines)						_		
	2. Disciplines of the field of study and speciality		Basic disciplines of professional training	181 credits						
			Disciplines by speciality							
			Additional professional competences	8						
	3. Disciplines of additional professional qualification (Certificate)		4							
Including training and production skills, experience including pre-graduate practice not less than 20 weeks			40 weeks							

One of the priority tasks of the pilot project is to revive the fundamental training of engineers.

# Significant changes to curricula and to the organisation of the educational process have been proposed:

- The concept of "Core" of higher engineering education was introduced, within the framework of which the fundamental knowledge and general technical training of students are formed.
- The period of practical skills and experience was increased from 26 to 44 weeks.
- The structure of educational programmes of specialised higher education was created.
- The terms of obtaining practical skills and experience on the basis of production and mining enterprises were increased.
- An institute of supervising and mentoring was created.
- A new approach to the training of scientific and pedagogical personnel was implemented.





## **INTERNATIONAL SHORT-TERM EDUCATIONAL PROGRAMMES**

International short-term educational programmes are implemented with the support of the Centre in order to increase the level of competence of undergraduate and postgraduate students.

Short-term educational programmes are intensive courses lasting 1-4 weeks, which include lectures and practical classes, master classes and trainings on priority areas of mineral resource complex development.

**37 unique educational programmes** have been developed, 27 of which are **accredited by the British Engineering Council and IOM3 Institute (UK)** in 11 areas: mining, oil and gas, mechanical engineering, geomechanics, geodesy, mineral processing, geoecology, economics, information technology, digitalisation, linguistics.

Undergraduate and postgraduate students from 43 countries have studied within the framework of the implemented educational programmes. In total, more than 80 universities acted as partners. The total number of participants exceeded 5 000 people.



## Participants of the international short-term educational programmes







## INTERNATIONAL EDUCATIONAL PROGRAMMES





The international educational programmes implemented by the Centre include double and triple degree programmes, inclusive education, academic exchange programmes and are aimed at creating a **common educational space** for the purpose of training highly qualified scientific and pedagogical staff of the world level for the development of mining and related economic sectors. During the implementation period, more than **100 people from 12 countries** have participated in the educational programmes in compliance with the principle of gender equality – **women make up 47%** of the participants in these programmes.





#### **Programmes:**

- Advanced Mineral Resources development.
- Engineering Geoecology.
- Natural Resources Energy Sustainability.

#### **Key partners:**

- Freiberg University of Mining and Technology (Germany).
- University of Leoben (Austria).
- Lappeenranta-Lahti University of Technology LUT (Finland).

## **SOCIALLY SIGNIFICANT EVENTS**

The Centre promotes global dialogue between scientists, universities and states on issues of training and policy in the field of mineral and raw materials complex development.

Since its foundation, the Centre has organised and held more than 50 scientific and practical events, forums, competitions and olympiads in the field of youth policy on the platforms of Russian and foreign partners: universities, companies, and research centres of various scales, formats and areas, in which more than 30 000 people took part in faceto-face and remote formats.

- Russian-German Raw Materials Dialogue, 2018-2021.
- Russian-UK Raw Materials Dialogue, 2018-2021.
- EUROCK International European Symposium on Geomechanics, 2018.
- Youth Forum of Future Leaders of the World Petroleum Council, 2019.
- Annual International Forum-Competition for Students and Young Scientists "Topical Issues of Subsoil Use".
- International Congress "Africa seeks solutions", 2022.
- International Forum "Nature management and preservation of the World Natural Heritage", 2023.





## THE CENTRE'S PROJECTS IN THE FIELD OF ENGINEERING EDUCATION DEVELOPMENT



Collaboration with the UNESCO Associated Schools Project Network:

- Project session for schoolchildren "Preservation of Russia's natural and cultural wealth". More than 500 participants from Russia and neighbouring countries.
- Competition of research projects for high school students "School Premier League". Over 500 participants from Russia and neighbouring countries.
- Forum of youth social initiatives with international participation "Just Act". Over 1000 participants from educational institutions of Russia, the Republic of Belarus and Burkina Faso.
- International methodological seminars within the framework of the project "New Approaches to School Education". Participants - more than 200 principals of the UNESCO Associated Schools Project Network in Russia and Belarus.



Formation of educational ideology in the field of engineering education:

Academic seminars for regional ministers "Improvement of educational policy in the interests of engineering education development". Participants – more than 100 representatives of education ministries of Russian regions.

Interaction with UNESCO Chairs of universities of the Consortium of Universities "Nedra"

Scientific and methodological conferences and seminars within the framework of the Project "Advanced Scientific Research for Sustainable Development of Engineering Education for All" in cooperation with UNESCO Chairs of the universities of the Consortium of Universities "Nedra".



## **CONSORTIUM OF UNIVERSITIES "NEDRA"**





The **Consortium of Universities "Nedra"** was established with the support of the International Competence Centre for Mining Engineering Education under the auspices of UNESCO in order to improve the level of adaptation of higher education institutions to the demands of the labour market and further integration of large core companies, public authorities and universities to form a unified scientific and educational environment.

The Consortium of Universities "Nedra" became the first public association of Russian universities, the creation of which was **approved by the Order of the Minister of Science and Higher Education of the Russian Federation**.

The Presidium of the Consortium consists of **14 leading higher education institutions** that are flagships in training specialists for the mineral resources sector.

The participants are **more than 100 leading higher education institutions** with more than 10% of their curricula related to subsoil use.





#### **Consortium objectives**

- Formation of state policy in the education system.
- Creation of a unified scientific and educational environment.
- Search and support of talented young researchers from among students, postgraduates and teachers.
- Formation of a system of personnel forecasting for the mineral resources complex.
- Preservation of the best scientific schools and traditions.
- Creation of a mechanism to improve the competence of the teaching staff using the best world educational technologies.
- Formation of interest, positive image and demand for mining and related specialities and areas among young people.
- Developing a consolidated position of the Consortium on key issues of interaction with the international scientific and educational community.

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![](_page_18_Picture_11.jpeg)

![](_page_18_Picture_12.jpeg)

"Training of higher education personnel, the demand for which is conditioned by the technological development and modernisation of the economy of the Russian Federation, is carried out exclusively with the level of higher education - specialist" – an addition to the Federal Law on Education in the Russian Federation, introduced on the proposal of the Consortium of Universities "Nedra".

## **CONSORTIUM OF UNIVERSITIES** "SUBSOIL OF AFRICA"

![](_page_19_Picture_1.jpeg)

On 26 July 2023, with the support of the Centre, a group of representatives of political and academic communities from **9** African countries (Angola, Ghana, Zambia, Zimbabwe, Egypt, Namibia, Nigeria, Mali, South Africa, Zimbabwe) signed an Agreement on the establishment of the Consortium of Universities "Subsoil of Africa".

In addition to broad public and academic support, the idea of establishing the Consortium of Universities "Subsoil of Africa" was supported at the highest level within the framework of the Second Russia-Africa Summit.

On 26 July at the Saint Petersburg Mining University an agreement on the establishment of the Russian-African Consortium of Technical Universities "Subsoil of Africa" was signed, which stipulates joint training of specialists for the mineral and raw materials complex. I think this is a very important and interesting area of cooperation.

#### **Vladimir Putin**

President of the Russian Federation

RUSSIA-AFRICA

The letter of intent formed the basis of the Agreement on the establishment of the Public-Professional Community Consortium of Universities "Subsoil of Africa", signed on 13 December 2023 by Vladimir Litvinenko, Chairman of the Governing Board of the Centre, and the Elected President of the Consortium - Rector of the Admiralty University of Nigeria, Omaji Paul Omojo.

To date, more than 40 African countries have already supported the idea of establishing the Consortium of Universities "Subsoil of Africa" and expressed interest in joining the community.

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#### **Consortium goal**

Ensuring the human, technological and managerial sovereignty of African States through the consolidation and coordination of intellectual, informational and other resources of universities and relevant organisations of African States on the principles of Pan-African networking.

#### **Consortium objectives**

- Provision of highly qualified engineering staff through basic higher education for the mineral sector of African States.
- Training of highly specialized specialists in "special higher education" - second diploma programmes with 1 to 3 years of study for integrated work in the mineral sector.
- Training of scientific and pedagogical personnel for higher educational institutions of African States and qualified workers for the relevant industries.
- Creation of a mechanism to improve the competence of teaching staff using the best world educational technologies.
- Scientific and engineering support for the development of the mineral and raw materials complex of African states.

- Consolidation of intellectual, human and information resources for the formation of state policy in education systems and management of resource potential of African states.
- Popularisation of engineering education and increasing the demand for mining and related specialties and fields among young people.
- **Consolidation of the African expert community**, involvement of authoritative international experts from different social and ethnic groups of the African continent in the Consortium activities.

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![](_page_20_Picture_12.jpeg)

## NATIONAL ASSOCIATION OF MINING ENGINEERS

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![](_page_21_Picture_2.jpeg)

The deficit of qualified managers and specialists of the mineral and raw materials complex enterprises is not only a constraint to the development of national economies, but also one of the main causes of loss of life and large-scale environmental pollution as a result of industrial accidents.

In order to create a unified system for assessing the level of personnel competence, the Centre established a **professional association "National Association of Mining Engineers"**, which received exclusive authority from the British Engineering Council along with the IOM3 Institute (UK) to conduct accreditation of specialists of mineral resource companies.

#### **Objectives of the Association**

- Creation of a national competence system for engineering personnel of the mineral resources complex.
- Creation and stimulation of the system of continuous development and advanced training of specialists of mineral and raw materials complex.
- Raising the prestige of the "Mining Engineer" profession.
- Development of the international system of assessment of mining engineers' competence.
- Increasing capitalisation of mining and processing companies by transferring information on the indicators of human resources potential to stock exchanges.
- Accreditation of specialists.

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![](_page_22_Picture_0.jpeg)

Based on the successful experience of international accreditation, the Institute of IOM3 (UK) and the International Competence Centre for Mining Engineering Education under the auspices of UNESCO have developed a unified international standard of competence for certification of specialists and awarding the title of "Professional Mining Engineer" (ISREE), which expands and supplements the existing standards of certain countries and enables engineers from all over the world to be recognised as specialists regardless of the place of education and work.

The ISREE standard defines **four broad competence areas**: ethics, safety, environment and financial planning. Combining the areas will create a broad set of competences appropriate for modern engineers.

The standard assumes that engineers will not normally be able to fulfil the ISREE requirements in less than 3 years from registration with national systems. The assessment is carried out by **interview by two representatives of the professional community**, one appointed by the ISREE national partner, the other by the ISREE host organisation.

![](_page_22_Figure_4.jpeg)

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## **RESEARCH & INNOVATION AND PUBLISHING ACTIVITIES**

The Centre actively promotes research activities in a wide range of areas of development of the mineral resource complex on the basis of Russian and foreign departments and partner universities.

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![](_page_23_Picture_4.jpeg)

The main scientific work is carried out in scientific centres based at the Saint Petersburg Mining University, which conduct research in priority scientific areas.

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- The Scientific Centre "Arctic" carries out scientific work at the Vostok station in Antarctica, develops technologies for drilling in difficult conditions and creating pile foundations in conditions of multifrozen soils.
- The Scientific Centre "Ecosystem" develops ways of minimising the negative environmental impact of the enterprises of fuel & energy and mining complexes, decarbonisation technologies and reduction of accumulated environmental damage.
- The Scientific Centre for Geomechanics and Mining Problems conducts research on geodynamic and hydrogeological processes, development of digital technologies and systems for monitoring geomechanical processes.
- The Scientific Centre for Mineral and Technogenic Resources Processing Problems deals with mineral resources processing, develops innovative technologies and materials.
- The Research and Training Centre for Digital Technologies conducts research on new energy systems, works on the development of digital technologies in various spheres, including mineral resources sector, fuel and energy sector enterprises.

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In order to promote the results of scientific research, the Centre actively supports the publication of scientific articles in highly rated international scientific journals and participates in the publication of specialised collections of articles and abstracts, including those based on the results of international forums and conferences.

More than 1000 scientific papers and 15 thematic collections have been published with the Centre's participation, including 90 scientific papers on sustainable development.

**6 experts** of the Centre in 2022 were included in the **TOP-2%** of the most cited scientists in the world, compiled by Elsiver publishing house, **1 expert** in 2019 was included in the **TOP-1%** of the world's reviewers in the publons.com rating.

![](_page_24_Picture_4.jpeg)

Published by Empress Catherine II Saint Petersburg Mining University SINCE 1907

## JOURNAL OF MINING INSTITUTE

![](_page_24_Picture_8.jpeg)

SCIENTIFIC JOURNAL

![](_page_24_Picture_10.jpeg)

## **INFORMATION SUPPORT**

One of the objectives of the UNESCO Centre since its foundation, and a necessary and obligatory condition for its effective operation, has been the information support of its activities, which allows sharing information and establishing a feedback process that provides an opportunity to evaluate the effectiveness of its activities.

Since its launch, more than **2 600 information materials** about Centre have been published, including in print and online newspapers and magazines, as well as on TV and radio not only in Russia but also worldwide in many languages. More than 100 stories in Russia were broadcast on TV channels such as First Channel, Rossiya-1, Vesti,

Rossiya-24, NTV, St. Petersburg, 78, Len TV 24, Ren TV, and more than 800 articles have been published in Russian and foreign newspapers and magazines such as Rossiyskaya Gazeta, Vedomosti, TASS, Prime, Moskovsky Komsomolets, Saint Petersburg Diary, and Komsomolskaya Pravda.

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The Centre's key partner is Forpost North-West news agency, a major online media outlet that publishes news, articles and analyses in 6 languages. The total number of readers annually

is more than 17 million people worldwide, including from Russia, Belarus, Germany, USA, Kazakhstan, Argentina, Spain, France, Israel, Finland, Colombia, Turkey and others.

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ENGLISH

![](_page_26_Picture_6.jpeg)

**CHINESE** 

![](_page_26_Picture_8.jpeg)

RUSSIAN

![](_page_26_Picture_10.jpeg)

![](_page_26_Picture_11.jpeg)

**SPANISH** 

![](_page_26_Picture_13.jpeg)

**GERMAN** 

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FARSI

#### PROFILE GROUPS, CHANNELS AND COMMUNITIES HAVE BEEN CREATED IN SOCIAL NETWORKS:

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"Mining University" in VK

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![](_page_26_Picture_21.jpeg)

![](_page_26_Picture_22.jpeg)

«Mining Activities» в Facebook

![](_page_26_Picture_24.jpeg)

«圣彼得堡矿业大学» B Weibo

#### **PARTNER COMPANIES**

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SIBUR

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