HIGHER SCHOOL OF ECONOMICS
NATIONAL RESEARCH UNIVERSITY
INSTITUTE FOR STATISTICAL STUDIES
AND ECONOMICS OF KNOWLEDGE

NOVEMBER 2020
ISSUE No. 6

Contents

HSE Institute for Statistical Studies and Economics of Knowledge (ISSEK) continues to monitor the state science, technology, and innovation policy, including the initiatives to fight the COVID-19 pandemic and facilitate economic recovery currently being implemented in Russia and the leading countries of the world, and relevant OECD recommendations.

Russia

Hydrogen energy roadmap until 2024 approved

As part of the implementation of the new Energy Strategy (RF Government No. 1523-r Order of June 9, 2020), the RF Government has approved the "Development of Hydrogen Energy in the Russian Federation until 2024" action plan (Order No. 2634-r of October 12, 2020). It is primarily aimed at increasing hydrogen production, expanding its use as an environmentally friendly energy source, and making the country a world leader in hydrogen production and export.

The roadmap is focused on developing domestic low-carbon hydrogen production technologies, including by conversion, methane pyrolysis, and electrolysis; increasing hydrogen production from natural gas or renewable energy sources and nuclear energy; adopting legislation to support hydrogen producers; designing and implementing state support initiatives to develop infrastructure for transportation and consumption of hydrogen, and energy mixtures based on it; promoting demand for hydrogen fuel cells on the domestic transport market; strengthening international cooperation, etc.

A number of pilot projects are planned to be implemented by 2024, to develop methane-hydrogen gas turbines, railway transport prototypes, hydrogen production units at oil and gas processing facilities and nuclear power plants. The roadmap outlines compilation of a register of relevant advanced manufacturing technologies and conduction of research in hydrogen production, storage, and transportation.

Government is reforming development institutions

The RF Government's immediate plans include reforming development institutions. The main goal is to improve their coordination and efficiency and prevent duplicate public funding of the same stages.

One of the reform scenarios involves consolidating development institutions that partake in the accomplishment of national goals on the basis of VEB.RF, the state development corporation. Other scenarios explore various approaches to coordination of development institutions' activities without their complete consolidation (like, synchronising innovation and technology development strategies, adopting an end-to-end methodology for setting goals and performance indicators, creating an integrated digital platform, etc.), establishing a partnership, where development institutions will be jointly managed by VEB and specialised organisations, or re-launching them in the current format. The choice of a scenario will be based on the uniqueness of development institutions' functions, their contribution to accomplishing the national goals specified in Presidential Decree No. 474 of July 21, 2020, and overlapping of their projects with those of other government agencies or commercial organisations.

First comprehensive S&T programme to be developed

The RF Government has approved the development of the comprehensive full-cycle science and technology programme "Clean Coal – Green Kuzbass". The proposal was presented by the world-class research and educational centre "Kuzbass", jointly prepared with other R&D and educational organisations. In total, there are 29 projects on developing cutting-edge Russian technologies that meet new international environmental standards. If successful, they will reduce the burden on the environment, and increase coal mining and processing efficiency. Advanced management and synchronisation mechanisms will be applied for the R&D, innovation, manufacturing, and marketing of high-tech research-intensive products. The resulting technologies will be procured by major Russian coal mining companies.

World-class research and educational centres' results assessed

The RF Ministry of Science and Higher Education provided the main results of the programme to establish world-class research and educational centres (NOC) in 2019-2020. They include the following:

- extended toolset for provision of regional support to NOCs. For example, the West Siberian Interregional NOC announced a tender for regional mega-grants to support research supervised by prominent scientists (5 mega-grants,150 million roubles each, for a period of five years);
- increased companies' interest in NOCs, along with the latter's extra-budgetary funding (from 5.5 billion roubles in 2019 to 7.4 billion in 2020);
- convergence of NOCs' research agenda with S&T priority areas.

The results of new competitive selection of NOCs will be announced in December 2020.

Support for engineering centres extended

The Ministry of Science and Higher Education has closed the grant application period for the tender to establish engineering centres specialising in industry priority areas. In total, Russian universities and research organisations filed over 100 applications proposing programmes for such centres' development. Grants will be allocated in the framework of the "Development of Advanced R&D Infrastructure" federal project being implemented in the scope of the "Science" National Project. State funds in the amount of up to 300 million roubles per project will be provided for a period of three years, to procure equipment, software, transportation, and patent services; repair premises; train personnel; and develop additional vocational programmes. The winner organisations must cover at least 30% of the expenditures with their own funds.

Engineering centres' main responsibility is providing a full range of technological services, from design to provision of supporting documentation for new R&D results.

Selection of new National Technology Initiative competence centres is underway

The Russian Ministry of Science and Higher Education announced a call for universities' and R&D organisations' proposals to establish two new National Technological Initiative (NTI) Competence Centres under "Photonics and New Materials" area. The programme of state support for such centres has been implemented since 2017; it's focused on strengthening cooperation in the science-education-business triangle to reduce technological barriers and promote integration of Russian companies into global value chains in NTI-relevant markets. Currently, 14 NTI centres are operating. In total, 8.7 billion roubles was allocated in 2017-2020 from the public budget to support their activities.

One of the new NTI centres will specialise in developing photonic integrated circuits, fibre optic, optical information and communication, quantum, and other technologies that allow to make significantly improved devices for data collection, storage, transmission, and processing. Another centre's development programme should focus on improving modelling technologies, designing materials with specific properties, and advanced products based on them. Applications period deadline is November 30, 2020.

Accounts Chamber and GenerationS launch call for research project proposals

The Accounts Chamber's Digital Transformation Department, with the support of the corporate accelerator GenerationS, is holding the first DataContest in the field of data analytics. The Contest will feature relevant data analytics research, the results of which can be applied by the supervisory authority.

The Contest will be held between 2 November and 11 December. Individual researchers and research teams with experience and competencies in key areas of the Accounts Chamber's activities are eligible to take part, along with teams developing data analytics solutions and 3rd – 4th year undergraduate, graduate, and postgraduate students. Anyone will be able to propose a project, finalise it under the guidance of the Accounts Chamber mentors and experts, conduct additional research, and present a solution to one of the 15 DataContest tasks.

Ministry of Energy develops oil and gas industry robotisation concept

The Russian Ministry of Energy is going to develop a concept and a roadmap for the oil and gas industry robotisation, plus an atlas of state support measures for relevant technological projects,

and submit them to the Russian Government in the first quarter of 2021. The oil and gas and related industries' demand may exceed 1 million robots by 2030.

The overall annual effect for the national economy of the oil and gas industry digitisation, application of cutting-edge technologies, process automation, and use of robotics can exceed 700 billion roubles by 2030. Digital transformation will reduce the exploration and production costs by 10-15%, the time for commissioning of oil and gas projects by 40%; and increase the oil recovery factor. At the same time the volume of orders will grow for the entire industry, including orders for training highly skilled professionals capable of operating advanced equipment. Also, it will create new incentives for stepping up, and localising production of domestic equipment and software.

Rosatom made a "nuclear battery" for spacecraft

In October this year, the A.A. Bochvar High-Technology Scientific Research Institute for Inorganic Materials (part of the Rosatom) made prototype space- and aircraft power sources based on tritium, a radioactive hydrogen isotope. They feed low-power electrical systems, microelectromechanical circuits, measuring instrument sensors, etc. Tritium is radioactive (half-life of 12.3 years), but its soft beta radiation does not destroy semiconductors' structure, so the power source will keep working at the design capacity for 15 years. The "battery's" power is 200 nanowatts, its diameter is 30 millimetres, and height – 15 millimetres.

BRICS Quantum Communications Initiative gains new momentum

The Rostech State Corporation will take part in the BRICS joint three-year research project in the field of quantum communications. The project is being implemented by a consortium of organisations, and funded by an international BRICS grant with the support of the Russian Foundation for Basic Research. The state corporation's Shvabe holding will be represented in the consortium by the research and production association "S.I. Vavilov State Optical Institute". Developing experimental equipment and infrastructure components for hybrid quantum communication channels based on fibre-optic and satellite communication technology will allow to create and maintain an intercontinental satellite quantum communication channel with a range in excess of 10 thousand kilometres.

South Africa is the lead contractor for the project; China will be responsible for the satellite quantum communications area, India – for modelling fibre-optic communications, and Russia – for the development of innovative optical fibre.

Domestic processors now have priority in public procurement

The Ministry of Industry and Trade plans to tighten the requirements for computers of domestic origin. If the relevant initiative is approved, only computers equipped with domestic processors will be included in the Unified Register of Radioelectronic Products. Government agencies must give preference to equipment included in the register in their procurement. This measure is intended to protect the domestic market and critical national information infrastructure, promote growth of the national economy, and support Russian microelectronics manufacturers.

Pilot 5G network will be based on Russian equipment

The Skolkovo Innovation Centre has launched a pilot fifth-generation network using domestic hardware and software. The new MTS Skoltech network standard is expected to offer data transfer rates many times higher than 4G (up to 10 Gbps), and use the 4.9 GHz band. Prior to the mass application of the new technology (according to experts this will take two years), the pilot network will be used for research and testing. In the future the network will cover the entire country. The proposed solutions allow the use of software and components from different manufacturers, which reduces dependence on foreign suppliers.

Government to use digital twins for electrical grids

The RF Government approved a pilot project to create digital twins for electrical grids, and apply unmanned online decision-making systems and monitoring mechanisms (RF Government Order No. 2801-r of October 28, 2020). Application of these advanced technologies is expected to improve the reliability indicators (reduce the frequency and duration of outages) without increasing the tariff burden on consumers. If successful, the pilot project is planned to be scaled up.

Investors and local grid operators for testing the innovation will be selected by mid-2021; the deadline for completing designs and signing contracts is December 1, 2022. Up to 2 billion roubles will be invested in total. The share of Russian equipment must be at least 80%.

Digital rouble in pilot mode can be introduced in 2021 already

The Bank of Russia plans, in accordance with the legislation on digital financial assets (the Federal Law No. 259-FZ of July 31, 2020), to launch the digital rouble in an experimental mode from 2021. The digital rouble will be an additional form to the Russian national currency, enabling to make payments faster, easier, and safer. Equality in access to the digital rouble will result in lower remittance costs and increased competition among financial institutions. People will be able to transfer digital roubles to their electronic wallets, and use them via mobile devices and other media online and offline. Special technologies will be needed to use the digital rouble offline, which will promote innovation.

Global agenda

European Union: supporting financial technology in Europe

The European Commission presented a framework programme to develop a digital finance strategy in Europe. The new measures are intended to promote the European Union's economic recovery after the COVID-19 pandemic. Application of digital technologies in the financial sector will open up new channels for funding strategic European sustainable development (European Green Deal), and industrialisation support programmes (New Industrial Strategy for Europe). The following key digital finance policy areas were selected.

- *Digital finance strategy*: developing new ways of financing small and medium-sized enterprises. Technological and legal innovations will reduce the fragmentation of the EU Digital Single Market, providing consumers with equal access to financial products, and promoting development of FinTech start-ups.
- *Retail payment development strategy*: creating a unified retail payment system in the EU, including instant cross-border transfer solutions.
- *New regulations for the cryptoasset market*, to ensure transparent conditions for issuers and users alike. The new rules will allow cryptoasset operators in each European country provide services throughout the EU. More stringent requirements will be applied to large cryptoasset issuers, regarding supervision, investor rights, etc. To test the regulatory measures in practice, "regulatory sandboxes" are envisaged for cryptocurrency transactions.
- *Digital Operational Sustainability Law*, to provide information security guarantees for all financial market participants.

France and Netherlands propose to tighten regulation of "digital giants"

France and the Netherlands announced the need for regulatory intervention in the activities of large digital platforms with significant network impact. The initiative was proposed in the scope of the European Commission's Digital Services Act Package.

The dominant market position of large digital platforms can limit small innovative firms' ability to enter the market, and increase individual consumers' and businesses' dependence on large platform operators. The potentially negative consequences require tighter regulation in this area, but too harsh interference would hinder innovation. Targeted measures for platforms of this type are believed to be optimal.

In particular, the following regulatory tools are envisaged:

- expanding business users' rights to use platform data;
- providing fair contracting conditions;
- banning priority promotion of own products and services by the platforms, or limiting third-party suppliers' access without a valid reason;
- introducing requirements for large platforms to actively offer users alternative products and services, and provide functional and data exchange compatibility with commercial partners.

Russian Science Foundation and French National Research Agency hold joint competition

The Russian Science Foundation (RSF) announced a joint call for proposals with the French National Research Agency (Agence Nationale de la Recherche, ANR) in the scope of "Basic and Exploratory Research by International Research Teams".

The competition is open to projects proposed by international Russian and foreign research teams. To receive support from the Foundation, the foreign research team must have received an ANR grant for the implementation of the project. The research project must address specific socio-economic development priorities in one of the following areas: *physics, humanities and social sciences*, and the *COVID-19 pandemic*.

The RSF will provide grants in the amount between 4 and 6 million roubles annually. The deadline for submitting applications is April 2021. Foreign research teams must submit a preliminary application for the joint project on the ANR website no later than December 1, 2020.

US: technology strategy for national security

The United States has adopted the first-ever National Strategy for Critical and Emerging Technologies designed to promote efficient use of the country's innovation potential for national security purposes, and limit competitors' ability to even out the United States' superiority in each of 20 key technology areas ranging from autonomous systems to brain-computer interfaces.

In addition to promoting inventive activities, reducing the administrative burden on businesses, developing human resources in the R&D sphere, and other general policy areas the Strategy focuses on intellectual property protection, including access to technologies at different stages of their development. The approaches to accomplishing the objectives set in the document will be determined based on particular technological areas' importance for national security: critical technologies require the US leadership, for less important ones equality, and cooperation with friendly countries would be acceptable, while in all other cases (mainly related to emerging technologies) risk management would be in order.

Canada: green defence against pandemic

The Innovation, Science and Economic Development Canada announced the launch of two new calls for proposals under the Innovative Solutions Canada programme, to find effective ways to recycle disposable personal protective equipment, in particular items used by medical personnel. Small and medium-sized enterprises proposing an economically viable model for production of biodegradable surgical masks, gowns, and respirators will be able to receive up to 300 thousand Canadian dollars to test its feasibility. Successful participants will enter the second stage of the competition, where they will be able to apply for 1 million Canadian dollars to make working prototypes.

Ireland: scientific advances in fighting coronavirus

A key element of the Irish Government's plan to combat the COVID-19 pandemic was the launch of a research and innovation funding programme to reduce the negative impact of the pandemic on the economy and society. Against the background of the renewed increase in morbidity, the Irish Science Foundation jointly with other organisations held a second call for proposals (for projects no longer than 14 months). A wide range of results are expected, including development of coronavirus-resistant plastics and ways to minimise skin damage while wearing personal protective equipment. The funding in the total amount of 5.5 million euros was divided between 41 projects; grants varied from 35,170 to 309,007 euros.

Australia: stepping up public support for business digitalisation

Australia approved the Digital Business Plan with a budget of 796.5 million Australian dollars (569 million USD) for 2020-2024 It aims to increase Australian businesses' productivity, income, and the number of work places by supporting the adoption of digital technologies. The funds will be allocated for:

- upgrading digital infrastructure (29.3 million Australian dollars for 5G deployment);

- reducing regulatory barriers (62.5 million Australian dollars);
- supporting digitalisation of small and medium-sized businesses (24.7 million Australian dollars, including 3 million for developing a tool to assess companies' digital maturity);
- digital transformation of the state (680 million Australian dollars.).

Cooperation with the OECD

NESTI Working Group meeting

On October 26-27, 2020, the annual meeting of the OECD Working Group of National Experts on Science and Technology Indicators (NESTI) was held online. Representatives of 36 out of 37 OECD members along with Brazil, Russia, India, China, South Africa, and other countries took part. The latest NESTI initiatives in the field of statistical measurement and analysis of science, technology and innovation development trends were discussed. Among the most recent projects, the second round of an international survey of scientific authors, and an analysis of tax incentives for R&D commanded particular interest of the participants. A test version of the new online indicator panel was also presented, implemented on the STIP Compass platform. The service will provide another access point to OECD resources, expanding the possibilities for quickly assessing the state of national science and innovation systems using quantitative indicators.

The plan for 2021 is to focus international experts' efforts on developing recommendations for conducting statistical surveys in the business enterprise R&D sector. Another area is developing microdata infrastructure on companies' R&D expenditures, generated on the basis of their published reports. Particular attention will be paid to analysing public R&D support tools (the Fundstat project), to share experience and information about the scale, forms, and areas of R&D funding, including in the pandemic and post-pandemic periods. The generative potential of artificial intelligence technologies will also be studied, and their contribution to development of science and innovation assessed.

First results of OECD survey "Science in the face of the COVID-19 crisis"

The preliminary results have been posted on the OECD Flash Survey 2020 website "Science in the face of the COVID-19". As of November 2, 2020, more than 2,600 responses were received (45% from scientists, and the rest from science policy advisors, experts in scientific communication, and administrative staff). The questions concern the impact of the COVID-19 crisis on science, expectations for the future (changes in research topics, research organisation, its productivity, availability of data sources about the pandemic and their credibility, politicians' and authorities' willingness to listen to scientists' opinions, etc.). A snapshot of the situation in 100 countries is presented. In the near future it is planned to expand the sample, and build panels for other periods. Interested academics and government officials can view the current version of the survey results, and take part in new rounds as respondents.

Commentary

Analysis of successful international science, technology, and innovation management practices shows that public support in this sphere is mainly provided in two areas. First of all, it's making full use of its potential to counter the COVID-19 pandemic (new fundraising mechanisms, including blended funding, quick priority setting for providing support and mobilising resources (and adjusting the priorities if required), accelerating research without damaging its quality, participating in international cooperation; simplifying access to research data and facilities, etc.). At the same time national governments and international organisations continue to develop the long-term agenda, paying particular attention to "end-to-end" challenges such as improving science and technology indicators, including those based on microdata and big data, and their measurement systems; upgrading digital infrastructure of economic sectors, regulating large digital platforms; strengthening the role of innovation in achieving sustainable development goals and maintaining national security;

supporting expensive high-risk research, and transfer of its results; strengthening public credibility of artificial intelligence and other breakthrough technologies; promoting and supporting the choice of a research career, and reducing the associated risks, etc. In general, the overall policy framework is being created, with an emphasis on the future and taking into account the "lessons" of the coronavirus pandemic.

Innovation policy in Russia is evolving in line with the global trends. The pandemic has become a kind of stress test for the national science and technology complex: the national anti-crisis plan includes targeted measures to create conditions, which would help restore demand for research results and new technologies, support technology companies and highly skilled personnel, adopt the "state as a digital platform" model, etc. At the same time long-term strategic planning in this area also continues, aimed at accelerating technological development, among other things on the basis of digitalisation and re-launching development institutions, and designing tools for the national project "Science and Universities".

Sources: official websites of the RF President, RF Government, RF Accounts Chamber, Ministry of Science and Higher Education, RVC, National Technology Initiative, OECD, European Commission, BRICS, Rossiyskaya Gazeta newspaper, RIA Novosti news agency, Izvestia newspaper, CNews, and foreign countries.

This information bulletin was produced in the framework of State Contract No. 13.563.11.0070 of July 17, 2020 titled "Providing Expert and Analytical Support for Cooperation between the RF Ministry of Science and Higher Education and the Organisation for Economic Cooperation and Development (OECD)"

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