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Programm Abstracts

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THE CATALYSTS FOR THE PROCESS OXIDATION OF HYDROGEN SULFIDE TO SULFUR

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Production of sulfur by the method of Claus provides for 90-95% in the world output due to the release of high quality sulfur from the gas phase. The process is based on catalytic oxidation of hydrogen sulfide to sulfur. This reaction was sufficiently studied and it is widely used in industry. However, the problem of finding more active and cheaper catalysts are actual at this moment.

As these catalysts are not produced in Azerbaijan republic, their import is dealt with certain difficulties. Therefore, it is necessary to create catalysts on the basis of local resources and industrial wastes. Approach to production wastes in recent decades has undergone significant changes. Wastes of one industry often are valuable raw materials for other industries.

For the first time we proposed for the process of Claus the synthesized contact based on solid waste from alumina production – red mud as a catalyst. It showed us the possibility of using red mud – raw man-made material as a cheap and available catalyst.

The optimum parameters of the process were determined: temperature- 250° C, space velocity of gas flow - 500 h⁻¹, ratio of initial components of SO₂/H₂S=1/2. Sulfur yield at this specified conditions was 95,0-97,0 %.

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UTILIZATION OF EXHAUST SULFUR DIOXIDE GASES OF METALLURGICAL PRODUCTION BY CATALYTIC METHOD

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Earlier we established that disposal of exhaust sulfur dioxide gases of metallurgical production with the aim of obtaining valuable product sulfur for ecological protection is very relevant. Nickel containing contacts have a rather high catalytic activity in the reduction reaction of sulfur dioxide by hydrogen or hydrogen containing reducers (for example products of methane conversion). For the aim of determining the composition of the formed new phases and changes in alumonickel catalyst we prepared contacts on the basis of γ -Al₂O₃ by impregnating nickel with nitrate with further decomposition and calcinations at 400°C 2 hours. The content of NiO in the composition of the contact is 10%mass. Reduction reaction of sulfur dioxide by hydrogen conducted at 400°C,

volumetric feed rate of gas mixture is 1000hr^{-1} . During the investigation we determined that stationary state of promoted alumonickel catalyst reaches after a certain period of its operation in reaction mixture, depending on temperature and composition of initial sulfur dioxide gas. Perhaps, this is related to the formation of catalytically active phases at a long-term contact of catalyst mass with reaction medium. Physical and chemical analysis of the waste catalyst was conducted after keeping in reaction mixture 300 hours. Absorption spectrum of the waste sample is observed at 240 cm^{-1} , which confirms the formation of sulfide nickel on the catalyst, but at $1070\text{-}1100\text{ cm}^{-1}$ it corresponds to nickel sulfate. By X-ray phase analysis it was established that nickel in the content of waste catalyst is in four phases: metal, sulfide, sulfate, oxide.

Further, we prepared alumonickel containing samples separately: Ni, NiS, NiSO_4 , each of which was kept in reaction mixture 300 hours. Results of physical and chemical analyses showed that despite the initial form of nickel in the composition of contacts, similar phases – Ni, NiO, NiS, NiSO_4 are formed at long-term processing with combustible mixture. Consequently, these investigations prove that in above mentioned reduction process all four phases show catalytic impact.

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DEVELOPMENT AND IMPLEMENTATION OF INNOVATIVE "GREEN" TECHNOLOGIES OF BIOGAS PRODUCTION FROM WASTEWATERS AND THEIR SEDIMENTS AND PLANTS WITH THE ENVIRONMENTALLY SAFE USE OF THE FINAL PRODUCTS

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The ecological environment of Ukraine is largely determined by the number and quality of wastewaters and sediments generated during sewage and wastewater treatment of the cities, agriculture and industrial enterprises, where most of the existing wastewater treatment plants (WWTP) are physically worn and purification technologies that they used are outdated and energy-intensive.

Therefore, it is currently important to develop and introduce the resource-saving "green" technologies aimed at creating and developing resource-saving systems of engineering life support of the business facilities with obtaining biogas and biotechhumus (BTH) from the biomass waste - on cost-effective basis, aimed at reducing of the pollution.

The aim was development, creation and usage of the new "green" technologies and environmentally safe equipment for conditioning of the contaminated water of the different categories, with conditioning of their sediments into BTH, in order to reduce the consumption of fresh water, improve soil fertility, promote the minimization of harmful

effects on environmental pollution, which contain in wastewater and in sediments formed in the process of the wastewater treatment.

As a result of work performed, the new technologies, useful models patented, and domestic and imported advanced equipment for improvement of the existing and introduction of the new WWTP cleaning wastewaters with the return of conditioned water for reuse were approved. In particular, we performed investigations with usage of chicken manure as an alternative source of heat and electricity and usage of nutrients contained in BTH (dewatered sediment of the biogas plant on chicken manure) and filtrate (technology aqueous solution obtained in BTH dewatering) to improve the fertilizing properties of the soil. The Institute of Hydrobiology of the National Academy of Sciences, Institute of Hygiene and Medical Ecology of Academy of Medical Sciences of Ukraine, Subsidiary Enterprise Central Laboratory of Water Quality and Soil of the Institute Water Problems and Land Reclamation of the National Academy of Agrarian Sciences of Ukraine were involved in control the quality of obtained in the performance of research, experimental, and design works on conditioning of waste waters and their sediments. AgroBioGaz, LLC together with Unilos-Ukraine, LLC produced and explored the research and production installation of anaerobic digestion of chicken manure in accordance with the useful model patent Universal Biogas Complex No. 110588 (Mandelstam O.S. et al).

The technological scheme of chicken manure processing included the following equipment: receiving hopper, into which portions of chicken manure are loaded and from which are fed into the homogenizer by the conveyor; biomass homogenizer, which receives rotary water for humidity 82%, which is equipped with cutting impeller pump; bioreactor of the 1st degree for hydrolysis of biomass, where optimal temperature and hydraulic mode are provided with biogas cleaning and purification system; bioreactor of the 2nd degree where optimal temperature and hydraulic mode are provided for methanogenesis, with biogas cleaning and purification system; digestion bioreactor - optimal temperature and hydraulic mode are provided with biogas cleaning and purification system, and removal of digested mold and water mixture into a container equipped with a device for gravitational dewatering of the biomass and with pump for filtrate supply into the homogenizer. The sediment (biotechhumus) was composted into the piles on covered site for deworming, then packed into bags for use in greenhouses for flowers growing. Biohumus had ash content 3.89%, humidity - 68.5%, contains potassium - 51 mg/100 g, nitrogen - 749mg/100 g, phosphorus - 56 mg/100 g of the initial sample did not contain viable eggs of soil-transmitted helminth in 1 dm³ of a sample, did not contain pathogens. Biogas is used to heat rotating water in heat exchange systems of bioreactors that maintain the optimum temperature of the mesophilic regime of biomass digestion.

Unilos-Ukraine, LLC in accordance with the patents for useful model patents developed and implemented technologies: No. 100170. Kotsar O.M et al. The complex of preliminary water purification ENZYM-AQUA-100. – for the use of biopreparation-bioregenerator in conditioning technology in household, industrial, rain and meltwater from biodegradation of the dehydrated sediments and reuse of wastewaters conditioned; No. 96993 Kotsar

O.M. et al. Bioreactor recuperator of water heat. TERMOBIOREAKTOR-97 - for physical-chemical treatment and biostabilization processing of rotary water in renewable energy cooling systems - biomass power station; No. 97075 Kotsar O.M. et al. Water phytoactivator and self-cleaner FRVASINERGY-14U – for conditioning of wastewaters of meat processing plants with the organization of wastewaters purification systems for bioplateau before wastewaters reuse for irrigation and replenishment of fresh underground (ground) water and compost - to improve soil fertility; No. 96994. Kotsar O.M. et al. Underground automated block-module for water treatment SBR-AQUA-FILTER-123 - for conditioning of wastewaters entering the reservoir, with the restoration of their biological usefulness.

In 2009-2015 Unilos-Ukraine Company introduced the innovative systems to optimize water management systems with reuse of wastewaters conditioned also at meat processing plants, oil-extracting factory, dairies, livestock complexes, using environmentally friendly biotechnology in bioreactors with adapted highly effective biological community based on biopreparations of filtering domestic zeolite loading of purification bioplateau, with disinfection with domestic environmentally friendly antibacterial preparations based on hydrogen peroxide, with reuse of wastewaters clarified for technical purposes, using biohumus obtained in agriculture - for growing corn and forage crops.

Developed “green” technologies allow to reduce the area under sewage treatment plants, since upon their implementation machinery and installations treatment of contaminated water are placed in closed tanks and buildings, environmentally safely, it is technologically and economically feasible to reuse conditioning wastewaters for technical needs, reduce volumes of fertile soil use in flower-growing and landscape “green” building, replacing it with biotechhumus, reduce the cost of treatment of polluted wastewaters and reduce the payback period for their implementation.

A.A. Asanov

DEVELOPMENT PROSPECTS OF THE METALLURGICAL BRANCH OF KYRGYZSTAN AND ITS ENVIRONMENTAL ASPECTS

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Kyrgyzstan is a mountainous country, rich in minerals and water resources, covers an area up to 200 thousand km², from which the mountain and foothill areas account for 95% of the total. Currently in the country major development and projects are implemented. For example, the Canadian company mines gold at an altitude of 4100 m, the Chinese company building roads with passes at an altitude of 3500 m, together with Russia began construction of cascade hydropower stations on the Naryn River (altitude 2000 m or

more). For the revival of the Great Silk Road and connection of China with Middle East and Europe there are plans to build a railway through mountainous terrain from China to Uzbekistan. Currently focuses on the development of the metallurgical industry and the production of export-oriented products.

For our country, with its closed geographical location and poor transport provision, the creation of modern networks of roads and railways, the development of mountain regions, rich in mineral and natural resources, the transformation of inefficient use of water resources and coal reserves in economic advantage is scientific and reasonable choice for economic development of the republic.

However, the level of industrial development of the country is determined not so much by their resource potential and the size of production with low technological conversion, as the degree of development of knowledge-based, technologically advanced industries. At the same time, the problem of the use of natural resources and protection of the environment from pollution emissions and anthropogenic materials become among the most important problems. Abroad, there are such technologies to produce new products and they are successfully implementing. In Kyrgyzstan it is a relatively new but very promising direction of development of the basic branches of the economy. Currently there is a realization in practice of innovative projects for the production of the above mentioned products together with foreign partners. Environmental aspects of such productions are also solved as part of them. Country's development strategy for 2013-2017 is accepted, which reflects the major project to be implemented in key sectors of the economy.

Successful implementation of the defined goals became quite possibly due to the fact that in recent years innovative high technologies are created, which allow the processing of mineral raw materials and coal with minimum environmental load on the environment and relatively high economic efficiency. In this respect for the country the use of coal natural resources as a raw material for the production of ferroalloys, in particular ferro-silico-aluminum and new generation carbon reducing for silicon smelting is indicative.

Existing technologies for the processing of coal can be divided by type of products obtained in four groups:

- Technologies to improve the quality of coal fuel (briquetting, thermal enrichment, thermo briquetting, ways of burning);
- Production technology of fuel products with new consumer properties and higher cost (pyrolysis, gasification, processing into fuel oil);
- Coal processing technology in the production of non-fuel use (adsorbents, fertilizers, reagents etc.);
- Technology for extraction from coal and coal ash inorganic mineral impurities (rare metals, silicon and ferro-karbo-silitsy etc.).

Complex processing of coal in these areas is one of the most urgent problems in the field of fuel and energy security, metallurgy and chemical industry. We have conducted development of the second and the fourth group of technologies for the production of export-oriented products. The use of these technologies in the production of silicon

and ferro-alloys allows obtaining competitive products that meet environmental and technological requirements.

Ferroalloy and silicon production are environmentally hazardous. Hazard factors of such productions are the allocation of large amounts of gas, dust and not permissible content of harmful substances in the gas. High calorific furnace due to utilization of a large volume of carbon monoxide in the ignition gas into the throat to reduce emissions, collects dust in the amount of from 400 to 1000 kg per ton of production involves the study of the causes of dust and harmful gases and the development of methods minimal impact on the environment.

Environmental safety of plants with the modern production growth is only possible by increasing the efficiency and scale of gas cleaning. The increase in power with its large gas purification material and energy consumption leads to unnecessarily high costs of cleaning. Today, it is one-third of the cost of smelting, close to half, and will be comparable to the cost. A huge amount of energy is lost with the gas, and catching dust represents some value to the construction industry. There is a paradox between the need of increasing the production of silicon and system requirements to improve environmental protection. In the production of silicon alloys only dry cleaning dust is used, which is achieved by excluding the sulfur from the charge materials.

Technical and technological activities foreseen during the design of such facilities can significantly reduce the costs of cleaning gases; improve the efficiency of gas purification, to improve a number of technical, technological and environmental performances of silicon production.

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FLY ASH AS A REINFORCING FILLER OF POLYMERS

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Since 2009, members of the Irkutsk State Technical University were initiated studies on the establishment of building insulation material based on waste heat power (fly ash) and thermosetting oligomers.

A new materials' production process researched after studying of minerals characteristic and capability assessment of that materials as filler for plastic. Thermal-power waste - Irkutsk Region thermal power plant furnace dust - was used as functional filler (reinforcing element). Taking into account a huge amount of fly ash available for recycling and usage for production of MPC it has been studied several types of fly ashes generated by various power plants in Baikal-Irkutsk region. An important factor for selection of fly ash for the project was the possibility of fly ash separation at power plants by the dry process.

The main component (filler) for MPC production is fly ash with the following

characteristics: Ash must not contain even trace amounts of radioactivity; Ash must have a minimum sulfur content (less than 0.1%) and carbon (less than 1%); Humidity ash should not exceed 0,5%; Optimal fractional composition of the ash - 0,1-3 microns.

For MPC production it has been used the local fly ash with the following characteristics and it met all federal save certificates in terms of metal oxides and traces of radioactive elements.

In cooperation with this company “Irkutskzoloprodukt” it has been chosen several tests for fly ash generated by various local power plants (Tables 1 and 2). The ash for testing has been selected based on a number of characteristics indicated in the passports of slag materials, such as humidity, grain size and chemical components of ash [Passport to ash, OAO Irutskenergo “TEC-9 station number, “Irkutskzoloprodukt», 2012].

The main processing technique for industrial production of MPC has been chosen an extrusion process. It is based on melting of thermoplastic binder with fly ash as filler, foaming of the mixture using commercial blowing agents and pass the melt-ash mixture through a special hollow die which has a cross section (profile) corresponding to the profile of the final items (boards, rhombic, tongue and groove, etc.) and cooling the extrudate in the water bath. The technology has been designed for the regular extruders and adjustable for injection molding technique as well. The extrusion process is a high speed continuous one and it can be fully automated.

Obtained material group have a good physicochemical and consumer properties' wide spectrum. Also flammability class put down from fillerless polyvinyl chloride highly combustible class (3 or 4 class) to researching materials low-flammable class (1 class). So that filler can be used as constructional finish materials for the better part of room types [Investigation of the properties of modern building materials based on industrial waste / Barahtenko V.V., Burdonov A.E, Zelinskaya E.V., etc. // Basic research. - 2013. - No. 10 (part 12). - Pp. 2599-2603].

The particulate filler reinforcement mechanism definition is important factor of obtained polymer mineral composites intent improving mechanical properties. Thereat reinforcement was influenced by many factors. The polymer particulate filled composites can be a laminated system. The system matrix is thermoplastic, which stratificated on dispersion particles surface with strata alternation or filler particles [Lipatov Y.S. Physical chemistry of filled polymers.- M.: Chemistry, 1977. - 287 p.]. The polymer mineral composites samples microscopic research confirm of material stratiform structure, where furnace dust numerous particles include in polyvinyl chloride interlayer space.

Therefore based on polyvinyl chloride and furnace dust obtained polymeric-mineral composite high physical integrity is attributable to characteristics and high content of the filler.

A very important part of our work is the environmental aspect, possibility of utilization of mineral waste and municipal solid waste from polymeric materials.

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**THE POSSIBILITIES OF 'KUMIR-RESOURCE' SYSTEM
FOR SMART GRID AND APARTMENT LEVEL ENERGY
ACCOUNTING**

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The cities energy infrastructure usually presents large-scale centralized systems, which include dozens or even hundreds of thousands of consumers. Management challenges of its expansion and functioning are often solved separately for different types of systems without linking together the obtained solutions. The organization of a coordinated expansion and operation process, as well as the combination of different energy systems into a single unit of power supply management using Smart Grid (intelligent network) will significantly improve their safety, reliability, economical benefits and environmental friendliness. Integrated intelligent technologies involve the creation of energy systems focused on combining the use of several types of energy sources through IT and telecommunications. Smart Energy System envisions the integration of traditional and non-traditional energy systems through new communication technologies, and integrated multi-level automated control system. Existing system of data collection in the field of heating, electricity and gas energy can serve as a fundament for the envisioned intelligent energy system. Such a system must be “transparent”, i.e. on one hand it should be possible to connect devices that collect meter data, on the other hand intelligent power supply control devices also need to be connected. In today’s market for energy accounting systems the company OOO “NTZ KUMIR” - “IIS KUMIR-RESOURCE” offers an alternative which fits these requirements. The given system integrates GPRS-terminals which are designed to collect telemetry data from metering devices of various energy sources (heat, electricity, gas, cold water). This task is performed by creating communication protocols between the server and the GPRS-terminals. Any equipment designed to collect data from metering and management systems for the supply of energy resources can be connected to the protocol. Real-time monitoring with minimized delays in the communication channel is a great advantage of the system. One GPRS-terminal “KUMIR-M32” can connect multiple devices via different interfaces: RS232, RS485, and CAN. The use of CAN-interface allows to integrate a variety of devices into a local network. Devices connected to a network can communicate both with each other and also with the server through a terminal. Devices that allow different components of the system to communicate via radio waves even though they are located at a considerable distance from each other are currently in development. This allows cable free communication and apartment level metering of energy resources by the terminal “Kumir-M32.”

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ENVIRONMENTAL ASPECTS OF CLUSTER FORMATION

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Operation and development of the national economy and its separate sectors is largely determined by the laws of globalization processes responsible for both the formation of new world economic relations and the definition of the specific status of each sector in the structure of world and national economy.

One of the components of the process of globalization is economic integration, the conditions of implementation of which is characterized by a mandatory technology link between companies and vertical integration of enterprises from raw materials to its full processing, which leads to the formation of a cluster.

We define the basic stages of clustering: the presence of assumptions and strategic initiatives; forecasting economic, social, environmental and scientific and information effectiveness of the cluster taking into account public, private domestic and foreign investments and all kinds of effects, including regional and national economy ones; definition of the indicative list of cluster members - basic, related, servicing companies; development and approval, at the national level, of long-term strategy of cluster development and appropriate incentives (the creation of special economic zones (SEZ), investments of the investment fund, tax, credit and other benefits); development and implementation of the plan to create a cluster as investment program.

In this connection, it seems to be appropriate to explore the internal possibilities of presence and structure of the resource base of the participants from the perspective of the organization of industry cluster, we consider it on the example of forest cluster. The most important factors in our opinion on the example of forest complex are as follows: 1) economic - the system of economic impacts prevailing in the country that covers all aspects of forest management, 2) the state of the legal framework, the availability of the necessary laws to ensure full implementation of the forest complex relationships, 3) the state of the institutional environment, which is characterized by the presence and effectiveness of institutions operating in the field of property relations, 4) environmental factors - the elements of the implementation of the protective functions of forests and forest policy, 5) social ones, including the necessary management bodies to ensure the stability of employment for work in the forest and processing of raw wood material.

It should be noted that the common interests of owners and users of forest resources mainly contain only an economic component. In addition, the environmental activities and environmental factors are also consistent with the interests of those and others as the global dimension of this problem is close and understandable to all participants.

Ecological effect - improvement of the species composition of forest stands, increase

of the quantity and quality of industrial wood to the age of maturity; water protection, soil protection, hygiene function. In this context, we can talk about the importance of environmental impact as about the difference between the state of the environment before and after the event.

In countries with developed forest industry forest cluster combines into system all the branches of cultivation and protection of forests and logging and wood processing. The core of the forest cluster is large processing and logging companies.

In Russia, the use of the cluster approach as a form of transition to the national innovation economy and diversification of production in the forestry sector has just begun. In single localized combination there are industrial enterprises, scientific research institutes, universities, major components of logistics in the North, Siberia and the Far East. In some regions, there is an experience of creation of forest clusters; this applies primarily to multiwood areas of Siberia and the Far East. At the same time the formation of clusters of timber harvesting and deep processing of forest resources, especially in the central, south-western and north-western parts of the Russian Federation, where forests are underutilized, could be a major moment in the way of improving the competitiveness of Russian timber.

Rational use of existing forest resources in the country, without disturbing the ecological balance and damage to nature, allows the state to receive a stable income through appropriate implementation of the forest and its products and to direct these funds to the state needs.

The paper revealed the economic, social and environmental conditions of clustering that provide a synergistic effect of the economic cooperation between the participants of the forest cluster.

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ABOUT THE EFFECTIVENESS OF HEALTH SYSTEMS IN FOREIGN COUNTRIES

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Health difficult to measure and to assess bad money, as it is - the price of human life. In some countries pay for the absence of the disease, while others - for the duration of treatment.

As the "Item" medical services appear. However, they have their own specifics include the efforts of various specialists, including high-tech medical care.

If the goods are considered in the market sense, the competition and the limited demand for a range of services pose problems of control over their production at all. A number of services in medicine depends on advertising, unfair competition, fashion (cosmetic medicine) and so forth.

Important role played by access to medical care. As the resources used by financial and

insurance products, therefore, the customer has to constantly choose where to invest: in insurance or financial systems.

In other words, what is more important: the income or health?

Effectiveness it is generally considered as the ratio of results to costs. Therefore, the question arises about the quantity and quality of performance in medicine. There is a problem of definition of goods in medicine. In other words what pays the patient or the society in its treatment? This question has no definite answer. Hence different interpretation of the effectiveness of the medicine in foreign countries and in Russia. The effectiveness of social medicine in question. Performing a social function, the government ensures equal access to medical care. In this case the government pays and controls the health.

An effective health care system operates in a number of developed countries, among which are Germany and Israel. European medicine focuses on Germany, where growth at high prices for medicines and medical services is high safety of the patient who is in the health care system. At the same time a lot of attention is given to preventive medicine, including sports training.

In Germany the Act on the formation of health was adopted (entered into force on 1 January 2004). In accordance with decreased costs of medical care (in 2008 – by 23 billion euros). In accordance with this act created the Institute for quality and efficiency of health care, who was involved in the following positions:

- analysis of therapeutic effects of drugs;
- introduction of 10 % additional payment for drug funds;
- increase amount of a hospital stay from 9 € per day for a maximum of 14 days to 10 € per day for the period up to 28 days;
- appointment of a fixed rate of 10 € for each ambulant consultation of General practitioner or specialist on the one hundred (except in cases of referral by the GP), and also for treatment in the emergency Department.

The office of health care financing Department of health and social security in the US uses about 15% of GDP on health care (for example, defense resources are used 4 times less). Moreover, the government spends a small amount not only in the U.S. but also in Western Europe. This constrains the growth of public health spending, which average in Western Europe account for over 75 % (in Norway more than 90 %) of all health expenditure. In Western European countries drug expenditure accounts for over 20% of total costs on health care.

The question is the sources of funding for health care. The main source is private insurance and Federal Medicare (support for the elderly); Medicaid administrative power (support the poor). From own means of the citizens paid the costs of the stay in homes nursing care and in the provision of outpatient medical care. Allocated for these purposes about 20 % of medical services, the rest is paid by insurance companies and authorities. The main source of health financing is a private and voluntary initiative. The employer can benefit from providing health insurance to their employees, he capitalizes

on the position of private insurance. Well developed cluster approach. So, in the USA works about 9 pharmaceutical and biotech clusters in Germany – 4, France – 10.

There are parameters that help to reflect the community health care system in our country and abroad, for example, the system of ownership, the incentive mechanism of health professionals, finance option, monitoring the quality of care. Each country has its own version of health care, depending on the economic, political and ethical relations.

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ADDITION TO THE TRADITIONAL CONCEPT OF STATE MANAGEMENT OF THE ECONOMY

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While microeconomics examines the economic processes of the private economic entities - households, enterprises, companies, macroeconomics examines economic events and processes of all market participants in an integrated form, taking into account the social division of labour, cooperation and common economic space, formed within the national economy.

Investigation of macroeconomic processes was first introduced in 1767 in the book of Francois Quesnay “Physiocracy”. F.Quesnay considered the economic table, which was a scheme of commodity circulation and cross expenses of productive (agricultural) and infertile (industrial) classes. The table was built taking into account F. Quesnay representations of the class structure of the society in the middle of XVIII century. Thus, the Physiocrats represented production and distribution of the social product between classes of producers, owners and sterile classes within the public economy.

Up to the 1930s of XX century neoclassical school considered macroeconomic processes as a complex of economic activities of separate enterprises. National economy looked like the unity of small market entities. Public sector of the economy wasn't taken into account and wasn't studied at all.

Marxism viewed capitalist economy as a whole in terms of production and distribution of the social product, created in the sphere of material production. However, Karl Marx didn't consider the state as an owner and market participant. The total social product was considered as a result of joint activity of the enterprises in the areas of production, means of production and articles of consumption.

First economic school that applied macroeconomic approach in the modern sense was Keynesian. According to Francois Quesnay, macroeconomics examines the economic processes that occur:

- a) within the national economy;

- b) within the public sector;
- c) within the enterprises and households integrated into a unified system.

Main problems, which macroeconomics resolves are: sustainable economic growth, reduction of inflation, growth of prosperity in the society. Macroeconomics is the material basis for national wealth. National wealth is a complex of material goods available in the country. The national wealth includes: productive and non-productive major funds (buildings, constructions, machinery and equipment of enterprises of productive and non-productive sectors); material circulating assets, cultural values, natural resources, state assets abroad.

National wealth increases owing to social reproduction. Social reproduction is constantly recommencing and repeating process of production. There is simple reproduction, when process of production is recommenced at the same scale, and expanded reproduction, when the public process recommences at an increasing scale. There is also narrowed reproduction, when production is repeated at a decreasing scale. In this case we speak about marginal economy. The basis for development and prosperity of the country is expanded reproduction. There are resident and non-resident institutional units participating in the social reproduction.

Residents are all economic entities, regardless of their citizenship and nationality, leading economic activity on the territory of the given country, within which they are able to conduct their activity. Non-residents are companies, including national ones, operating outside their home country.

The national economy of the state includes:

- 1) enterprises,
- 2) economic infrastructure, i.e., banks, government institutions,
- 3) a system of economic relations, that is, diverse metabolic processes that connect enterprises and infrastructure, and
- 4) economic organizational system, i.e., all the controls of the economy (for example, monetary and foreign exchange organizations).

The national economy is always tied to a particular economic system. For example, in the Soviet Union there was a command-administrative system, in European countries there is a social market economy.

The state should support input-output balance in the national economy. But it is not its only function. The aim of the state in the national economy is to create conditions for free functioning of market mechanism.

The shadow economy is the economy, which, entering economic and financial interaction with the state does not pay taxes on revenues. Illegal economy can also be attributed to shadow economy. law.

The small size of the “shadow sector” does not affect the welfare of the state. But if the “shadow sector” grows, negative changes in the legal sectors occur. Sphere of the shadow economy covers mainly import and export commodities: aluminum, oil, gas, ferrous and nonferrous metals. For the economic analysis of the sphere of material production

indicators of national activity are used. They are called macroeconomic indicators (GNP and GDR). GNP includes total cost of final products, produced by resident and non-resident institutional units that are created, distributed and used in the national economy during the year.

GDP includes the value of final goods and services produced within a country's resident economic entities.

However, the traditional understanding of state regulation of the economy should be treated critically. Public administration is dominant in the management of economic entities. Other economic actors (firms, households) also participate in the management process. In the case of an imperfect state institute of regulation possible contradictions between the regulation and the interests of the state in regulating the market entities. These contradictions will be offset in the case if the basis for the state management of the economy will be based on the support of welfare that meets the requirements of modern life. Therefore, we need social policies aimed at supporting the living standards in the field of health, education and social assistance.

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ENVIRONMENTAL PROBLEMS IN THE CONTEXT OF GLOBAL COMPUTERIZATION

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Universal informatization and computerization has become one of the major components of scientific and technological progress in recent decades. In this connection environmental issues are acquiring particular importance in relation to the use of various electronic media.

Environmental requirements in this context can be considered at two levels: technical and psycho-ethical. The technical aspect is connected, first of all, with ensuring safety of life and health: compliance with sanitary and hygienic norms prescribing the operation time with electronic media (compulsory breaks at regular intervals while working with a computer); the required furnishing of the room, namely the right arrangement of a computer desk and a chair, taking into account the distance from the eyes to the screen, the degree of illumination, etc.

Electronic devices must be kept in good order, and software must meet the requirements of today, since out-of-date equipment may not conform to the principles of health protection and must be disposed. Deviation from acceptable standards of electromagnetic and infrared radiation, the threshold of noise and vibration exceeded can affect adversely the health of a human provoking various pathologies to emerge.

At present, unfortunately, previously used computers continue to be applied due to their low prices, but such economy may negatively influence the human health, both

immediately and with a retard effect. Thus, the timely disposal of computers should become an important environmental task, which therefore makes it necessary and urgent to construct and develop specialized enterprises.

Out-of-date, defective computers which are thrown away as worthless material pose a threat to the environment because the production of the units and parts of a computer is linked with the use of lead, mercury, chromium, zinc, barium, beryllium and other chemical constituents. Interacting with air the elements mentioned are subjected to erosion, which causes pollution of the surrounding area.

Ecological aspects of the use of computer technologies are not limited to overcoming the damage and potential risks associated with the technical devices.

It should be stressed that of importance in respect of health care and health rehabilitation becomes the concept of “computer errors” with reference to applications used for medical diagnostics and treatment, since any system failure may lead in this case to fatal consequences.

Apart from technical problems, ecology in relation to the information space is designed to put and solve questions of the protection of the psyche of a human against influence of negative factors which appear to be the so-called cost of universal informatization and computerization. These include a permanent state of stress, feelings of insecurity caused by time pressure, techniques of manipulation applied in the mass-media, intrusions on one’s privacy, use of databases without the user’s permission, clogging the information field with spam of all kinds, etc.

In addition, it is becoming frequent enough to record the cases of the so-called addiction to electronic devices: these are computer games addiction, an exaggerated habit of using social networks, inadequate passion for self-photos, surfing the Internet in an obsessive way. Moreover, not only young people suffer from Internet addiction, the similar disease is attacking the people of mature age. Even being aware of the negative consequences of this kind of addiction they cannot manage the situation without special psychological assistance. Thus, the problems of the protection of the environment and human health in the information society of today remain topical and call for effective actions.

Jürgen Caro

NANOPARTICLES, NANOMATERIALS – A FASHION, A KEY ENABLING TECHNOLOGY OR A HEALTH RISK?

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In a first part of the lecture, different nano-materials are shown: optical pigments, car tires, catalysts, solar cells etc. The lacquer of modern cars does not contain any “color”. The optical color is a physical effect, namely interference at thin layers and the pearl-shine

effect, interference of light reflected from curved surfaces.

In nanostructured materials, bionic effects are used such as the lotus effect or the riblet structure of a shark scale and application of the lotus effect: not wettable lacquer boxes.

In a second part of the lecture, the application of nanoparticles in medicine sector is discussed such as hyperthermia. Also two major dangers of nanoparticles are addressed: self-ignition in contact with air, and penetration of nanoparticles through cell walls. Nano particles in food and cosmetics is a critical issue. Examples are the deodorants with silver nanoparticles. Also the risk of nanomicells as nanocontainer for the transport of organics such as dioxins or female hormones will be presented.

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STRATEGIC APPROACH TO THE DEVELOPMENT OF A REGIONAL WASTE MANAGEMENT SYSTEM

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Currently the handling of municipal solid waste (MSW) in Russia has many problems: poorly developed competition, absence of a clear tax policy, tariff structure is based on a costly mechanism, and it is funded by “residual principle”. It is well-known that disregarding the existing problems in this complex socio-economic system inevitably will lead to negative consequences, particularly in the environmental field.

The MSW system should be built on evidence-based principles like focusing, systemization, complexity, and others. If these principles are ignored or not taken into account sufficiently the efficiency is significantly reduces. Thus, the main reason for existing and aggravating problems in this area is the lack of systemization, i.e. a linking between all elements of the process, including the stages of collection, transportation, processing and recycling.

Nowadays municipal solid waste management is in the hands of local authorities that do not have sufficient capacity and resources to solve existing problems. This results in growing waste volumes, the absence of an adequate information management systems and a poorly developed infrastructure of the process. Since January 2016 changes in the Federal Law 89-FZ “Production and Consumption Waste” will take effect. This permits to expand the influences of the Russian Federation and thus, the possibility to improve the system and its complex management decisions. However, infrastructural projects and programs in the field of solid waste management are based on budgetary resources which are limited for regional and local budgets. Only 9 regions in Russia could prevent a budget deficit in 2014. Analyzes of the budget deficit dynamics in Russia, including the Tver region, show a constant trend of increasing debt. Based on the forecast for 2016 the budget deficit may increase to 58.92%.

Analyzes of foreign experience show successful public-private or municipal-private partnerships. Given the social importance of this sector, the responsibility for rational organization of waste management is a task for the state (region, city) but public and

private enterprises can be involved for specific jobs. Participation in such a partnership for the state - a possibility to reduce the burden on the budget and reduce the risks associated with maintenance of municipal infrastructure, and for entrepreneurs - an attractive field to be explored.

Unfortunately, to this day no project that includes several components, such as garbage collection and recycling, waste disposal and has significance on the scale of the Russian Federation was implemented.

As foreign practice shows it is advisable to split the responsibilities for the handling of MWS between regions, municipalities and private entities. At the level of Tver region a public-private partnership - BOT (Build, Operate, Transfer - construction - operation / management - transfer) is advisable. This is a traditional version of the concession relations where the concessionaire is responsible for construction and operation and after a certain time period, during which the concessionaire receives the profits from operating the object, the object is transferred to state ownership. This described system is not the only possibility, there are variations, such as BOOT (Build, Own, Operate, Transfer) and DBOOT (Design, Build, Own, Operate, Transfer).

Problems in the MWS treatment in many ways are typical for the Russian Federation and municipalities, therefore development of infrastructure projects with private investment is advisable.

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**IMPROVING THE ENVIRONMENTAL PERFORMANCE
OF GAS TURBINE ENGINES BY USING METHODS OF MULTI-
CRITERIA OPTIMIZATION**

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One of the main directions of gas turbine engines (GTE) development is to improve its environmental performance: reducing the emission of pollutants and level noise. Reduction of pollutant emissions can be achieved by improving of GTE thermodynamic cycle parameters. GTE thermodynamic cycle parameters can be improved by increasing the efficiency of GTE main units, such as the compressor. Modern CFD-modeling software such as NUMECA FineTurbo can accelerate the compressors development and improving its efficiency and allows to use optimization methods that implemented in the software package IOSO.

The results of a seven-stage high-pressure compressor (HPC) optimization are presented in this paper. The optimization task was to improve the HPC efficiency at two operation modes (100% and 80% rotation frequencies) by optimizing of the stagger angles of all blade rows. The total number of optimization's variables was 15 (setting angle of 7 rotor blades + 7 stator blades + inlet guide vane).

The HPC mathematical model was created using NUMECA FineTurbo software. The model included domains of all HPC blade rows and bearing which is located before compressor. Validation of the numerical model was carried out before starting the optimization process by comparison of calculated and experimental characteristics.

IOSO software needed 446 references to HPC numerical model to solve the optimization task. One reference to numerical model consisted of calculation of two points at the HPC performance map in the programming software NUMECA FineTurbo: max efficiency points at the 100% and 80% rotation frequencies.

Set of unimprovable solutions called Pareto set was obtained as a result of solving optimization task. Pareto set was a compromise between efficiency increase at the 100% and 80% rotation frequencies. Each point from Pareto set had a correspondence with HPC geometry represented as angles massive of all HPC blade rows.

The middle point of Pareto set (point 3) was chosen for further investigation. This point allowed to achieve efficiency increase by 0,5% at the 100% rotation frequency and by 1,6% at the 80% rotation frequency.

Flow structure analysis of optimized HPC showed that optimization of stagger angles allowed to eliminate flow separation near hub of 4th and 5th HPC rotor.

The conducted investigation showed the opportunity of the optimization methods using for engineering development of the multistage HPC and improving GTE environmental performance.

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TECHNOLOGY FOR THE REMOVAL OF OIL SPILLS FROM UNDER THE ICE

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The development of hydrocarbon resources in the Arctic regions requires quite a serious approach to ensuring the ecological safety of the oil production process. One of the main difficulties of removal of oil pollution in the Arctic is the presence of ice cover. In this regard, existing methods to remove dirt, used for cleaning of water reservoirs from pollution cannot guarantee removal of oil pollution. Development in recent years towards the removal of dirt from under the ice ineffective and often extremely time-consuming. This situation can be illustrated by example, when to remove oil spills from under the ice are encouraged to use an icebreaker equipped with fragmentation and melting of ice, followed by the separation of oil contaminants from water. Such projects are very energy-intensive, expensive and time-consuming.

Important requirements to the means of cleaning water with ice covers include mobility, speed of deployment and containment of spills, the presence of robotic deployment and operation, simplicity, low cost and high reliability of the used technology. With the aim of increasing the efficiency and productivity of collection, containment and removal of spills

of oil and oil products from the ice with the surface waters, the authors developed a new technology and installation. The peculiarity of the technology is the possibility of rapid containment of oil spills under the ice and remove impurities with the use of the effect of concentration of oil products under the ice. Depending on the area of the oil spill technology provides steady concentration of petroleum products or migratory concentration areas.

Stationary technology for removal of oil spills from under the ice lies in the localization of spots of oil or petroleum, drilling in the ice cover in the area of localization of spots of oil or oil wells, dip swirl with pumping device through the borehole in the region of the spot or their placement with the use of mechanized complex under ice cover. The concentration of the oil slick is carried out by rotation of the swirler and create in water and oil under the ice vortex. As a result of centrifugal forces in the water under the ice is formed in a funnel formed by the funnel with the water surface (with boundary “water – oil - ice”) is collected in the water spilled oil and petroleum products. Further assembled into a vortex funnel oil (petroleum products, oil or similar contaminants) is pumped out by the pump through the perforations of the sampler through the hollow shaft of the agitator in the receptacle.

Localization of spots of oil or oil product is carried out, for example, by placing under ice booms by unmanned underwater transportation means. Above the area of localized spots of oil or oil product place mobile facility for drilling and pumping oil. After immersing the swirl in the water to the required depth disclosed the vanes of the swirler and the swirler creates a rotation in the water under the ice vortex for the collection of oil or oil product. Produce the pumping of oil or oil product from vortex. In the formation of the water vortex because of the density difference, the oil is collected in the Central part of the vortex. Further, through the perforations in the hollow shaft of the swirler oil or petroleum products through the pipeline is pumped into a tank for collecting petroleum products. Then after removing the oil vane of the swirler and the swirler are formed is removed from the ice and a mobile unit for drilling and pumping of oil moved on to another area where you want to remove oil pollution.

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**RESEARCH OF FIRE RETARDANT COMPOSITION
EFFECTIVENESS WHEN APPLIED TO METAL AND WOODEN
STRUCTURES**

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Fire is one of the factors that, in some cases, cause irreparable damage to the national economy due to non-compliance or disregard of constructions and fire protection products fire safety. Currently, in the Republic of Kazakhstan and abroad, fire-retardant paints and

coatings, which include organic and inorganic binders and refractory fillers, are developed.

Therefore, we have conducted research on the development of fire-retardant intumescent coatings for the improvement of structures and materials' fire resistance. To achieve this goal following research objectives have been identified:

- generalization of the known information about the current state of theory and technology of flame retardants, of the known technological solutions for the surface treatment of wood and steel structures by fire retardant paints;
- development of RIC production technology (selection of optimal process parameters: time, temperature, mixing ratio);
- study of the coating flame retardant properties, study of phase transformations occurring as a result of thermal decomposition of wood impregnated by RIC;
- study of RIC fire-resistance effectiveness when applied to the metal surface;
- development of RIC technology application on construction sites;
- experimental and industrial testing of the developed technologies and assessment of their environmental and economic expediency;

A number of flame retardants (domestic and foreign) were examined as objects of study.

We used a set of different techniques: physical and chemical ones (chemical analysis, thermogravimetry, sedimentation analysis, photomicrography) and a number of methods of mathematical analysis (statistical analysis, design of experiments).

The reliability and validity of the obtained results are provided by the correct setting of research, sufficient volume of experimental studies obtained using proven techniques with modern equipment and highly reproducible measurements (above 93%).

The practical value of this work consists in the technology of flame retardant intumescent composition (RIC) development and its application in industrial facilities in South Kazakhstan region ("Petro Kazakhstan" JSC, "Kalita" LLP, "Semser" JSC).

In this paper differential thermal analysis was used to study the phase transformations that occur with wood treated by RIC as a result of thermal decomposition; thermal effects of wood and fire-protected wood thermal decomposition, depending on the qualitative and quantitative RIC content (Dt (differential temperature change) %) were defined; levels of fire-proof efficiency (maximum temperature of the gases during independent combustion and smouldering of the sample) were defined.

Analysis of the experimental results shows that the compounds based on phosphoric acid and urea with various modifying and synergistic components such as "BAN", "VANN-1" (contains urea) are able to provide only the second group of fireproof efficiency by capillary impregnation i.e. difficultly-combustible group of materials, which is confirmed by the practice of fire protection of wood chipboard, fiberboard and other wood-based materials.

The minimum estimated content of agents, for example for "BAN", providing the level of flame retardancy is 0.2 l/m^2 . The guarantee of difficult-combustibility in this way is possible only in theory.

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ENVIRONMENTAL GEOCHEMISTRY OF AQUA SYSTEMS ALONG THE EASTERN BORDER OF FENNOSCANDIA

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Eastern framing of Fennoscandia is one of the largest nature reservoirs of freshwater in Europe. From other point of view inner seas serve as important chains of biosphere systems, which significantly determine normal life conditions for a number of North European countries. The monitoring of their conditions is carried out episodically by efforts of different countries and organizations, however an optimal solution would be to conduct a joint systematic research on changeable characteristics of bottom sediments of water bodies as general indicators of their condition. The analysis of the various geochemical maps of coastal bottom sediments of the Baltic Sea, White Sea, Barents Sea and Lake Ladoga, Lake Onega and other lakes, which frame the Baltic Shield enables to single out main natural and technogenic factors determining their composition. Besides, the obtained materials enabled to reveal background and abnormal concentrations of chemical elements-indicators in bottom sediments, which allows further regular monitoring of the water bodies condition.

The geological peculiarity of a territory is the most important natural factor and it determines different chemical compounds of bottom sediments of coastal slopes. Predominant development of magma and metamorphic crystal rocks from the side of the Baltic Shield and from the south and east - the sediment formations of the East-European mantle determines the morphology of the coastal line of the Gulf of Finland, Ladoga and Onega Lakes, the character of water circulation and background concentrations of chemical elements in bottom sediments in different segments of water bodies. The North of Lake Ladoga is formed from natural chemical compounds that sharply differ from its southern part, where the main water catchment from the Neva and the Gulf of Finland takes place. The significant natural factor influencing geochemical peculiarities of the sediments is its distance from the coastal line and the bottom morphology of bottom basins, distribution of their depths. Mouth zones of the rivers also bear traces of chemical nature of geological formation in their drainage basins: chemical compound of sediments from the river regions flowing along sediment rocks of the Palaeozoic differ from the territories of the crystal shield.

Technogenic factors adding to the natural compound of geochemical fields, in its turn, can be presumably divided into regional ones influencing significantly a water body, and the local ones, displaying locally. Particularly, as technogenic factors referring to the aqua system of the Gulf of Finland is the urban impact of Saint Petersburg, providing its eastern

part with complex technogenic-environmental character. Local factors depending on the geomorphology of a bottom and its hydrological characteristics, usually display as contrast geochemical anomalies at the maps of distribution element associations and sometimes even as monoelemental anomalies. The same can refer to the maps of distribution of technogenic radioisotopes, which bear the traces of both regional and local impact on the aqua systems.

The experiments on studying the deposit types of chemical elements in bottom sediments showed that most dangerous for biota, their moving forms, are predominantly associated with iron hydroxides, at a smaller scale – with manganese hydroxides and organic properties of the sediments, which can be considered as indicators of dangerous contamination of water bodies.

Arie Lev Gilat
Alexander Vol

HYDROGEN AND HELIUM DEGASSING AS THE MAIN ENERGY SOURCE FOR EARTHQUAKE AND VOLCANIC ERUPTIONS, THE PRIMARY NATURAL THREATS TO LIFE AND PROPERTY

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Eyewitness accounts of mighty earthquakes and volcanic eruptions are followed by critical review of relating theories. All terrestrial processes are explained by three major sources of energy: decay of radioactive elements; the heat from gravitational differentiation; and the heat generated by impact of meteorites. These can supply only about half of observed heat flow of Earth, and their energy can be neither concentrated nor focused. Recently the discovery was registered, formulated as: “An experimentally established and theoretically corroborated phenomenon of the conversion of trapped and stored during Earth’s accretion latent energy of primordial hydrogen and helium, released by degassing processes from the Earth’s core and lower mantle due to decomposition of their compounds and interstitial solutions into a totality of different types of thermal, electromagnetic and chemical energies of active compounds that are responsible for the major endogenic terrestrial processes”. Authors are geologist and physicist-chemist (Gilat and Vol., 2005, 2011, 2012). This energy release is accompanied by H- and He-degassing and excellently correlates with mantle helium-3 concentrations. It is: (a) quasy-constantly released and practically limitless; (b) can be quickly concentrated and focused; (c) is of very high density; (d) offers very high velocities of energy release; (e) small losses during transportation over long distances. Authors proposed a conceptual system of hypotheses, which explains that during Earth’s accretion primordial helium and hydrogen were trapped and stored in the planet interior as He- and H- solutions (HHeS) and compounds (HHeC), stable only under ultrahigh PT-conditions, which were discovered in recent

experiments. Endothermic reactions of HHeS and HHeC generation provided effective cooling of the planet; the end-products of these reactions are more compact, than the initial gases. Since stabilization of the planet exothermic processes of H and He degassing became dominant, releasing the energy invested in their generation. Specific energy of the core-mantle H and He was calculated. ^3He serves as a unique measuring transformer correlative to the internal heat flow. Multiplying its flow from the lower mantle by the highest coefficient of correlation, we obtain $5.12 \cdot 10^{20}$ J/year, which is equal to half of the present rate of heat flow from the Earth's surface, five times greater than the energy loss in earthquake and volcanic activity. Described are: H- and He-sublimation from the solid and convection in the liquid core; flux-melting the solid mantle and generating gas-liquid (pyromagma) scavenging plums. H- and He-release from HHeS and HHeC, their incorporating in H-He and other chemical compounds and following decomposition due to gradual decompression are accompanied by intense energy release. The explosion-like decompositions of the H- and He-compounds, triggered by decompressions within the fault zone generates earthquakes. Ongoing decompression within an upward moving hypocenter (magma chamber), accompanied by additional release of energy will cause release of elemental H, O, C, S, Cl, F etc., and new detonation induced synthesis of H_2O , SO_2 , H_2SO_4 , CO_2 , H_2S , HCL, HF and other compounds. Volcanic eruptions are produced by ascending pyromagma, which melts and bores through the solid rock under the pressure and heat of continuous explosions (volcanic earthquakes). More details in http://idea.relengy.ru/Priority/1estestv/1estestv_catalog.html

E.A. Golovina

ENSURE EFFECTIVE MANAGEMENT OF THE EXTERNAL RISKS OF MODERN INDUSTRIAL ENTERPRISES

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Keywords: external risk, adapting enterprise risk management system, the mechanism of information and analytical support for the risk management system.

The article describes the main questions of the organization of the management of external risks in the modern Russian enterprises and the formation mechanism of information - analytical support of a risk management system.

All enterprises in the activity are faced with all sorts of risks, which vary in time and place, together external and internal factors that affect their value and, consequently, the method of analysis and the method of accounting.

Efficient organization of risk management at the enterprise depends primarily on the correct identification of the risk, which creates prerequisites for the effective application of appropriate methods and techniques of risk management.

External risks, most recently aggravated under the influence of the unstable political and

economic situation, in varying degrees affect the activities of enterprises in Russia. Therefore, the problem of organizing an effective system of management of external risk is of particular importance to the whole world of modern enterprises. Note that important to manage and minimize the risks is to implement the principle of system management.

Dynamism of the environment gives rise to the need to create an adaptive control system external risks that are not resistant to environmental changes and changes with it.

Obviously, when the manifestation of external risks is more likely to suffer large enterprises, other than inflexible to changes in the external environment.

We have investigated the status of risk management at the mechanical factory No. 2.

To this end, we conducted a diagnosis of the system with the help of leaders and specialists of the enterprise. Assess the state of the risk management system on the following criteria:

- 1 -Quality of personnel of the enterprise.
- 2- Quality of technical and technological resources of the enterprise.
- 3- The quality of financial management.
- 4 -Quality management of information resources.
- 5 -Quality of marketing management.
- 6 -The quality of corporate planning (numbering corresponds to the numbering of the criteria the criteria in Figure 1).

Each of these criteria is a set of parameters that must be evaluated by a 10-point scale (1 - minimum score of 10 - the maximum score). In addition, we estimated the weight (importance) of each criterion for the enterprise. Then visualize the state of crisis management system and got a total assessment of the state.

During the analysis it was found out that most of the factors are a threat to the successful operation and development of the company at the present stage. At this plant as well as at many Russian enterprises management system corresponds to a stable external environment. The problem of the system of risk management at the mechanical factory No. 2 is due, firstly, the lack of a unified, systematic and comprehensive understanding of the risk management system. Secondly, as a rule, the implementation is episodic events that leads to low efficiency. The functioning of the control system of the enterprise at the expense of operational and functioning of the current management. Thirdly, the idea of managing external risks leadership unpopular and perceived as an additional cost of financial resources.

The main element of the risk management system on modern Russian enterprises is insurance. The researchers note that the identification of these concepts takes place, that is, instead of the risk management system in enterprises implementing corporate security.

In our opinion, any enterprise paramount need to establish such an important element of the management of external risks, as the provision of information, because of the quality of information exchange, receipt and use of information products depends on the performance of the risk management framework as a whole.

We have proposed the following mechanism for information - analytical support of a risk management system for mechanical plant No. 2.

It is important to note that you need to manage, above all, sources of risk, rather than the

consequences of its occurrence. Enterprises should clearly identify which risks to transfer to the insurer, and which - to prevent on their own, implement a set of preventive measures.

Funding for the implementation of the risk management system must be perceived as the leaders of the company effective contribution to the security and stability of operations.

The basis for successful and effective adaptation and risk management are logically built system development strategy. Only a comprehensive, systematic approach in this process will reduce the dependency on risks and later risk protection businesses.

Igor Gossen

BEWERTUNG DEN BODEN-ÖKOLOGISCHEN ZUSTAND DEN TECHNOGENEN LANDSCHAFTEN

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Der jährliche Anstieg der Kohleproduktion führt zu einem Anstieg den Kippflächen. In dieser Hinsicht sind die Rekultivierungstechnologien auf die Pflanzen- und Boden Wiederherstellung gerichtet. Im Zusammenhang mit diesem ist die Bewertung des Boden-ökologisches Zustands der Kippflächen äußerst wichtig. Aber meistens werden nur die natürliche Ressourcen und die Sanierung der Eigenschaften und Arten der einzelnen Komponenten der Kulturlandschaften bewertet, die die Geschwindigkeit und die Richtung der Strömung in diesen Landschaften von Bodenbildungsprozessen bestimmen, und die Möglichkeit des Substrates zu die Bodenherstellung quantifizieren. Dabei wird die Bewertung des Boden-ökologisches Zustands zu der quantitativen Analyse der Entwicklung der Bodenbildungsprozesse reduziert.

Die Effektivität der Rekultivierung ist in erster Linie von der Höhe der Nutzung der natürlichen Ressourcen abhängig. Zu den grundständigen Ressourcen gehören die fruchtbare Schicht den Böden und potenziell fruchtbare Rasse, die direkt mit den lokalen natürlichen Bedingungen geknüpft sind. Die Qualitative Bewertung des Boden-ökologisches Zustands war mit Hilfe der detaillierten Bodenkartierung durchgeführt, die sich auf die Klassifikation den Kippboden basiert. Auf den Untersuchungsgebieten werden Iniziale, Organo-akkumulative, Grassode- und Humus-akkumulative Embryozems identifiziert. Jedem Embryozemtyp entspricht eine bestimmte Bodenbildungsstufe. Die Einstufung den Boden-ökologisches Zustand der Bodengrundstücke ist in die folgenden fünf Kategorien unterteilt:

1. unbefriedigend - die Rate der Bodenbildung ist sehr gering und über einen Zeitraum von 20 Jahren von anfänglichen Aufenthalt bleiben auf das Iniziale Stadium;
2. zufriedenstellende - Bodenbildungsprozesse laufen langsam, und ein 20-Jahres-Zeitraum führt nicht zu die Bildung von Humus-akkumulative Embryozems;
3. gute – die Humus-akkumulative Embryozems werden in einem Zeitraum von 20 Jahren gebildet;

4. sehr gute – die Humus-akkumulative Embryozems bilden sich im Zeitraum von 15-20 Jahren;
5. Ausgezeichnete – die Humus-akkumulative Embryozems werden im Zeitraum bis 15 Jahren entstehen.

Es ist klar, dass diese Fristen setzen voraus, aber ihre Verwaltung kann mehrere Probleme auf einmal lösen. Erstens, wird eine einheitliche Skala gebildet, die um den Boden-ökologischen Zustand der Kipplandschaft im Hinblick auf die qualitative Bewertung der Bodenbedingungen zu quantifizieren lässt. Zweitens gibt es ein Werkzeug zur objektiven Analyse der Bodenbeschaffenheit auf Grund der Geschwindigkeit der Bildung eines bestimmten Typs Embryozems. Drittens, die Einführung dieser Skala ermöglicht die Vergleichung den Boden-ökologischen Zustand nicht nur innerhalb der verschiedenen geomorphologischen Stätten von Kipplandschaft, sondern auch zwischen den Kippflächen der verschiedenen Naturräume, Regionen, verschiedene Arten von Bergbau (Kohle, Metallurgie, Baustoffe, etc.)

Jedoch so eine Bewertung den Boden-ökologischen Zustand den Rekultivierungs Gebieten ist nicht immer genau, weil es im Wesentlichen eine qualitative Bewertung ist, und um eine quantitative Bewertungsmethoden zu erhalten, muss Bodenzahlmethode verwendet werden. Im Zusammenhang mit diesem wird vorgeschlagen die Abrechnung auf der Grundlage der Bodenzahl durchführen. Vergleich den Bodenzahlpunkten natürlichen und Rekultivierungs Boden gibt die Möglichkeit ihre Verschiedenheit zu bewerten, und die Aussichten für die wieder Aufbaueng der Ökosystem mit die Verwendung den unterschiedlichen Rekultivierungs Technologien. Es erfordert jedoch eine gewisse Modifikation der Methode zur Berechnung der Bodenzahl, weil auf die Bodenbildung in Rekultivierungs Landschaften wirkt der Technogenische Aufbau den Kippen.

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STUDY OF WASTES OBTAINED DURING PROCESSING OF DASHKASAN IRON ORE AND GADABAY COPPER-SULPHIDE DEPOSITS

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As the result of industrial development of a number of deposits of useful mineral resources a considerable volume of metallurgical wastes accumulated on the territory of Azerbaijan Republic.

Processing of industrial wastes allows us to solve considerably the problems of

environmental protection and utilization of valuable components, in particular, toxic heavy metals.

In the work we presented the studies on the processing of bulk wastes of copper-sulphide and iron ores. Wastes of these enterprises contain sulphur, cobalt, non-ferrous and precious metals.

For the extraction of non-ferrous and precious metals into solution it is recommended to process them by percolation leaching using hydrochloride solutions of hypochlorite of sodium obtained by electrolysis of sodium chloride. In the solution the concentration of hypochlorite ion corresponds to -0.8%, redox potential – 750 mV, pH=8.

In order to increase the redox potential we added HCl into the solution. After this EH increases up to 1240 mV, pH decreases to 3-4. It was experimentally established that chloride-hypochlorite washing enables to transfer non-ferrous and precious metals in ion form into the solution which essentially decreases its toxicity.

When selecting a method for extraction of non-ferrous metals from solutions we preferred sorption method which does not lead to additional pollution of processed solution.

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EXTRACTION OF COBALT FROM FINAL TAILINGS OF ORE-PROCESSING PLANT

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Iron ores of Dashkasan deposit are enriched by flotation method (wet and dry) for producing iron concentrate.

Current concentration tailings which were stockpiled on the territory of tailings dam belong to wastes of enrichment processing. At present, approximately 25 million tones of tailings which are useful for processing have already been stockpiled. After separation of iron concentrates all sulfoarsenide and sulfide minerals, as well as cobalt containing pyrite, copper pyrite and others together with non-ore minerals are thrown out in the form of “tailings”. In cobalt containing flotation tailings is found to be relatively high -0.013 – 0.028%. In laboratorial studies we used wastes containing (%) 0.03 - Co; 0.3 - Cu; 0.15 - Zn; S - 0.11.

The content of cobalt in tailings may be of great interest for obtaining of cobalt and other precious metals during operation.

On the basis of physical-chemical and technical studies we have developed the technology of complex processing of a given type of recyclable raw material including the following basic limits:

1. Sintering of wastes with sodium chloride by reduction.
2. Aqueous acid leaching of sintered material by obtaining cobalt containing solution.
3. Extraction recovery of cobalt and other non-ferrous metals from solution.

Obtained results show the real possibility of extracting cobalt and other non-ferrous metals from dump waste products.

V.I. Ilyin

THE PRIORITIES OF THE ENVIRONMENTAL POLICY OF THE RUSSIAN STATE

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Today, due to a number of reasons, the environmental policy of the Russian state is not in conformity with the acute character of the problem of the protection of the environment. The analysis of its content and results allows determining some directions and urgent measures for improvement. Among them are:

1. The change of the staff and the structure of the bodies administering the nature-protective activities. The Ministry of Natural Resources must not remain the supreme instance of the environmental self-control. It is necessary to detach the body of control over the economic subjects engaged in the use of natural resources including the Ministry of Natural Resources and give it the autonomous status.
2. The regulation and differentiation of the functions between the specialized bodies in the field of the environmental control - they include Rostechndador, Rosgidromet, etc., because these structures duplicate their powers, which results in decreasing their responsibility and lessening the effectiveness of the control functions performed.
3. The strengthening of the technical base for exercising the environmental control, putting the qualitatively new monitoring equipment into operation, which allows checking the information on a certain case given by an enterprise and checking the results of nature-protective measures.
4. Updating the system of training and the provision of the environmental services with the highly qualified employees.
5. Replacing the remainder principle of financing the nature-protective activities by the purposeful financing of large projects. To achieve the goal it would be necessary to resume the functioning of the Federal Ecological Fund, the ecological funds of the subjects of the Russian Federation with the aim of collecting payments for the damage to the natural environment.

6. The improvement of the mechanism of payments for the damage caused to the natural environment, a price factor under the conditions of inflation considered, otherwise, the accumulated funds could be depreciated rather quickly. Another reason for the measure is that it is more profitable for those who break the law to pay for the pollution than to take nature-protective measures and put into operation new purification plants.
7. The perfection of the system of encouraging the nature-protective activities, and namely, in the form of giving tax privileges and other financial stimuli in case of introducing new technologies, the use of unconventional kinds of energy, etc. The opportunities here may range starting from the use of privileged forms of credit, purposeful loans guaranteed by the state, etc.
8. The introduction of such new instruments as the trade with the emission quotas, establishment of the banks and exchanges for the rights to pollution – the successful experience of this kind is already available in a number of developed countries.
9. A more active stimulation of scientific research activities on the environmental problems.
10. An optimal combination of administrative, economic and information methods and means of the environmental policy. Each method has its definite advantages and they reveal their potential to the utmost if they are combined in an optimal way.

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ADAPTATION TO NEW APPROACHES IN TEACHING STUDENTS

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The modernization of social and economic education in the Republic of Kazakhstan, is characterized by the complexity and ambiguity of the processes occurring on the labour market, the education system and successful integration into social and professional world space, the choice and development of future professions and professional self-affirmation, which involves a number of psychological problems in the formation of a new identity. Today all specializations should ensure the formation of new key skills of success in changing technologies during higher education. Youth has always had the perspective to further develop the human society. Thus all generations at all times have experienced the extraordinary charm and admiration for force, beauty and vibrant energy that constantly comes from younger people. There was always a challenge for the older generation to forward all the youthful energy in the right direction. Youth should always be useful to society themselves and the new generation. Modern conditions of complete reorganization of types of learning at all educational levels showed a conscious willingness of young generation for new standards.

In today's dynamically changing world, society places education a social order for mobile personality, capable of flexibility and feasibility to adapt to changing conditions that is to say a creative personality.

Today the world is in dire need of professional mobile people capable of competently make decisions and be responsible, capable of successful and efficient realize and find themselves in different life situations.

In this regard the problem lies in the need for new approaches and its solution in the interests of the individuals and society.

The result of the creative process of education must be the development of personality itself, forming a unique microcosm-human psyche and soul, where the ability to self-education predominates as well as tolerance and responsibility for own actions and risk assessment.

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THE POSSIBILITY OF REDUCING PRESSURE ON THE ENVIRONMENT IN THE TECHNICAL MANUFACTURE OF RUBBER

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Chemical and petrochemical industry relates to one of the main polluters of air basin (carbon dioxide, carbon oxide, sulfurous gas, hydrocarbon, combination of nitrogen and industrious dust of different composition and etc.), water and soil (petroleum and petrochemical products, phenol and other poisonous substances). The given emissions caused contamination of soils by metals and other toxic substances above maximum concentration limit in the radius to 5 km around cities, where they are situated. From 2.9 km³ of sewage water, contaminated water accounted for about 80% due to the enterprises of chemical and petrochemical industries. Problems of environment protection connected with chemical and petrochemical, in particular, rubber industry is especially actual in view of increase of share of synthetic products in chemical production, which are not decomposed or decomposed slowly in the environment. Rubber products relate to such synthetic products. In rubber industry different natural minerals are employed mainly as fillers, rarely as modifiers or components of polyfunctional effect. Positive sides of their employment in rubbers are apparent: natural minerals are ecologically safe, available, cheap and possess certain physico-chemical activity allowing to improve properties of rubber goods and mainly reduce technogenic pressure on geosystem "rubber production - environment". According to the results of conducted research it can be said that zeolite employment in rubbers is more perspective from the above listed natural minerals. It is explained by that zeolite due to its chemical composition and structure possess unique properties: natural zeolites are porous crystals, their aluminosilicate frame is permeated by regular cavities and channels

in which sodium cation, potassium, magnesium calcium lithium, barium and other are located, and water molecules as well. Except substitution isomorphism of tetrahedral atoms of the frame exists in the composition of cations. Zeolite practical employment is based on specific peculiarities in behaviour of these minerals, caused by their crystal-chemical structure and composition, exactly, correlation of $\text{SiO}_2/\text{Al}_2\text{O}_3$ in the composition of zeolite, and also by a kind of mineral – clinoptilolite. Zeolites are unique adsorbents. In order to realize this capacity, it is necessary to liberate the zeolite cavity from water molecules located there under the atmospheric pressure and at room temperature. Dehydration is usually realized by heating to the temperature 350°C . Unlike adsorbents of other types zeolite frame structure predetermines strictly homogenous allocation of pores by sizes, entries to which are controlled by windows of permanent for all pores of round or oval outline. Preparation technology of natural minerals to mixture consisted of following stages: zeolite grinding, screening and firing. Zeolite was added to rubber mixture in the mixing stage. Conducted experiments showed that mixing technology, rubber mixtures processing and vulcanization in natural mineral adding don't practically differ from standard mode, fixed in process regulation. Samples vulcanization was carried out at the temperature 155°C during 15 minutes. For definition of zeolite effect character, its dosage in rubber mixtures is of considerable importance. In dosage less than 10 mass parts advantageously elastomer chains modification is observed, in this case zeolite will play a role of a modifier. In great dosages polymer heterophase occurs in elastomers, chemically connected with rubber and playing a role of active filler. In employment of zeolite as filler for tread mixtures it was added to mixtures in amounts of 1-10 mass parts per 100 mass parts of rubber. For definition of technological properties of rubber mixtures with zeolite and physico-mechanical properties of their vulcanizates number of tests were carried out according to the standard and process regulation on corresponding equipment under the plant conditions. Tread rubber wearability increases, that, apparently, is caused by direct interaction functional group, located on the surface of zeolite with rubber to structure formation of elastomer matrix. Thus, employment of natural zeolites of Chankanaiski deposit not only improves physico-mechanical properties of tyre rubbers, and considerably decreases ecological pressure on the environment.

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ENVIRONMENTAL ASPECTS OF IRRIGATION

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Reducing the cost of production of perennial grasses rolling lawns and improving the quality of products is vital and needed. Effective stage of cultivation remains watering by sprinkler irrigation.

When a band-sprinkler irrigation sprinklers slopes with lawn grass often is a sharp decrease of the uniformity of the distribution of rain and the occurrence of water erosion of

soil in the longitudinal direction of movement of the sprinkler truck (due to the differential geodetic heights) and in the transverse, perpendicular to the motion of the truck (due to side slipping).

One of the main requirements for improving the passband of sprinklers is to improve the quality characteristics of artificial rain and achieving a more uniform distribution of irrigated area, especially on challenging terrain.

This is true for the introduction of these new technologies create rolling lawns, which in the shortest time possible to get on any green object quality, in two weeks ready-to-operate lawn that meets all the necessary technical and aesthetic requirements. Perennial grasses rolling lawns are widely used in agricultural production to address the development of weeds under the trees in orchards, nurseries; to strengthen and protect against water erosion drainage channels for irrigation and drainage networks, slopes of roads and Railways, bridges, overpasses; lawn serves as a coating to create custom landscape objects; to reduce dust generation, noise absorption, temperature regulation, air purification, environmental improvements.

The serial execution bandpass soaker hose with pre configuration for the required pressure on a flat terrain, compensating to some extent the difference in geodetic height ensures the required indicators of irrigation uniformity on the relief with a negative slope.

Proceeding from stated, the problem arises to investigate the influence on the uniformity of distribution of rain drop geodetic heights in the longitudinal and transverse directions and the development of an improved regulating device, and to exclude lateral slipping of the truck – not slipping devices.

It is established that the uniformity of the distribution of rain hose sprinkler with a regulating device, characterized by the effective coefficient of irrigation is around irrigated area 0,75–0,80 against its average value of 0.60 (with a length of stretched hose 150 m) without the pressure regulator.

Found to be practically implemented irrigation mode ($m \approx m/\text{ha}$) of perennial grasses creep serial sprinkling truck up to 10 m or more is observed when the value of the slope 0,05 ... 0,10.

Proven to prevent lateral slipping sprinkler truck its pneumatic wheels must be equipped with devices not slipping representing a tubular flange mounted in a diametral plane of the tire at their outer perimeter.

It is revealed that the sprinkler equipment sprinkler truck not slipping devices it eliminates the shift on the section with a cross slope of $i=0.10$ and redistribution of rain in a lateral direction. This determined the preservation of the coefficient of effective irrigation with regard to the regulation of the pressure along the length of the strip not less than 0.75 and 0.80 vs. 0.67 and muddling up to 10 meters or more.

It is determined that the received operation-technological parameters of operation of the improved hose sprinkler have a high value, due to the rational mode of the process of its work, the reliability of structural elements, including regulatory and not slipping devices, and the ease of installation and maintenance.

Edgar O. Klose
T. A. Karasyova

**„PLANTVITAL® 5000“ - TECHNOLOGY AND DEVICES
FOR VEGETATION MONITORING AND ASSESSMENT
IN DIFFERENT ECOSYSTEMS**

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Modern instrumentation to obtain information on the current state of plants should meet the following conditions: it should be applicable to all plants on earth in different ecosystems, including terrestrial and aqueous environments, under similar conditions. It should be applicable to plants as objects of investigation (plants for nutrition, plants for feeding, plants for new materials, plants for renewable energy, plants for landscaping, plants for sustainable ecosystems) and plants as subjects of investigation (plants as indicators to assess the pollution of the environment: water, soil, and air). It should be able to investigate the state of a given plant without any interruption to its development. To meet this demand, the method should be able to analyze the plant using a small part of the phyllosphere if one is interested in the processes occurring in the rhizosphere (e.g. in investigations concerning mycorrhiza processes). The method should be able to analyse leaves (herbs, deciduous trees), needles (from conifers) as well as algae, seaweed. The data collection process should be able to give quantified values with an objective assessment, which can be used to investigate the vegetative development of the plant, as well as the dependence on natural or anthropogenic impacts on generative development. The data obtained from the measurement process should be suitable to characterise the species under investigation in a simple and clear way without application of any complicated mathematical, physical or biochemical procedure. The method should be able to simulate the environmental conditions for the plant during the measuring process (e. g. selected temperature). The optimal measurement system should provide the operator with the convenience to select different parameters and conditions when running experimental procedures. The measurement system should be computerised to control the measurement process, as well as to automatically interpret the provided data, but the option should be available so that a skilled operator can interfere the measurement process or the process of interpreting automatically the results of measurement. In addition to displaying the measurement process on the monitor for the operator to follow, the system should also be easy to handle. The target preparation should not be time-consuming or material-consuming, and no other scientific instrumentation for target preparation should be required. The entire measurement process should run automatically, giving the operator the opportunity to be engaged in other tasks during the process.

Discussing several applications of this device it will be demonstrated that these demands are met by different versions of the system PlantVital®5000.

In particular the application of this device to investigations of mykorrhiza aspects at winter wheat observing the antagonistic competition of *Fusarium* with *Glomus* will be discussed. Other topics demonstrating the power of this measurement technology are the optimisation of best practice tilling strategies in agriculture for a Sustainable Development in rural areas and aspects of environmental monitoring.

Edgar O. Klose
T. A. Karasyova

VERNADSKIY'S NOO-SPHÄRE UND DIE „MODERNE ÖKOLOGIE“ IM LICHT DER DIALEKTIK. ANSPRUCH UND WIRKLICHKEIT BEI DER BEWÄLTIGUNG ANSTEHENDER AUFGABEN IM GLOBALEN RAHMEN

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Der Beitrag beschäftigt sich mit Aspekten der Weiterentwicklung der Grundlagen der NOO-Sphäre im Sinne Vernadsky's bis hin zu den modernen Grundzügen der Ökologie; es werden Aspekte der Einheitlichkeit aber auch von Widersprüchen diskutiert. Insbesondere werden dabei Analogien in der Entwicklung von Natur und Gesellschaft einer näheren Betrachtung unterzogen. Das betrifft unter anderem dialektische Betrachtungen zur „Nachhaltigen Entwicklung“ in Natur und Gesellschaft in der Ganzheit von „Ökonomie – Ökologie - Soziale Gerechtigkeit“.

Von besonderer Bedeutung sind dabei die Felder Primärproduktion in der Natur, Energieversorgung der menschlichen Zivilisation und der weltweite Klimaschutz im untrennbaren Zusammenhang. Qualitative und quantitative Aspekte werden gegenübergestellt.

Im zweiten Teil des Vortrages werden an Hand von Thesen ökologische Aspekte aus der Sicht der Primärproduktion in der Natur, ökologische Aspekte aus der Sicht von Energieversorgung sowie Kohlenstoffkreisläufen in der Natur und in der Weltwirtschaft betrachtet. Daraus ergeben sich Einsichten in zu lösende Aspekte aber auch Perspektiven der Energieerzeugung und der Energiespeicherung für die Zukunft.

Es wird aufgezeigt, wie ökologische Aspekte und die Perspektiven des weltweiten Klimaschutzes untrennbar verknüpft sind. Daraus ergeben sich Anforderungen an die Gesellschaftsstruktur für eine zuverlässige Lösung der anstehenden Aufgaben. Der Ausblick beschäftigt sich in Thesen mit möglichen Zukunftsmodellen für ein erfolgreiches Zusammenspiel von Natur und Gesellschaft. Welche realen Modelle für das Zusammenspiel von Staat und Zivilgesellschaft in Gegenwart und Zukunft könnten in der Lage sein, die anstehenden Aufgaben zu lösen: Gedankenspiele auf realer Grundlage.

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ECONOMIC METHODS OF WASTE MANAGEMENT

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Constantly increasing level of population consumption leads to a growing level of solid domestic and industrial waste, which, first of all, has a negative effect on the environment. Along with ecological aspects there are economic aspects that become extremely important when choosing the technology for the recycling of domestic and industrial wastes both for businesses and for public administration.

For making an adequate decision it is necessary to have different methods of evaluating the various recycling technologies.

In Platov South-Russian State Polytechnic University (NPI) there has been developed an approach to such an evaluation which represents technologies classification on the basis of its correspondence with a certain technological order.

The criteria for such a classification are the stage of production system development, the leading economic resource, the dominant management concept, the degree of production system's information materialization and the dimensional scale of the formation processes.

One of the quantitative characteristics of technological orders is the degree of production system's information materialization which is getting become deeper as we move from the previous technological order to the next one. In the evolution of production systems there are changes concerning the information content of the labor process and character of information carrier, which eventually determines the production system's shape typical for a particular technological order.

Among other factors, natural science methodologies may be efficient for solving the production and other waste management problems. In that case the level of the technological processes' development in the wastes recycling, of the business processes and production systems that develop the processes should be determined by the correlation of the systems' conditions with the features of one or another technological order.

Another quantitative characteristic is the dimensional scale of the formation processes typical for the dominant technology of the corresponding technological order. The dimensional scale of the formation processes has been decreasing within the transition from the previous technological order to the next one. Within the period of 1-4 technological orders it was due to an increased dimensional precision of mechanical engineering products determining their operating parameters. The fifth order was associated with the appearance and development of microelectronics operated with a few microns dimensional parameters. Obviously, the sixth technological order will transfer the formation processes to the nanolevel that will result in a conceptual changes of economic tools of the production systems management.

Along with the described approach it is important that the degree of recycling technology corresponds to the level of the extremely efficient technology.

The idea of this method was developed in the USSR in the late eighties by prominent engineer-economists G.L. Avrech, B.B. Tsyarkin and E.P. Shchukin but unfortunately was not properly elaborated due to the collapse of the Soviet Union. According to the authors an extremely efficient technology is a technology that provides 100% process selectivity with the minimum unit costs of production. The degree of the real technology correspondence to the extremely efficient one can be considered as an indicator of the production process efficiency. In this case the evaluation of recycling technology will be carried out at the level of the economically minimal production systems.

On the basis of the presented methods a system of waste management at the corporate, municipal and regional levels can be developed.

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THE USE OF MICROWAVE ENERGY IN THE RECYCLING PROCESSES OF SAWMILL

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More efficient use of raw materials during advanced processing – it is the key issue for the forest sector of the Russian economy. Wood is used in various ways but mankind is still far away from utilizing everything. Most of the wood waste generated during the manufacturing process remains unused and these challenges not only apply to the secondary raw materials. Low-quality wood is not recycled and therefore often burned.

According to experts sawmill waste accounts for an average of 60%. Of the total amount of waste, only 26% is large-sized waste that can serve as excellent raw material for the pulp and paper industry and the production of wood panels, the remaining 34% are difficult to use: the bark (11%), chips (10%) and sawdust (13%) are good raw materials for environmentally friendly biofuels with high consumer qualities.

One of the ways of using wood waste is to produce charcoal for metallurgical production.

According to some studies, the whole process from planting trees to manufacturing cast iron using charcoal removes 1.1 tons of carbon dioxide per ton of pig iron from the atmosphere. Using coke for cast iron production puts 1.8 tons of carbon dioxide into the atmosphere. Thus the use of charcoal as an alternative to coke reduces carbon dioxide emissions by 2.9 t / t of pig iron. The quality of cast iron produced in blast furnaces operated on charcoal exceeds the cast iron quality produced with coke because it contains less sulfur and phosphorus. In addition, cast iron produced using charcoal is usually free from minerals such as titanium, chromium and zinc. For the most part those minerals enter the furnace as part of the coke ash.

Using high frequency electromagnetic energy for heating and pyrolysis of wood materials enables to perform those process faster and more efficiently compared to the conventional methods.

As a result of experimental studies of the impact of electromagnetic waves on wood materials a correlation between the characteristics of electromagnetic fields and the composition of the final product (charcoal) was established. Based on the results certain parameters of the experimental equipment were set in order to provide a uniform volumetric heating of the material; optimal power densities per unit volume for various types of wood materials were calculated. The degradation process of wood materials was investigated, it show the effect of temperature distribution on the course of chemical reactions, the dependence of the process upon the mutual influence of electromagnetic and thermal fields. It is found that electromagnetic fields (microwave frequencies) affect not only the process of thermal decomposition, but also actively interact witj solid and liquid fraction of the pyrolysis products.

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ENVIRONMENTAL EFFECTS OF THE UTILIZATION OF BINARY FUEL SYSTEMS

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The manufacturing of a coal-water suspensions (CWS) and its subsequent transport and use as an energy source is one of the most promising ways to transfer coal into a liquid state. It complies with the environmental requirements for toxic emissions set for burning solid fuels and can be used to replace oil in certain areas. The combustion of coal-water suspensions instead of pulverized coal reduces the emissions of sulfur oxides (20%), nitrogen oxides (30%) due to the binding of these compounds with the contained mineral components. The emissions of carbon monoxide are significantly reduced which allows to reduce the formation of benzopyrene when using lower combustion temperatures. Excess moisture in the combustion zone changes the qualitative composition of the ash waste which simplifies its disposal. Substandard coal, waste that accumulates during coal processing and waste from other industries can be used in the preparation of the CWS. This allows to save resources.

This study was conducted due to the lack of evidence-based technology solutions for obtaining and using CWS in industrial heating devices. The results show a significant resource-saving effect. Nowadays for CWS production certain parameters are experimentally selected for each coal type: grinding mode, granulometric composition of coal, thinning and stabilizing additives and the homogenization mode. Creating and improving new production technologies for CWS seems to be an urgent and economically promising issue.

We have studied the possibility of using pulp and paper industry waste as a plasticizing agent in the production of CWS. Other substances that were used as plasticizing agents were process water, alkaline solutions as well as substandard coal as a possibility of its disposal. We determined the influence of certain factors (pH of chemical additives, ash content, coal dampness, temperature) on the technological characteristics of lignite suspensions. Pulp and paper industry waste was used as plasticizing additives in the production of CWS also coal waste and substandard coal. The additives are most effective when added during the homogenisation stage. Oxidized lignite with a humic acid content of up to 60% was used as an alkaline reagent for production of CWS.

The results show that the CWS viscosity is reduced by half when changing the pH of the used additives from 5 to 10. Using alkaline solutions as plasticizers allows to obtain a stable and fluid CWS from lignite. The increase in ash content leads to a rise in the amount of basic solution. Drying of the original coal increases the solid phase content of the CWS to an average of 10%. It was determined that it is most effective to adapt the coal moisture to an equilibrium moisture. Increasing the temperature from 4 to 80° C, freezing and subsequent thawing does not lead to significant changes in viscosity but increases the initial tension.

It is proposed to use coals of different metamorphic grades as the solid phase for CWS to partially replace hard coal with cheaper and highly reactive lignite. A method for utilizing anthracite sludge as a CWS composition was developed. It was found that high ash contents of anthracite and lignite can prepare highly concentrated slurry with a solid mass fraction of 49-62% and calorific value between 11.7 and 5.6 MJ/kg.

Identified patterns suggest the possibility of optimizing the properties of CWS in industrial settings by changing in the amount and ash content of the added coal.

The results above were obtained on industrial equipment by testing a two-stage technology for CWS production on the basis of lignite. Industrial tests confirm that the technology provides reliable results. CWS out of lignite can be manufactured with a capacity of 200-225 tons / h with a solid phase content of up to 42%, and the structural viscosity value of 0.5 Pa s. Experimental burning of CWS conducted in kilns for cement production, show that after transportation stratification does not occur. All in all the CWS has the necessary operational parameters.

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THE USE OF CEMENT COMPOSITES FOR LONG-TERM STORAGE OF RADIOACTIVE WASTE

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In accordance with the International Convention on the Safety of Radioactive Waste Management, effective protection of individuals, society and the environment from the

harmful effects of radionuclides and ionizing radiation should be provided at all stages, both now and in the future. For the long-term safety the most important stage for radioactive waste (RW) is long-term storage and disposal. One of the factors that ensure the safety of long-term RW storage is the physical and chemical characteristics.

The most commonly used process for solidification of liquid radioactive waste (LRW) of low and medium activity levels is to include inorganic binders (cementation process). The resulting product has a number of advantages: high mechanical strength, non-flammability, chemical and radiational stability. High density cementitious materials can reduce the external radiation.

The current study addresses the issue of the treatment of radioactive pulp with ultrasound to change the granulometric composition and its solidification to a cement compound with the use of technical water and water after cavitation.

The main purpose of this study is to determine to what extent the properties of the cement compound depend on the method of preparation of the cement mixture, the pulp preparation and properties of the water used. The main tasks are: examining the influence of the physicochemical properties of water on the quality of the cement compound; testing the effect of ultrasonic treatment on the pulp before adding it to the cement compound. During the work certain parameters are measured: flow and density of the cement compound; leaching rate; mechanical strength (crush strength) and frost resistance, i.e. verification of all characteristics and requirements to ensure a safe long-term storage for the cement compound.

Reducing the RW particle dimension can lead to a more uniform distribution in the compound structure. During the step of mixing cement grout, fine RW particles (lower sedimentation rate) do not have time to settle by gravity and concentrate on the bottom zone.

With the number of processing cycles of the pulp with ultrasound increasing, the diameter of the particles decreases. The resulting compound is more uniform at micro level. The β - and α -radiation load on the solid phase compound is more uniform, which improves the radiation resistance of solidified radioactive waste. Compounds samples with the best mechanical strength and frost resistance after 28 days were prepared using water treated with the cavitation technology. All samples cement compounds proved to be reliable in terms of leach rate of cesium 137.

Methods for preparation of a solid a cement compound that contains radioactive waste were developed. Water activated by cavitation technology can achieve long-term stability of the solidified waste and also complies with federal regulations. The new cavitation-activated water technology for long-term storage of radioactive waste proved its viability and prospects of application in the future.

I.V. Lantsova

THE ORGANIZATION AND CARRYING OUT ENVIRONMENTAL MONITORING WHEN LAYING MAIN PIPELINES

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In recent years the increasing concern of experts has been focused on an ecological condition of industrially developed regions therefore priorities are displaced from economic problems towards the ecological. It is explained by that contradictions between social and economic and ecological spheres reached the serious sizes and without their fastest mitigation or elimination the solution of social, medico-hygienic and economic problems is impossible.

Due to the aforesaid toughening of requirements to ecological justification of projects of industrial facilities, and also to the organization and carrying out environmental monitoring at their construction is quite clear.

The main pipelines belong to objects of the increased danger therefore carrying out environmental monitoring at their laying and operation is an indispensable condition for ensuring minimization of negative impact on environment components.

The purposes of environmental monitoring are:

- receiving reliable information about character and intensity of negative impact of the main pipeline on the environment components (EC);
- receiving reliable information about consequences of this influence at stages of construction and operation and drawing up the forecast of development of a situation;
- justification and development of the nature protection actions allowing to prevent or reduce negative impact.

For achievement of a goal the following tasks have to be solved:

- 1 – organization of continuous and long-term supervision over sources of impact on environment components;
- 2 – organization of continuous and long-term supervision over a condition of components of environment;
- 3 – choice and justification of a network of points of control;
- 4 – choice and justification of observed parameters;
- 5 – justification of frequency of supervision.

The Program providing carrying out supervision over nature of change of all components of environment at construction and operation of linear object is developed for the organization and carrying out environmental monitoring and also at accidents on its separate sites. Already follows from this formulation that the program of production environmental control for the requirements is rather multidimensional and volume.

The period of construction of the main pipeline is characterized by intensive negative impact practically on all components of environment.

Thus, at the organization and carrying out environmental monitoring when laying the main pipelines it is necessary to consider the following features:

1. The amount of objects of monitoring and the list of obligatory controlled parameters on the main pipelines do the Program of control very volume, multidimensional and difficult feasible.

2. For successful functioning of PEK it is necessary to reduce as much as possible number of points of supervision and number of observed parameters and that thus quality of the received information didn't decrease it is necessary to select the most representative objects and items of control, and also the list of indicators and frequency of supervision.

3. It is necessary to develop industry standards for requirements to Programs of environmental monitoring of the main pipelines, volume and quality of the received information, and also – a form of granting materials that will allow to receive adequate information on the objects located in various regions of the Russian Federation. Comparability of information will allow to create a uniform databank according to impact of the main pipelines on environment components for development of long-term forecasts of development of a situation.

Vasily V. Markhinin

**THE SUSTAINABLE DEVELOPMENT CONCEPT
AND SOCIAL STRUCTURE: THE POSITION OF ACADEMICIAN
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Academician Valentin Afanasievitch Koptyug (1931-1997) made an important contribution to understanding problems of concretization of the sustainable development concept and its implementation in the practice of social life, both at the international level and especially in Russia. V.A. Koptyug was a world-renowned chemist, President of the International Union of Chemists (1988).

V.A. Koptyug substantiates his point of view that capitalism is inherently incompatible with the fundamental requirements for sustainable development. The ideologists of the capitalist system, proclaiming the economic and environmental efficiency of the developed capitalist countries, do not want to realize that this efficiency is equivalent to the effect of exploitation of developing countries. However, the capital available in the developed countries is not always ready to be used for environmental protection measures. It is not ready for it to the extent that they adversely affect the economic profitability. V.A. Koptyug cites the example of the attitude of German business circles to environmental protection. In 1994, the Federal Service for Environmental Protection published the book Environmental Protection – an Economic Asset, representing the views of the business community, which regards the cost of environmental protection as unacceptably reducing profits. The scientist also draws attention to the many examples of attempts

by Western countries, primarily the United States, to disrupt environmental protection measures adopted by UN Conferences in the framework of the sustainable development concept. These examples include these countries' refusal of adequate quotas for greenhouse gas emissions, US attempts to modify for their benefit the decisions on biodiversity conservation, reduction of carbon dioxide emissions, and forest conservation adopted by the international community at the Conference in Rio de Janeiro, etc.

But it is particularly problematic under conditions of the persistent world domination of capitalism – with its private ownership of the means of production and the consequent pursuit of maximum profit at any cost – for the developing countries to achieve high levels of economic development. For example, when discussing the problems of environmental protection at the UN Conference in Rio de Janeiro it was demonstrated that private ownership of high-tech biotechnology, which is an important means of modern economic progress, establishes a monopoly by Western countries on such technologies. Western countries, especially the United States, insist on the basis of private property rights to patented products that biotechnology should be transferred on a commercial basis. The US and other Western countries also refuse to transfer a share of profits derived from biotechnology. As a result, capitalism as a global system realizes a tendency to perpetuate the underdevelopment and dependence of developing countries, which is reflected in the ongoing growth of external debt. If, nevertheless, Western capitalist countries have somehow to comply with the joint decisions made by UN member states, including on environmental protection, and a growing number of the developing countries to this day are demonstrating their ability to develop dynamically and to weaken the stranglehold of neocolonial dependence, could this mean that global capitalism is no longer all-powerful and that we are witnessing the prerequisites for the formation of global socialism?

The real prerequisites for mankind's possible transition to the socialist path of development and implementation of the ideal of sustainable development was seen by the academician in the convergence of public administration experience gained by the socialist-oriented countries – first and foremost, the Soviet Union – and the experience of market self-regulation playing a significant role in the economies of the developed capitalist countries. He was convinced that Russia would return to the path of socialism, and believed that it was well prepared by the Soviet history to become a leader in the transition to implementation of the sustainable development concept. V.A. Koptug was quite aware that the transition to this new path “was fraught with many harsh conflicts based on the struggle for resources, ecological reserve, and living space”. Western capitalist countries have lived, live today and, of course, will try to keep living off the rest of the world's resources. First of all, their claims will be addressed to Russia, which has, as probably no other country, vast natural resources, ecological reserves, and territory. But this is exactly what makes Russia face the alternative: either to continue copying the futureless model of capitalism, in fact getting into deeper neo-colonial dependence on the West, or to adopt a strategy of transition to sustainable development and the relevant social structure.

N.N. Matinyan

THE ECOLOGICAL STATE OF SOILS AND SOIL COVER IN THE PARKS OF ST. PETERSBURG

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Majestic architectural park ensembles in St. Petersburg - "Pearls of Art" are most recognized landmarks of the city. In recent decades, the growth of housing and industrial construction, increase in number of vehicles lead to increased levels of man-caused stress on the soil, causing environmental degradation of the park ecosystems.

During their creation parks endured great changes of their environmental conditions. The land topography was changing, surface depressions were filled, terraces and hills were created, natural vegetation was replaced by broad-leaved tree species, humified soil was used. Anthropogenic soils, underlain by soil-forming elements or buried by native soils, developed. Anthropogenic soil is composed of a number of humified layers, which include noticeable artifacts - small bricks, broken glass, pottery and other debris. The degree of anthropogenic transformation of soil in the parks depends on their location and historical developments.

In the central part of the city, there are smaller parks, surrounded by urban structures or highways, only anthropogenic soil with many artifacts can be found. The presence of stones, cracks and voids in anthropogenic soils cause high water permeability in the soil profile, which affects the functioning of urban ecosystem. These soils are usually contaminated with heavy metals (Pb, Zn, Cu), their amounts are not only increased in the surface layers. In some cases they reach hurricane concentrations. A conducted geochemical analysis of soil in downtown Sheremetev Park in shows that all upper soil layers (0-20 cm) are contaminated with toxic elements (Pb, Zn, Cu, Ni). Their accumulation can be detected in the middle part of the soil profile, where man-caused debris accumulates. In some sections amounts of toxic substances exceed the maximum permissible concentration (MPC) by 20-30 times. In addition higher amounts of tin and cadmium were detected. In the park Derzhavina concentrations of heavy metals also exceed the MPC: Pb - 3,6-10 times, Zn - 4,7-12 times, Cu - 1,2-2,0 times. Unfavorable soil characteristics and poor downtown soil cover significantly change the plants and have an impact on their overall appearance.

Peterhof (Petrodvorets district of St. Petersburg) represents a special group of parks. They are located in the southwestern part of the city on the southern coast of the Gulf of Finland. Historical Peterhof parks were created in the course of XVIII-XIX centuries. The palace and park ensemble of the Upper Garden and Lower Park, English, Alexandria, Kolonistsky and Meadow Park, and the Lihtenbergskogo Park.

Peterhof Park has a remarkable diversity of landscapes, floral richness, and a high peculiarity of soil. The soil cover of the Peterhof parks differs by the component composition and its three-dimensional structure. The reasons are both the natural features of soil formation and the history of the parks' formation and their changes over time. The percentage of anthropogenic soil which is an important characteristic is connected to the history of

the park. The least share of anthropogenic affected soil can be found in the soil cover of Alexandria Park (5% of the park area) - and the maximum percentage was identified in the Lugowoy Park - (35%). On average, the amount of anthropogenic soils in the Peterhof Park is less than 25%, which is significantly lower than in the other city parks.

Heavy metal pollution of soils in Peterhof Park have local nature. Zinc and lead have contaminated certain lawns. So in the Lower Park, in the western sector a lawn is contaminated by a number of elements with very high pollution levels - Lead - 400 mg / kg., Zinc - 1,000 mg / kg. In general, the Peterhof Park is weakly contaminated with heavy metals. Small pockets of contamination are confined to the edges of the park, adjacent to highways and residential areas, as well as in areas where contaminated soil was used for beds. Exceptions are the soils of the Gulf of Finland, which are naturally accumulating geochemical pollution.

Pollution of soils with heavy metals in parks not only have a negative impact on the plants, but also on the groundwater, streams and rivers, and on the air.

Parks require constant human effort to maintain optimum soil conditions, which are essential to ensure the sustainability of the park ecosystems.

Information about the structure of the soil cover, soil properties and the amount of heavy metals is the basis for environmental monitoring of park areas. It serves as a foundation for forecasting the development of the ecological environment and allows us to take measurements to preserve the stability of the park ecosystems.

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PUBLIC-PRIVATE PARTNERSHIP AS A WAY TO SOLVE ECOLOGICAL ISSUES

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One of the most important issues confronting the world is waste management. For the last 50 years a lot of artificial materials have been used, so decomposition of that kind of wastes will last for decades and centuries. It does not only pollute the environment, but also becomes the reason of animals' death. According to GreenPeace, «About 100 thousand sea animals and one million of birds die because of plastic garbage» [The problem of waste. [Electronic resource]. - URL: <http://www.greenpeace.org/russia/ru/campaigns/waste/>].

Moreover, waste management is a great issue for remote areas such as island Olkhon, the biggest island on the Lake Baikal. If you want to get there, you will need a ferry in summer, an air cushion vehicle in autumn and spring, and a car to go through the frozen lake in winter. When the USSR was in office, wastes were taken from island to landfills, but for the last 20 years of the 20th century all the garbage were collected on the Olkhon because of unstable political situation. Moreover, for the last 10 years a lot of tourists came to the island (about 30-50 thousand per year), and the problem of waste management has become more serious [Galkin I. Unique Baikal. [Electronic resource]. - 2014. - URL: <http://www.baikalvisa.ru/media/entry/>].

One of the most effective ways to solve ecological problems may become the mechanism of public-private partnership.

In the modern world, this mechanism means a partnership of government and private sector company (or companies), which are created for increasing the effectiveness of social projects. Sometimes communities are also involved in such projects.

The first step of waste management on the Olkhon was to answer the question: what to do with all the garbage? Local authorities decided to collect, sort, press, and transport it from the island. Such decision was not the easiest, but the most ecological. Also, it required a lot of resources such as press machine, garbage tracks, and other staff. The solution came from different sides: the Russian government helped to solve ecological problems by giving grants, private partners presented press machine, volunteers helped to collect and sort garbage. The result of these activities was decreased number of garbage dumps and «disappearance» of the biggest dump close to Khuzhir, a township on the island [Ulyanov O., Nikiforov M. The development of public-private partnership as a form of financing of innovative infrastructure projects. [Electronic resource] // Russian Entrepreneurship. 2014. No. 9 Vol. 1 (97). C. 60-64. URL: <http://www.creativeconomy.ru/articles/10159/>].

However, the territory of this biggest dump was in need of restoration, and, the second time, cooperation of local authorities, private companies and volunteers was successful. With the help of locals, about 1000 small pines were planted on the place of former dump. This example shows that public-private partnership could become an effective mechanism for solving social problems.

In conclusion, it is necessary to say that sometimes ecological problems may be huge and unsolvable, but there are people who care about their land. They are not afraid of difficulties, they are not even afraid of risks and failure. They just try to find a way to solve the problem. For such people, the partnership between government, business, and community is a way to unite efforts.

M.A. Medvedev
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**ABOUT AN APPROACH TO OPTIMISATION OF DECISION
MAKING IN WASTE MANAGEMENT**

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Currently, one of the important issues for the industries of Russia is the need to improve the environmental efficiency of enterprises that use natural resources (mines, smelters, power stations etc.). As a rule, they are the sources of formation of big amount of solid and other waste. As one of the approaches to solving the problem of resource saving and waste reduction at the regional level, the economic stimulation of environmental activity may be used.

In particular, one may consider the possibility of providing grants by a regional

government for partial funding of specific projects, which reduce the production of waste per unit of output or involve them into recycling. Due to the limited amount of funds, the main problem of such approach is selection of the grant recipients, which can use them most effectively.

The traditional practice of solving this problem in Russia foresees the selection of counterparties on the basis of expert assessments and some other almost heuristic methods. Meanwhile, to solve such tasks can be used methods of economic-mathematical modeling, which complement the intuitive methods of analysis by quantitative assessments and represent a reliable tool for decision support.

Formulation of the problem is the following. Suppose that there are M counterparties (companies with big volumes of waste), each of which has L performance criteria (e.g., volumes of solid waste generation, atmospheric emissions and waste waters per unit of output, market share in the relevant industry of the region, the amount of investment in environmental protection and others). The purpose is, that in accordance with planned amount of investments, it is necessary to get a set of potential counterparties to finance, for each of which we can't improve the value of a single criterion without deterioration of any others.

The task can be formalized as follows. Let several counterparties, each of which marked with the number m ($m=1, \dots, M$), are compared with each other on criteria "j", ($j=1, \dots, L$), so that for each counterparty we have $K(m) = (K(m)1, K(m)2, \dots, K(m)j)$ – vector of values of criteria (each company has its own vector). $K(m)j$ - is the value of criterion "j" for the counterparty with the number m .

The task is to determine the set of counterparties, which are Pareto optimal, that is, such counterparties with the numbers \hat{m} , that we can't find other counterparties with the numbers m^* , which would be better on any of the components of the $K(m)j$ vector and not worse for the rest of components.

The proposed approach may be more effective than the existing ones, so as when selecting contractors on several performance criteria there is an opportunity to evaluate and compare the properties of not only individual counterparties but groups, that, in the end, allows determination the most efficient variant of interaction with recipients of grants, which can use funds allocated for environmental activities with highest efficiency.

O.V. Mesinova

ENVIRONMENTAL REGIONAL STUDIES AS A FACTOR OF THE DEVELOPMENT OF THE PERSONALITY

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The course of environmental regional studies belongs to innovative ones in modern education. Its introduction and dashing development are accounted by the urgency of the

formation of ecological consciousness of the young, the aggravation of the problems of the environment, demands for ecological enlightenment and the expansion of ecological tourism.

The aim of environmental regional studies is the formation of ecological consciousness of the learners, the accumulation of knowledge in the field of fundamental theoretical and applied ecological researches and the development of the skill to project them on the ecological situation in a particular area, the involvement into the nature-protective monitoring activities, the formation of the habits of team-work, and the development of environmental culture.

Environmental regional studies are designed to realize the functions of scientific research, enlightenment, the formation of target-oriented values, adaptation and socialization.

The function of scientific research consists in studying and systematizing the materials of biological and geographical character, monitoring the ecological condition of the territories, describing the natural wealth of the area, registering new objects of the natural heritage which require urgent attention while carrying out the nature-protective activities.

The function of enlightenment is realized by means of the popularization of ecological knowledge, the involvement of the public into the process of solving ecological problems, the cooperation with mass-media, the use of Internet-resources and opportunities of ecological sites, portals, blogs, etc.

The function of formation of target-oriented values is directly connected with the education of the young people, the defining of the matrix of precious values, among which are nature, the nation's and the mankind's health, the security of the environment and the readiness to take care of and protect the planet's potential necessary for life.

The function of adaptation consists, first of all, in creating the ecological medium in education, i.e. such conditions which contribute to integrity, the absence of contradiction, the harmonious interaction of man and environment and do not disagree with the processes of natural evolution.

The function of socialization suggests increasing the opportunities of participating in the activities of the community, acquiring the paradigm of social norms, developing the stereotypes of behavior through the use of environmental knowledge, skills and habits.

To put it in a different way, environmental regional studies contribute to the development of a personality with such traits as erudition, the presence of target-oriented values, social responsibility.

The course of environmental regional studies has its share in the development of cognitive interests provoking the desire for getting accustomed with the natural monuments of other regions, for comparing preserved territories, for acquiring the knowledge of a broader natural and cultural context. Environmental knowledge also becomes an inseparable constituent of the key processes of humanization of the community. Only being fully aware of one's own role, destination, right and duty to take care of, protect, restore and multiply the natural resources, it is possible to realize the personality's ethical position.

Elena V. Milanova
Ruslan Butovsky

**WASTE TREATMENT IN EUROPE AND RUSSIA WITH
THE BEST AVAILABLE TECHNOLOGY IMPLEMENTATION**

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The best available technology development is particularly important for waste treatment. The improved system for waste management is an essential element of resource conservation policy in Russia as well as in Europe and the rest of the world. Waste management is deeply integrated in the European environmental policy, and is reflected in the road map towards the resources' conserving European economy according the concept of European Commission (EC, 2011) and in the Framework Directive in the area of waste management (EU, 2008). In practice, the implementation of these guidelines became longer and the previously adopted EU instruments, including the Directive on waste landfilling (EU, 1999), primarily determine complicated, and waste management.

An effective policy on waste treatment requires an understanding of its steps' sequence. One of the universally accepted solution to this problem is to reduce landfilling of waste (for example, the elimination of the landfills) and, instead, the concentration of efforts on the waste prevention policy, its re-use and recycling that was mostly done in European countries by 2010. "The hierarchy for waste management" adopted in the EU defines the waste management priorities. The high priority in this hierarchy is prevention of waste formation in comparison with their secondary use and processing, and waste disposal (allocation) or landfilling one could see only at the last place in hierarchy.

The European countries have been successfully moving in line with the above-mentioned hierarchy for waste management, although slower than the legislation requires. The amount of waste disposal to landfill sites has considerably decreased starting from 2001 as the volumes of waste combustion (burning), composting and recycling has increased. Totally, 50% of metal,

22, 5% of paper and cardboard, 60% of glass and 15% of plastic is recycled and re-used in Europe. The general principles of waste treatment in EU: self-sufficiency of enterprises, BAT implementation, complete waste utilization, prevention of waste generation, producer's responsibility.

In Russia, the solution of the waste disposal problems and prevention of their negative impact on the environment is a high priority. The waste generation monitoring has revealed that currently in the country more than 94 billion tons of waste are accumulated at landfills and heaps. According to official Rosprirodnadzor data, each year more than 3.5 billion tons of communal waste is produced, and during the last 5 years, the quantity of wastes has increased by 1,5 times. 54% of waste are generated during extraction of energy resources (mainly in the coal industry), 17% – in ferrous metallurgy, 17% – in steel industry, 12% – the remaining waste, including municipal communal waste. According to the Russian Federal Service for supervision in the field of environmental protection (Rosprirodnadzor)

, in Russia at the beginning of 2010 7518 landfills for waste accumulation were registered, including 1699 landfills for communal waste, 576 landfills of industrial waste and 5243 illegal landfills.

As regards to the municipal (communal) waste there were registered only 7 regularly functioning waste burning facilities, 5 waste recycling and 39 waste sorting enterprises. That is why the processing and disposal of waste is far behind its generation, especially in recent years. According to the data of the Deputy Minister of environmental protection Mr. Gizatullin (2013), the only 50% of waste is re-used and recycled.

In Europe to date, BREFs are being developed in cooperation with EU member States, industry and other interested partners. The Bureau of the European Integrated Pollution Prevention and Control (EIPPCB), Institute of Prospective Technological Studies, Joint EU research center in Seville (Spain), coordinates this work. Currently the EU is designed 33 BREFs, including 27 so-called “vertical” (addressed to different industries branches) and 6 “horizontal” ones (with cross-cutting approach).

Two BREFs concerning waste treatment are designed in EU: “Incineration of wastes” and “Processing of waste” (European Integral Part Bureau, 2006). Additionally, the issues on waste treatment during the technological cycle stages are considered in all BREFs, addressed to the different industries. All BREFs contain such data as the legislative aspects; description of traditionally applicable production processes; data on the emissions, waste generation rate, raw materials and energy consumption throughout the whole production cycle; description of the technology and methodologies applied in the BAT for specific industry; the assessment of the possible environmental benefits when BAT implementing; the data on limits of BAT applicability; economic BAT indicators (capital and operating costs, raw materials consumption and materials per unit of production, etc.); information on the new technologies’ implementing in the process of research and industrial development.

This approach allows to change the waste treatment from pollution control “at the end of tube” and to move to prevention of waste formation at their generation sources. As a result, instead of implementing technologies for deactivation of pollutants the attention will be focused at implementations of industrial processes, when for increasing of production and services the fewer resources will be used, thus reducing the level of waste amount and pollution.

Elena V. Milanova
Ruslan Butovsky

**BEST AVAILABLE TECHNOLOGY AS POLICY TOOL
OF ENVIRONMENTAL PROTECTION IN RUSSIA**

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Best Available Technology (BAT) is the new driving force for sustainable development streamlining in the last decade the formation of green economy (green growth), based on the

understanding of environmental factors' increasing role in the future mankind harmonious well-being.

In 1996, this approach was designed and set up in the EU Directive on Integrated Pollution Prevention Control, 96/61/EC in which the main concept, definitions and reference guides' of BAT were elaborated including Best Available Techniques REferences (BREF).

In Russia, the BAT started to be developed in recent years, although its introduction was complicated by weaknesses and contradictions of the existing environmental legislation. Currently, the development of the legal framework to regulate definitions and principles for BAT introduction is developing in the country rather rapidly. The new important statements have been added to the Federal Law "On the protection of the environment" (from 07.21.2014, no.219-FZ): inter alia the new BAT concepts and definitions, the categories of environmentally hazardous enterprises, requirements for compulsory implementation of the programs improving the environmental efficiency, the levels of the negative impact on the environment, etc.

The Government of the Russian Federation approved the procedure for the determination of BAT in industry (Act of 23 December 2014 No. 1458) "On the procedure for determining the best available technology". It is expected that BREFs will be published in the open access and updated once in 10 years.

The authorities of Rosstandard (Ministry for economy and trade RF) have signed Order No. 1920 of 3 December 2014 "On the creation of the BAT Bureau". The functions of the Russian BAT Bureau, coordinating activities of the technical working groups (TWG) in developing Russian BREFs, were delegated to the Federal State enterprise "All-Russia scientific and research institute for standardization materials and technologies". In addition, an order No. 113 of Rosstandard has defined the establishment of a new technical Committee on BAT standardization to ensure that Russian enterprises will be provided by documents on standardization in the BAT field for different industries.

The EU transition to the new BAT system took about 10 years. The long-term prognosis of the BAT implementation in Russia is 14 years for completion of the industry ecological modernization.

It is expected that in 2015-2017, the process of BAT implementation in Russia will cover the following areas: the database of all enterprises, ranked to categories, publishing 47 BREFs, to adoption of all BAT by-laws. Soon about 300 enterprises – the major pollutants in the country will be determined, for which the transition to the BAT will start in 2019. The same year, BAT should be taken into account when designing new enterprises. Until 2025, environmental permits should grant all enterprises of this first category. It is expected that during the 1st period (2015 – 2021) the negative environmental impact will decrease by not less than 15%, during the 2nd (2021–2026) – by 45-50%, for the 3rd (2026- 2031) – by 75-80%. In 2033–2040 – all large enterprises (ca. 15 000) will fit the BAT standards.

The environmental legislations will serve as a system of incentives: for example, set-off cost for the implementation of measures at the enterprise for reducing the negative impact as well as the tax exemption for the business, introducing BAT, etc.

All these measures on BAT implementation will improve the industry enterprises' efficiency as well as an ecological situation in the Russian Federation.

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SEPARATION OF SELENIUM FROM TELLURIUM ADMIXTURES AT THE PROCESSING OF SLUDGES

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Selenium has a series of valuable properties, such as semi-conductive, photoelectrical, therapeutic properties, due to which found wide application in different fields of modern technology – radio technique, electronics, medicine, metallurgy, glass, ceramic and rubber industries.

The studied selenium contains averagely 99.32% Se and the following admixtures, %: Fe=0.01±0.5; Cu=0.005±0.3; Pb=0.03±0.3; Hg=0.2±3.0; Te=0.003±0.4; As=0.005±0.1; Sb=0.02±0.5.

These hard-to-control mixtures in the form of metal selenide considerably decrease valuable electrophysical properties of selenium. That's why purification of selenium from mixtures is very important.

Tellurium is always associated with selenium, since their physical and chemical properties are similar. However, the presence of tellurium influences negatively on electrochemical properties of selenium. Tellurium results in the decrease of selenium rectifiers, moves maximum photosensitivity of selenium photoelement to the region of long waves and so on. The problem of selenium and tellurium separation remained its relevance for many years.

We have developed the method of electrochemical decomposition of selenium and tellurium providing the transformation of selenium into solvent and its subsequent deposition with obtaining of elementary selenium.

In the present investigations for separating selenium from tellurium mixtures at refining technical selenium we used electrochemical deposition method which in most cases is conducted from solutions of selenous acid. We established optimum conditions for electrolytic separation of selenium and tellurium by transferring selenium into solution, namely: electrolyte – 2.5N NaOH+20%NaCl+0.2% and less Te, current density is 3mA/cm², temperature is 18±25°C. It was found out that under these conditions we may reduce concentration of Te in selenous solutions from 0.17 to 2·10⁻⁵%.

After separating tellurium chlorohydric acid was poured into the solution till neutral reaction, current density was increased up to 0.06±0.15mA/cm², temperature of eletrolized solution was increased to 60°C and electrodeposition of selenium was performed. It was defined that some mixtures (Hg, Pb, Ag), which are in the composition of technical selenium, are absent in electrolytic selenium. Deposit was filtered through glass filter No. 3,

washed first with distilled water, then with pure distilled alcohol and dried at the temperature 50-70°C. According to spectral analysis obtained elementary selenium contains not more than $5 \cdot 10^{-5}$ tellurium.

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TECHNOGENESIS AND THE ASSESSMENT OF HEALTH RISKS - PROBLEMS AND WAYS OF SOLUTIONS

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The term “technogenesis” in Russian is commonly understood as the process of changes in natural complexes and ecosystems under the influence of industrial activity. During the technogenic biogeochemical cycles a huge amount of anthropogenic chemicals is involved in the biosphere, which adversely affects both the functioning of natural systems, and the health and human reproduction. Traditionally, to assess the impact of anthropogenic factors on human health medical and demographic indicators are used in comparison with the results of hygienic assessment of the state environmental components (air, natural water, soil, etc.). However, according to the WHO, people’s health extremely depends not on the level of environmental pollution but on the lifestyle of the person. Therefore, used indicators of the health of the population reflect not so much the quality of life-supporting environments, as the socio-economic situation in the region. In this regard topical line of research is the search and the use of more reliable criteria for evaluating the technogenesis influence on human health. In our opinion these criteria are the indicator of health risk under the action of environmental pollutants, as well as the microelemental status of the population. The first one reflects the expected growth rate of health problems under the action of pollutants (excluding the impact of lifestyle and level of health care, genetic disposition). The second one reflects the anthropogenic imbalance of chemical elements in the body of people living in urban areas.

This report presents the results of research on the influence of anthropogenic factors on the population in the city of Saint Petersburg. Based on the data of air pollution by priority pollutants (sulfur dioxide, carbon monoxide, nitrogen oxides, ozone) the risk of non-carcinogenic effects for human health was evaluated. For methodological framework “Guidelines for the assessment of health risk under the action of chemicals that pollute the environment” was adopted. It was found that the overall risk of non-carcinogenic effects as a result of receipt into the human body by inhalation of air pollutants is above the permissible. In the city center it is 3.69. Index of danger is above the permissible (greater than one) for the respiratory organs (3.59), the mortality rate (1.67), diseases of the blood (1.4) in the center of St. Petersburg. The overall index of risk for peripheral parts of the city is 3.15. Index of danger is above the permissible (greater than one) for respiratory organs (3.05), the mortality rate (1.03).

The data on health risk assessment was supplemented with information on the elemental

composition of the human body. The elemental imbalance and the accumulation of microelements including toxic ones were revealed in hair samples of 6-10 year old children living in Kolpinsky district of St. Petersburg. The accumulation of zinc pronounced in 53%, lead – 65%, cobalt – 78%, manganese – 88%, copper – 91%, nickel and chromium – 94% of children's hair samples. The accumulation of iron and cadmium was found in all the children's hair samples. A set of microelements in children's hair reflects the state of air quality and the composition of drinking water in disadvantaged in terms of the environment Kolpinsky district. Elemental imbalance leads to a number of diseases, so it is important to develop and apply recommendations for correcting the element status of children.

Talantbek Namazbekov
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TRANSFORMATION OF STRATA AS UNECONOMIC FACTOR OF ECONOMY GROWING

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Stratification in modern terms carries clear character of determinedness. Causal inquisitional connections in stratification are the reflection of transformation in the structure of economy and grow influence on the economy.

Stratification is a location of individuals and groups from top to bottom on horizontal layers (strata) on the sign of inequality in society, level of education, volume of power, professional prestige. Exactly these criteria allow to apply economic measuring devices for determination of influence of transformation of strata on economic growth. Stratification, from the point of view of T.I. Saslavskaya, reflects social heterogeneity, stratification of society, difference of social position its members and task forces, their social inequality

Social strata that affect economic growth, are experiencing a constant transformation. Stratification of modern society in our understanding include:

- strata on ethnic signs (nationality, ethnoses),
- professional strata (on the types of professions),
- strata by manufacturing (in manufacturing collectives),
- strata by standard of living (profitable, middle class, of scanty means),
- strata by composition by sex and age (men, women, children, old men),
- strata by education (higher, common middle, middling - professional) ,
- strata by risks (drug addicts, prostitution, etc.),
- strata according to the status in a national environment (citizens, are refugees).

In modern Russia, the transformation of strata looks like changing the composition of professions, and appear new trades connected with the market. Some professional groups, the status which is connected with budgeting and found himself understated, are closed, reminiscent of castes (professional team of doctors, education workers power structures and others.).

Productive strata is present mainly on large managing subjects (enterprises, institutions of higher learning, hospitals, etc.). Small and midsize businesses not having large collectives for productive aims practically do not form manufacturing strata.

In strata on the living standards there is high difference in incomes. In these strata loss of motivation between work and incomes is observed.

Abruptly increased the number strata associated with social risk and marginalized populations. A large number of refugees in the various countries, despite the host of social assistance for a long time to adapt to new circumstances, bring their own culture and contribute to the criminalization of the host country by virtue of their limited income.

Yu.V. Perfilva

ECOLOGICAL DISASTER OF CHINA

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Currently, mankind is experiencing an explosion of technological advances. Life has become more convenient and comfortable. Life expectancy is increasing. Dramatic changes have occurred in everyday life. We are willing to accept the benefits of civilization, sometimes without thinking about the consequences they may cause.

In megapolises people are choking on smog from factories, from exhaust emissions. According to a joint report of the Asian Development Bank and the China Institute of Tsinghua, the ten most polluted cities in the world are: Taiyuan (China), Milan (Italy), Beijing (China) to Urumqi (China), Mexico City (Mexico), Lanchou (China) Chongqing (China), Jinan (China), Shijiazhuang (China) and Tehran (Iran).

The most catastrophic situation can be observed in China. The country, which due to its intensive growth rises to become the world's largest economy, begins to destroy itself from within. Of the 500 largest cities in China only the air quality of 5 complies with international standards set by the World Health Organization. In a country, that is called the "world's factory" and produces a lion's share of all goods, more and more children are born with defects and serious health problems. Many kilometers of land surrounding industrial cities are saturated with toxic substances, which inevitably are distributed by groundwater, contaminating everything. Each year, with the beginning of the heating season, the situation is only getting worse. Since the beginning of October this year, the pollution in 40 Chinese cities is 10 times higher than international standards allow. Since 2012, authorities are obliged to report the amount of PM_{2.5} particles in the air. Because of the small size these particles that are most harmful to people. With them harmful bacteria, heavy metals and toxic chemicals can enter the human body. To date, Beijing releases 250 mg/m³ PM_{2.5} particles whereas regulations allow 25 mg/m³ a day. The number of respiratory diseases in Chinese cities has been steadily increasing. According to the Beijing Health Bureau the number of lung cancer cases in the capital rose by 56% over the last decade. A forecast for 2025 ranks China first in the world for this disease. People

are forced to wear respiratory masks and use air-conditioners at the offices and public transport to clean the air. Chinese authorities offer to increase the national standards for “clean air” to 75 mg/m³ in 2016.

For a long time air pollution has been a big problem in China. It is related to the wide use of industrial coal as the primary fuel, as well as to the untreated plant emissions and car’s exhaust emissions.

Chinese authorities try to avoid talking about it, but the environmental situation continues to worsen. About 70% of cities in the country cannot improve their air quality standards, in addition, 40% of the water quality of rivers and lakes under governmental control corresponds to the fifth, the worst, level of contamination. It is unsuitable for household use as well as for fish breeding and bathing. In addition 33% of the sea zone adjacent to China is highly contaminated. Such large-scale environmental pollution leads to disastrous consequences, especially for the health of the population.

Tens of millions of Chinese people live and work on the ground poisoned by toxins. They eat and sell locally grown toxic agricultural products and do not even know it as authorities conceal information about the actual situation. Today, fruits and vegetables produced in China are sold everywhere in the world. It makes us think about the fact that the earth is our common home and an ecological disaster in one country could turn into a tragedy for all of us.

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E.V. Zelinskaya

**BASED ON WASTE THERMAL INSULATION MATERIAL
MANUFACTURING EQUIPMENT**

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Thermal insulation material (TIM) industry is actively developing at the present time. There is a number of methods for their manufacturing which differ with equipment, manufacturing process complexity and labor intensity. In this paper presents an equipment and TIM manufacturing methods analysis.

The goal of this work is the based on waste thermal insulation material receiving processes engineering support research. Mineral filler (mineral waste) addition to the TIM manufacturing composition improves ecological and economical efficiency.

Despite the based on waste TIM use prospects the companies producing insulating materials with mineral fillers number is extremely small. This is associated with information gap on compositions, equipment and problems during the manufacturing.

The topic novelty is that thermal insulating materials with mineral filler manufacturing equipment analysis was first held and maintenance feature and mechanism structures development directions were identified.

Waste reuse for thermal insulation manufacturing has good prospects. It offers an

opportunity for output products cost reduction and achieving high quality and economic numbers. Moreover, the mineral filler use improves ecological state in regions of which this raw material will be supplied to a company. Area which was previously used for waste burial will be reduced.

The same materials can be obtained by various methods. One of the selection criteria is incorporated equipment, its reliability, cost, repairability and possibility to obtain the material with fillers (i.e. from heterogeneous raw material), which may be abrasive and increase machine components wear.

After TIM with fillers types reviewing we concluded that these materials variety and variants for the use provide their application opportunities in all human activity spheres. Compositions variations offer an opportunity to give the material required in this area at the moment properties.

During TIM with mineral fillers production manufacturer faces challenges which technological and organizational issues and economic aspects. These challenges include low-quality raw materials, equipment deterioration, irregularities in the procedure etc. After all technologies and providing them incorporated equipment detailed examination we concluded that extrusion and casting are the main «problem» technologies. We formulated particular solutions to eliminate these problems and following actions to prevent their occurrence, for example:

- The material at the output from the drain bushing is delaminated or torn. In this case it is necessary to change the temperature, drawing speed or low-quality composition.
- The composition low quality during extrusion. The composition quality depends on the temperature and the humidity in raw material store. To solve this problem it is necessary to put the composition through a blending machine many times or dry each component separately. Also, the material can be put to short-term preservation.
- Fast cutting wheel dulling because of higher material strength. The solution is to replace the cutting wheel to wheel from heavily alloyed hardened steel with a blade edge sharpening at 35 - 45 ° angles.
- Composition overheating or underheating can be eliminated by setting the heating or cooling elements with a remote control.

The analysis and our 3-year experience in manufacturing TIM with mineral fillers allowed to compile all the suggestions for improving machinery for the thermal insulation production. It is shown that the environmental and economic problems arising from the waste using can be solved by equipment modernization.

Despite all the problems mineral waste using in thermal insulation materials is prospective, relevant and cost-effective.

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D.S. Rybakov

ASSESSMENT OF MAJOR ECOLOGICAL RISKS FOR THE ENVIRONMENT AND POPULATION OF THE REPUBLIC OF KARELIA

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Ecological problems and risks in the Republic of Karelia (Northwestern Federal District, NWFD, Russian Federation) arise mainly from the technogenically changed environment (habitat) affecting living organisms, including humans. Risks caused by atmospheric air, water and soil pollution are discussed.

Atmospheric air pollution and population mortality. In the past 10-15 years the structure of pollutants emitted into the atmospheric air in the region has continued to change. The quantities of particulate matter, sulphur dioxide and carbon oxide have decreased, while those of nitrogen oxide have increased. Total annual emissions from stationary sources have declined from 150.1 to 94.9 thousand tons (2000-2014), while those from motor transport have grown from 41.4 to 74.8 thousand tons (2000-2013). Population mortality have changed almost synchronously: total mortality has decreased from 2003 to 2014 by 26.5%, mortality from diseases of the circulatory system by 27.8% and from external causes by 59.0%; in 2004-2014 mortality from neoplasms increased by 23.5%.

Pollution comes mainly from big industrial centres such as Kostomuksha (mining and processing of iron ore), Segezha, Kondopoga and Pitkäranta (mainly pulp-and-paper industry), Nadvoitsy (aluminium production) and Petrozavodsk (mechanical engineering and heat power engineering).

The correlation coefficients of linear models (r), which relate the total amount of emissions from stationary sources to mortality coefficients (total mortality, mortality from diseases of the circulatory system and from external causes), are 0.87-0.90, and those estimated without regard for emissions from Karelsky Okatysh OJSC (Kostomuksha) are 0.97. The relationship between the amount of emissions from motor transport and the averaged coefficient of mortality from neoplasms is statistically significant and increases gradually with the increasing time interval of the moving average (with $r=0.71$ – a two-year interval to $r=0.91$ – six-year interval).

In a natural environment and in areas affected by air pollution, the diameter increment of pine-trees (*Pinus sylvestris* L.) has a negative correlation with heavy metal concentrations in annual rings. As this relationship (r) weakens, the elements are arranged in the following order: $\lg\text{Cu}$ (-0.64), $\lg\text{Ni}$ (-0.64), $\lg\text{Cd}$ (-0.59), $\lg\text{Fe}$ (-0.56), $\lg\text{Cr}$ (-0.53), $\lg\text{Pb}$ (-0.36), $\lg\text{Zn}$ (-0.27), Mn (-0.15).

In the Medvezhyegorsk municipal district radioactive elements (U, Ra, Pu, Tc etc.) as well as decay probable products of radionuclides (Pb, Sc etc.) have been revealed in the annual rings of *Pinus sylvestris* L. corresponding precisely to the time of nuclear weapons

testing and the Chernobyl disaster. The ^{137}Cs pollution density of the study area as of 1992 did not exceed normative values and were $<0.1 \text{ Ku/km}^2$.

Water pollution and disease incidence of the population. Six towns and large villages of the Republic of Karelia have no sewage purification facilities, and storm water in Petrozavodsk is not purified. The region is regarded as one of the worst in the NWFD on water pollution and human health. In the NWFD (without regard for the Nenets Autonomous District) the water pollution level in the distributive central water supply system, shown by the 2012 sanitary-chemical indices, was statistically significantly related to the primary disease incidence of the entire population (r): diseases of the circulatory system (0.84), digestive organs (0.75), and to that of the adult population: diseases of the circulatory system (0.83), digestive organs (0.81) and nervous system (0.72).

Pollution of soils and grounds of urbanized areas with heavy metals and metalloids is confined primarily to industrial sites, including those which already have ceased operating, for example, the industrial site of a tractor plant, covering an area of 0.2 km^2 in the centre of Petrozavodsk, which was shut down in 2008. A new city quarter is now being built in this area. The soil and ground in such places are often polluted with Pb, Zn, Cu, Ni, Cr, Sb, Sn, As, W, Mo and other chemical elements in concentrations considerably exceeding background values.

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**MIXED LIGAND COMPLEXES OF TUNGSTEN (VI)
WITH
BENZIDINEBISAZOPYROCATECHOL
AND CETYLPYRIDINIUM CHLORIDE**

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Azo-substitutes of pyrocatechol are promising reagents for photometric determination of a number of metals Cr (III), Mo (VI), Ga (III), Ge (IV), W (VI). Over the past years the researches showed that the use of surfactants contributes to the obtaining of positive analytical effects of different photometric reactions.

We have studied the complex of tungsten (VI) with benzidinebisazopyrocatechol (BBAP) and cationic surfactants cetylpyridinium chloride.

Homoligand complex of tungsten (VI) with BBAP is formed at pH 6-0.5 M H_2SO_4 . The reaction is low-contrast. With cetylpyridinium chloride the formation of the complex shifts towards more acidic region, reaction contrast increases. With the presence of cetylpyridinium chloride the complex of tungsten (VI) with BBAP is formed at pH 5 – 1.5 M H^+ ; optimum condition for formation of the complex is found to be pH 3 – 1 M H_2SO_4 .

Homoligand complex maximally absorbs at 480 nm, reagent at 380 nm, mixed-ligand complex with 560 nm. With cetylpyridinium chloride the absorption bands bathochromically shift 80nm and the greater hyperchromic shift is observed.

Optimum conditions of formation, physical – chemical and analytical properties of the complex were established: $E_k = 7 \cdot 10^4$, $\beta_k = 4.8 \cdot 10^8$.

Molar ratio of components of the complex was determined by different methods W (VI): BBAP : CP = 1:2:4.

Beer's law is observed 1-20 mkg W (VI) / 25 ml.

A new method was developed for photometric determination of tungsten with BBAP by using cetylpyridinium chloride.

The method is highly-selective and sensitive. Most of ions which accompany tungsten (VI) both in natural and industrial materials do not interfere with the determination of tungsten with BBAP and cetylpyridinium chloride.

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DECONTAMINATION OF RARE EARTH METALS AND SCANDIUM SEPARATED FROM URANIUM MINING WASTE SOLUTIONS

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Rare earth elements (REEs) have unique physicochemical properties that make them essential elements in many high-tech components. For more than two decades, Chinese rare-earth producers have provided at least 95% of the annual global supply of the REEs. The tightening of rare-earth export quotas has caused supply risks outside China, as evidenced by the rare-earth crisis of 2011 with record high prices. This situation endangers the secure and sustainable supply of these critical metals to many economies in the world. This situation has also stimulated other countries to look for alternative rare-earth resources such as uranium mining solution, waste electrical and electronic equipment, red mud and bottom ash from incineration plants.

An insignificant concentration of targeting product over high amounts of Al, Fe, Ca, Mg and some other elements as well as the possibility of radioactive contamination the obtained product are typical technological problems of REEs recovery from uranium mining solutions. A series of experimental sorption recovery of REEs and scandium from industrial uranium solutions was performed in this work. The total activities of primary concentrates of REEs and Sc were $(5.8 \pm 0.9) \cdot 10^6$ Bq/kg and $(1.8 \pm 0.25) \cdot 10^8$ Bq/kg respectively. The results of alpha and gamma spectrometry of these samples have shown that beta activity of Sc product was conditioned by the presence of Th-234 – Pa-234 and its alpha activity was conditioned by the presence of Th-230; the activity of REEs product

was conditioned by the presence of the long-lived Ac-227 and its short-lived daughter radionuclides.

The developed liquid extraction process of scandium decontamination allowed for Th-234 and Th-230 elimination with the decontamination factor (DF) as high as $7 \cdot 10^4$. Finally, scandium oxide with chemical purity of 99% and activity of 2.6 ± 0.4 kBq/kg was obtained.

A combination of precipitation and liquid extraction methods of REEs decontamination provided $DF = 6 \cdot 10^2$; activity of REEs product was 9.8 ± 1.5 kBq/kg. Further deactivation will be performed after separation of individual REEs.

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PROCESSING TECHNOLOGIES DEVELOPMENT OF OIL SLUDGE, INDUSTRIAL AND DOMESTIC WASTE

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Due to the deteriorating situation on the placement and processing of oil sludge, industrial and household waste and a simultaneous increase in the cost of fuel and energy resources, there is a need to find alternative sources of hydrocarbons, the production of which may be carried out by waste production and consumption.

As renewable energy sources can be regarded as conventionally used low calorie energy (wood, peat, brown coal), and domestic and industrial waste origin.

This article presents the physicochemical properties of the investigated waste and oil sludge and methods of experimentation.

As raw waste thermolysis half of asphaltum oil mixture used and different types of waste in a ratio of 1: 4 by weight. Used waste were taken on the basis of statistical data and consisting of paper, polyethylene, of tires and food waste (potato peel). Also, as the raw material was a mixture of all these wastes taken in equal proportions.

Thermolysis oil sludge was conducted using a sample, which is a pasty mass stable emulsion of water in the fuel oil with impurities. This sample was selected from the second section of the two-piece flotation clarifier sludge plant number 17 water management, sanitation and wastewater treatment "LUKOIL-Perm Refinery." This material was used in the process in pure form without adding a liquid or solid phase.

Considered experimental laboratory coker and produce bitumen. Studied methods for determining the quality characteristics of the products obtained. An evaluation of the impact of research on the basic parameters of the yield of products of thermal degradation.

We examine the quality of the resulting products recycling and ways of their further use. The designs developed coking reactor and the results of their tests. An process for producing bitumen using as a raw material liquid hydrocarbon products of thermolysis of waste. Considered alternative ways to use the products of thermolysis - gasification and getting fuel on the basis of aqueous emulsions.

The study of process parameters was carried out on laboratory batch coking. For coking process waste ground and mixed with half of asphaltum oil then placed in the coke cube. Then join water cooler, pre-weighed absorber and receiver.

Cube opening for a gas burner. Some time after the start of heating, the temperature was raised in pairs and receiver flask were first drops of distillate. Process of thermal degradation of the raw material proceeded in the temperature range 400 - 450 0 C with gas evolution. Gas coke is taken up in a gas burette for later analysis. The end of the coking process was judged by evolution ceased distillate. Thereafter, the cube was heated for 30-40 minutes, to coke calcination and remove volatile hydrocarbons. The process of coking, the following products: distillate, consisting of water and hydrocarbon moiety, gas and coke. The resulting products were analyzed by coking.

The solid residue is structurally fragile and friable. Externally WCI he repeats the shape of the type of waste, which was used in the experiment. Qualitative analysis of the coke was not exposed.

The gaseous products were analyzed on a VTI-2 gas analyzer and chromatography CROM-4.

Distillate coking dispersed at atmospheric pressure with the selection of fractions (NK - 200°C) and the remainder (> 200°C). The resulting fraction (NK – 200°C) was separated on a separating funnel of water. For the selected part of the hydrocarbon (NK - 200°C) were determined iodine number, group composition and relative density.

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**THE COMPARATIVE STUDY OF NATURAL AND SYNTHETIC
SORBENTS FOR DEACTIVATION OF LIQUID RADIOACTIVE
WASTE BASED ON SEAWATER**

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A large volume of liquid radioactive waste (LRW) containing up to 10⁸ Bq/L of fission products, mainly ¹³⁷Cs and ¹³⁴Cs, in diluted seawater was deposited as a result of fire extinguishing at damaged reactors at the Fukushima-1 nuclear power plant. A part of these LRW was treated using reverse osmosis method that allowed reducing LRW volume approximately by an order of magnitude. However, this resulted in formation of secondary waste based on concentrated seawater with a higher activity (up to 10⁹ Bq/L). Thus, the problem of decontamination of LRW based on seawater with various salt content is still important.

The possibility of use of natural and synthetic sorbents for caesium separation from LRW based on seawater with various degrees of dilution or concentration was studied in this work. A natural quartz-glaucanite concentrate from Karinskoye deposit (Chelyabinsk region, Russia), pilot samples of the glauconite and hydrated titanium dioxide (T-55 sorbent) modified by a mixed nickel-potassium ferrocyanide (developed and produced by the Radiochemistry and Applied Ecology Department of the Ural Federal University) as well as the T-35 sorbent (produced by Termoxid company, Russia) were chosen as sorbents for caesium separation.

The results have shown that the surface-modified glauconite and the T-55 sorbent are the most effective sorbents for caesium separation from LRW based on seawater with total salt content of 3.5 to 140 g/L; this is conditioned by a very high selectivity of phase of the mixed nickel-potassium ferrocyanide for caesium. For these sorbents caesium distribution coefficients were more than 10^4 mL/g (up to $7 \cdot 10^5$ mL/g for the T-55 sorbent) over the whole studied salt concentrations range. By contrast, the natural glauconite have shown the worst result; caesium distribution coefficients did not exceed $3 \cdot 10^3$ mL/g that is conditioned by nonselective mechanism of caesium sorption by this sorbent.

Thus, ferrocyanide surface-modified sorbents are advised to be used for caesium separation from LRW based on seawater with various degrees of dilution or concentration.

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ECOLOGY OF SPEECH COMMUNICATION IN THE MODERN INFORMATION SOCIETY

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Modern speech communication (both verbal and non-verbal) is undergoing considerable changes. The structure of speech is subjected to transformation on the semantic, grammatical and stylistic levels. Moreover, the given processes take place in a dashing, spontaneous and, to a greater extent, unpredictable way.

Due to their syncretic character the issues related to ecology of speech communication are considered by linguists, psychologists, sociologists, pedagogs.

The beginning of the current century will be recorded in history as the time of crisis characterized by socio-political and economic instability, increased aggression, manifestation of extreme views and the struggle of the world community against terrorism. Deformations, which the socio-cultural space is subjected to, find their expression both in the language and in the practices of communication, including the so-called electronic communication.

In different forms of communication one can trace, more often than ever, a provocative attitude expressed both implicitly and explicitly, certain aggression of speech behaviour resulting in the violation of equilibrium mechanisms in communication, without which the effective, etiquette interaction is impossible; evident dominance of cynicism and vulgarity,

reflecting on the low morals and depreciated values.

Speech communication carried on by means of Internet social networks is not only below the elementary literacy, but is also characterized by a low level of informativeness, unjustified logical and semantic shifts, the poor and primitive nature of speech patterns, etc.

On the one hand, the given processes may be accounted for by the law of speech economy existing objectively and originally inherent in the practice of communication, on the other hand, – by the excessive pragmatism, typical of a modern man.

The concept of “ergonomics”, i.e. convenience in exploitation, easy use of something, has become productive in modern speech. Speech patterns are also subject to such ergonomics, losing by it on the semantic capacity, the accuracy of usage, the addressee relatedness, the attractiveness of individual speech.

The absence of addressing a particular person in the course of interaction as a vivid indication of distancing, and sometimes impersonality while communicating, introduced by the practice of e-mailing information, is becoming a regular habit.

No mentioning the addressee’s name removes many moral and ethical restrictions, allows neglecting the generally accepted norms of politeness. Sharp, often insulting emotive evaluation in electronic communication is not only an indication of freedom of speech, which is understood straightforwardly, but also a derivative of the feeling of impunity, permissiveness because of the opportunity of being a communicant under the cover of a nick-name. Commentaries in blogs, at forums have sometimes the character of speech hooliganism, as they contain obscene words, vulgar and cynical references, etc.

Ecological requirements in relation to modern speech communication could be defined as follows:

1. It is necessary to observe in speech communication the principle of interpersonal equilibrium; only in this case communication will be to an equal degree safe to each of the participants of speech interaction considering the socio-cultural, psychological, ethical, esthetic planes.
2. It is necessary to oppose not only the scarcity of speech element, its contamination with obscene words, slang, jargon, etc., but also excessive utilitarian practices leading to forced and premature archaizing of language resources.
3. One should counteract the vulgarization of speech by means of developing lingo-ecological consciousness of the young, educating a protest attitude towards commonplaceness, vulgarity and cynicism both in the social and the language environment.
4. It is necessary to use all possible means of enlightenment activity to defend the language as part of national wealth and a major instrument of self-identification for an individual.
5. One should act irreconcilably towards a poor standard of professional training of the staff engaged in mass media and destined to cultivate the language norms and display the standard patterns of verbal art in their speech works.

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**THE PROBLEMS OF DOMESTIC SOLID WASTE MANAGEMENT:
COLLECTION, REMOVAL AND DISPOSAL IN THE CITY
OF ROSTOV-ON-DON**

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The organization of removal, utilization and landfilling of industrial and domestic waste on the territory of Rostov-on-Don is carried out in accordance with the “Rules to ensure the cleanliness and order in the city of Rostov-on-Don. Part I. Organization of removal and utilization, including the disposal of consumption and production wastes”, adopted by the decision of April 20, 2004, No. 613 of the Rostov-on-Don Municipal Council.

The task of organizing the solid domestic waste (SDW) removal was entrusted to a specially created Municipal Institution (MI) “Clean City”. MI “Clean City” also controls the process of removal and disposal of solid domestic waste in the city, collects funds for this purpose, partly using the budget financing in the framework of special municipal programs.

As an executor, Municipal Institution “Clean City” follows in its activities the laws and regulations of the Russian Federation, the regulations of the Rostov Region and the city of Rostov-on-Don. It is accountable to the City Administration bearing full responsibility to the producer of the waste, who signed with it a contract, for the performance of contractual obligations, and to the City Administration – for the organization and implementation of works on the removal and utilization, including the landfilling of production and consumption solid waste (PCSW), as well as organic waste collected from the city.

The executor was also entrusted the function of being responsible for organization, coordination and perspective development of the entire solid consumption waste management system, including:

- 1) Carrying out activities on the conclusion of contracts that ensure removal and utilization, including the disposal of solid consumption waste;
- 2) Maintaining a database with the necessary information on all the municipal solid waste producers, including sub-producers;
- 3) Approval of the frequency, timing and schedules of PCSW removal, obligatory for all providers of the service;
- 4) Control over the conditions for special transport access to the places of the PCSW temporary storage on the streets - for all providers of the PCSW removal service.

In the system of waste management, all sources (producers) of waste are divided into seven categories: the population of multi-family housing, the population of individual housing, legal entities and individual entrepreneurs, seasonal workers, people travelling on official business and tourists, the territory of the municipality, the objects of renovation, reconstruction and new construction.

As a basis for calculating the retrospective total amount of solid domestic waste is accepted the average index of relative waste distribution into two primary categories:

- ⇒ waste produced by the population – 65 %;
- ⇒ waste produced by the other groups (legal entities and individual entrepreneurs, tourists, etc.) – 35 %.

The calculation of amount of solid waste produced by the population should be carried out with consideration of the construction of new multi-family housing and the increase in the amount of solid waste at a rate of 5% per year.

One of the key elements to solve the problem of regulating waste management is a continuous improvement of the regulatory and legal framework in this area.

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INTEGRATION PROBLEMS OF POWER INDUSTRY IN TAJIKISTAN

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The power industry is systemically important branch for any country. Maintenance of the energy sector is able, effectively satisfying requirements of the population and the enterprises, is an important task for national economy. It concerns also power industry of Tajikistan which has a set of problems, including, the efficiency of its functioning.

Republic Tajikistan need of reforming of energetics, the branch including activity of several energetics enterprises the largest of which is “Barki Tochik” is considered. This company created during the Soviet period in 1991 was transferred under jurisdiction of Tajikistan and is the central energy company which part 24 energetics objects are, including, Nureksky, Baylazinsky, Kayrakkumsky hydroelectric, the Dushanbe combined heat and energetics plant, Vakhshsky’ Cascades and Varzobsky hydroelectric energetics stations, and also – Hazaria hydroelectric. In this holding more than 10 thousand employees work. In “Barki Tochik’s” holding keeps also export and import energetics transactions with the companies of Kazakhstan, Russia, Uzbekistan, Kyrgyzstan, Turkmenistan and Afghanistan. As a part of the company a large number of the energetics distributive enterprises works.

The state holding receives investment resources from banks of the Middle East. The financial condition of the company in the last two years shows problem areas in management of such large integrated enterprise. From 2012 to 2015 losses of the company accrued. 2013 when the loss made about 600 million somoni became the most problem (1 somoni at the rate made at this time 4,8 dollars and 6,6 euros). In September, 2015 there was a replacement of top management of the company according to the order of the government which demanded to bring an order to realization of energetics services and personnel policy of the enterprise.

These processes testify that the structure and the organization of activity of the large integrated enterprise need reconstruction, and energetics branch – in reforming. In case

of “Barka Tochik” is necessary disintegration of the company on regions or on functions. Consequences of such disintegration can be risky: regional disintegration can lead to a difference of the prices of energy resources on regions, and functional disintegration can raise the prices of energy resources for the population owing to lack of a uniform pricing policy.

When developing different options of integration transformations in electricity industry it is necessary to consider that it consists of a number of processes: productions, transfers, distribution and sale. Now almost completely these functions are carried out by one organization.

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UNDEREMPLOYMENT AS A FACTOR OF ECONOMIC CRISIS

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Modern economic world over the last 20 years has changed significantly. Crises become systemic and global in nature, their manifestation occurs now primarily in the financial sector, affects the production and ensures the country's growing unemployment. The theory of cyclical behavior has been developed by scientists from around the world. British economist and statistician Joseph Kitchin saw the root cause of cyclic fluctuations in development of the world's gold reserve, Soviet and Russian economist Nikolai Kondratiev in technical changes in production, a French statistician Clément Juglar – changes in investments in fixed assets. That is, researchers saw causes of cyclicity in the material factors of production and sought ways to influence them to mitigate crises. Condition of employment as a factor of the cyclical nature of production in this sense has not been investigated. Once in the industrial era unemployment could be countered by full employment. However, unemployment is just a form of employment in state. There are new forms that have become crucial in developed countries and is now becoming the part of our Russian life. Often it is part-time employment, when a person combines work with study or caring for children or seeking independence and the lack of control. Hundreds of thousands in our country do programming, writing and translation of texts, layout of books, while being at home behind a computer. Today is becoming more and more popular remote work (freelance). Freelance specialist – freelancer performs the job in company, organizations without a labor contract, can cooperate at the same time with different clients. There is greater acceptance and a form of co-working is equipped with all necessary for work space. It rent to any interested person for as long as necessary, basically it is all the same freelancers. Companies use in the practice of HR outsourcing, which involves either leasing specialists, or their withdrawal from the staff (outstaffing). The main objective of outsourcing is to endure beyond the business in specialized areas of activity. Various forms of part-time employment affect the General economic condition. For example, in manufacturing industry the

number of employees from 2005 to 2013 decreased by nearly 2 million people. And, in turn, reducing the number of employed was accompanied by a deterioration of the age and educational structure of production workers. Such changes of human capital form the factors of economic instability, enterprises, influencing the duration of cycles in the overall economy. For these reasons, the following sequence occurs: an unstable staff – unstable production - unstable Finance – payments crisis, and, as a consequence of all this economic crisis. In these conditions there is a transformation of human capital in the professional side of his degradation, and at the heart of its growth based on the principles of competitiveness on the market. This approach provides a constant voltage to the employee. In humans, there are various fears and concerns, including lack of competitiveness, rejection, personal inadequacy, another control, and, finally, the fear of losing income. As a result of modern post-industrial economic system, called market, is characteristic of instability in society, is the basis for economic crises.

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IMPLEMENTATION ISSUES ACCOUNTING
FOR THE INTERESTS OF SUBSOIL USERS AND LOCAL
AUTHORITIES IN THE DEVELOPMENT OF SUBSOIL AREAS
OF LOCAL IMPORTANCE

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This article analyses the current legal issues relating to the use of subsoil. The author draws conclusions which are based on studies of regulatory framework that deals with the problems raised by the author. The special attention is paid to the relationship of subsoil users with public authorities of various levels and local governments.

According to Article 10.1 of the Law “On The Subsoil” the regional bodies of executive power of the Russian Federation provide by the results of the auction local subsoil areas for using. The legislator doesn’t provide a clear list of subsoil local areas, but on the base on variety of legal acts it can be concluded that the list of subsoil local areas -it is a list of subsoil plots within the boundaries of the region of the Russian Federation that might be given in accordance with the law of subsoil. According to Article 4 of the Law “On the Subsoil” this list shall be prepared and approved by the regional executive power bodies of the Russian Federation within its borders in coordination with the Ministry of Natural Resources and Ecology of the Russian Federation. A procedure of forming the list is regulated by the “Order of the Federal Agency for Subsoil Use” from 15.06.2012 No. 687 “ Of approval of the preparation, review, harmonization or reducing to harmonize the list of local subsoil”. The project of the list of local subsoil is agreed upon the territorial body of the Federal Agency for Subsoil Use. Than this territorial body sends a letter to the regional bodies of executive power for harmonization or reducing to harmonize the list of local subsoil.

The procedure for determining local subsoil areas does not include the interests of local

authorities. The main normative legal act, which defines the development of settlements or urban district is a general plan. The concept of the general plan is provided by the Town Planning Code. The general plan is a town planning document of urban planning for the development of urban and rural settlements. The general plan is the main town planning document which defines the benefit conditions of forming a vital life sphere, a direction and a limits of territorial development of urban and rural settlements, a territorial zoning, a development of engineering, transporting and social infrastructure, a town planning requirements for the preservation of historical and cultural heritage and especially protected areas, an environmental and health well-being. The content and preparation of the general plan is regulated by Article 23 of the Town Planning Code. Provision of lands must be given in accordance with the general plan of a specific local area.

When you turn on a certain area in the list of the local subsoil areas there is no procedural harmonization with local authorities based on the general plan. Gaining a complete understanding of this issue, it is necessary to create a real case. For example, a potential subsoil user had taken part in the auction, than he won it and got the license for using the subsoil. According to the established procedure the regional authorized body of the Russian Federation included this area in the list of subsoil plots. In this case, a lot of problems might be appeared, one of which, for example, is the conflict between the subsoil user and the private person, who have private rights to the land. The second problem can have a connection with the subsoil user between local authorities. It is expressed in the fact that local government bodies have a general plan, which has been enforcing for a long time, and the regional authorities of the Russian Federation included a specific territory in the list without this using document, or information about certain encumbrances existing on the territory, and preventing the extraction of minerals. The general plan defines the territory of the municipality that will be used in the future in this particular area that is based on the policy of the municipality. For local authorities the mining on their territory might not be a priority direction as the construction of certain companies or entities that provide their volume jobs and tax revenues in their budget. The only solution to this problem is a legislative consolidation of compulsory harmonization of the list of local subsoil areas.

But then another problem arises: local authorities may approve mining operations in this area, but in any case it is necessary to amend the general plan, that creates inconveniences for subsoil user both in time (changes in the general plan are not always possible, and it will take at least six months, despite the fact that the license expires), and in material aspect (the process will entail a loss of profits for the non-realization of the license, and the cost of changes to the master plan). This situation can create a corruption factor, which will be expressed in lobbying local government bodies in the subsurface user to decide on an expedited amendments to the general plan. To solve this problem it is necessary to obligate initiating changes in the general plan legally within six months after the site in the list of local subsoil areas.

On this basis, it is appropriate to amend the Order of the Federal Agency for Subsoil

Use from 15.06.2012 No. 687 “Of approval of the preparation, review, harmonization or reducing to harmonize the list of local subsoil” and to fix a mandatory agreement with local authority list of local subsoil areas, taking into account the general plan of the area. It is necessary to add in the Article 23 of the Town Planning Code the normal duties of local government bodies for initiating a process of amendment the general plan for the territory during the negotiating of the inclusion of this area in the list of local subsoil areas.

A structured regulation of the these issues will ensure the correct application of law in the interests of the variety authority levels, as well as create complement guarantees for the subsoil user, which will allow him realize his rights by the most effective way.

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PROCESS OPTIMIZATION OF THERMAL DISPOSAL OF DRILL CUTTINGS

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High danger for natural environment objects are production and processing drilling waste which are accumulated and stored directly on-site drilling. In its composition they contain a wide range of contaminants of mineral and organic nature, represented by materials and chemicals used for preparation and processing of drilling fluids.

The environmental activities involve the construction of installations and facilities to obtain raw materials or finished products from processing waste.

Methods of thermal processing of drilling waste are used to obtain or destroy the hydrocarbon component. They are most effective in removing organic components of waste. Also they reduce the amount and mobility of salts and metals. Drill cuttings after heat treatment can be used in road construction, road fill, as building materials such as cinder blocks in low-rise construction, paving slabs, curbs, binders mix granular aggregate in concrete (after grinding of the solid phase).

The thermal method of disposal of drill cuttings is the burning of sludge in the special process equipment (furnaces) and then receiving the secondary waste. In order to complete the decomposition of unwanted gases combustion in furnaces of calcination (incinerator) it is necessary to use high temperatures (of the order of 850-2200 °C). An alternative solution method of thermal disposal of drill cuttings is the burning of waste at temperature range up to 100 °C. Thus there is a condensation of oil fractions with subsequent collection for use as an energy resource.

Analysis of the available facilities for thermal treatment of drill cuttings showed that as a result of heat treatment major secondary waste are: inert waste (sand, “inert soil”, ash, etc.), water, hydrocarbon oils, and also combustion gases evolved into the air.

The gaseous products of combustion of petroleum fractions may also contain heavy metals that requires gas-cleaning equipment.

Technological process features and installation design must ensure the absence of waste

gases emissions. An effective gas cleaning system ensures compliance with the maximum permissible emissions.

Promising technology solutions should include the safe operation of the equipment through a locks system and combustion processes and gas cleaning control. They also include the use of heat from incineration waste to heat water or steam.

Selection of methods of waste management should be determined by the drilling waste classifier based schemes of waste drilling.

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ADJUSTING THE ELASTICITY OF COMPOUNDED BITUMENS BY CHANGING ITS CHEMICAL GROUP COMPOSITION

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The service life of road surfaces depends on compliance ranging from raw material components to road paving of the manufacture production line and use. One of the problems of manufacture and use of road bituminous materials is their quality. In pavement composition about 20-30% of the road bitumen and the products placing on the road is very different in quality materials. So, at the present time task is improve the quality of road bitumen using in road construction.

Blown bitumen not has the necessary degree of flexibility and is not able to regain its structure after removing the load. At the same time unoxidized tars have elasticity, but they lack the strength properties. Consequently, only compounded bitumens can meet modern requirements for bituminous binders. Therefore, study the possibility of adjusting the road bitumen elasticity to improve the stability of asphalt concrete pavement, study the effect of bitumen production technology in its plastic and elastic properties is an important task.

At the first stage was studied the oxidation depth effect of three tars samples of their elasticity and other physico-chemical parameters. The tars was taken at various refineries, differ its chemical group composition and the funnel viscosity value. The tars oxidations were carried out on an experimental laboratory setup that simulates the conditions of industrial production of road bitumen by oxidation. During oxidation at regular intervals the tests were taken from each sample for measuring such parameters as the softening temperature, degree of elasticity and extensibility.

Obtained results are confirms that when increasing the softening point of the oxidized samples, obtained from various natural tars, the solvent ability of the dispersed medium is falls, volume of the disperse phase is increases, the disperse system is changes and the coagulation structure of the samples becomes a condensation-crystallization. There is all of this by changing chemical group composition of the tar during its oxidation. To study the dependence of extensibility and elasticity of binding on the oxidation rate (the softening

point) was studied the dependence of ductility and elasticity on the oxidation rate of tars.

From the analysis of obtained results it can be concluded that the dependence of extensibility and elasticity on the oxidation rate of tars to a certain level (-60°C) are antipathetic nature: with increasing oxidation rate of tars extensibility first increases, goes through a maximum and then begins to decrease, while the elasticity decreases.

This is probably due to the fact that unsaturated components in tar during oxidation are converted into oxide and peroxide formation and then condensed. Furthermore, the malthenes quantity is decreases and the asphaltenes quantity is increase, mainly by reducing the oil quantity. That was later confirmed by an analysis of the chemical group composition of oxidized tar samples. Thus, changing the oxidation rate of tars is can be adjusted by changing the elasticity of the oxidized product.

With increasing of oxidation duration the paraffinic-naphthenic compounds concentration almost constant, the resin concentration slightly decreases. At conditions the blown bitumen preparation the paraffins and alkyl substituents in the aromatic compounds of oil residues undergo oxidative degradation with formation of saturated compounds with a lower molecular weight. This fact can be explained that the total content of saturated compounds in tar and their derived blown road bitumen is approximately the same. For 5 hours oxidation of tar aromatic content decreased to 22%, and the bicycloaromatic compounds concentration decreases most intense. The concentration of asphaltenes in the oxidation process has increased almost 1.5 times, which is also reflected in the structure of the dispersed phase and the bitumen elasticity. In addition, the bitumen with a high concentration of asphaltenes do not meet the required level of requirements for road binders by brittle temperature, expansibility index at 0°C when simultaneous decrease their heat resistance.

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**RECYCLING OF WASTE OIL PRODUCTION AND REFINING –
SULFUR BY THE USE IN THE PRODUCTION OF TECHNICAL
RUBBERS**

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The Tengiz field was discovered in 1979 and is one of the deepest and largest oil fields in the world. The development field is JV “Tengizchevroil”, formed in April 1993 on the basis of the agreement between the Republic of Kazakhstan and Chevron Corporation.

In the oil-rich North-Caspian region of Kazakhstan jointly with foreign companies implements a number of ambitious and large-scale projects. Crude oil Tereskova and other deposits in the region is high i.e. the important feature of this oil is its high content of hydrogen sulfide in associated gas. To bring crude oil to marketable condition, she is clean and the result is elemental sulfur. With the increase in oil production grow and

sulfur accumulation. Allocated from Kazakh oil elemental sulfur is the most valuable raw materials for industrial enterprises of the chemical industry. However, in reality the bulk of the chemicals still stored near oil production facilities. Tengiz sulfur is stored in specially equipped areas in the form of solid blocks of large dimensions, the so-called "sulfur maps". The storage of sulfur in blocks is the only method used, for example, in countries such as Canada, Mexico, the Netherlands, Poland and the USA. Huge volumes of waste oil - sulfur ("sulfur cards" holds more than 8 million tons of product) is a grave concern to environmentalists and the local population. The government of Kazakhstan has set before TCO the task of eliminating the backlog of inventory. Sulfur is the primary curing agent for the majority of rubber products, including tires. To its quality and chemical composition are special requirements, which primarily include high degree of purity of the product (minimum content of harmful impurities – metals of variable valence) and high degree of dispersion. These characteristics determine the vulcanization activity of sulfur, its dispersibility in the rubber-technological properties of rubber compounds and rubber. The ever-increasing requirements for quality tires require the establishment of effective components of rubber mixes. Particular attention is paid to the development of curing agents. Back in the early 80-ies of the last century appeared polymeric sulfur, which quickly became applicable on companies that manufacture tires and rubber products.

Sulfur in the rubber compound, obtained from the oil refining waste oil is introduced to a partial or total replacement of conventional sulfur. In the experiment, a tread rubber compounds and belt. The mixture was prepared in two stages, sulphur, are obtained when refining was introduced on laboratory rolls. The technology of mixing, processing of rubber mixtures and vulcanization is virtually indistinguishable from the standard mode as specified in technical specifications. The cured samples were determined at a temperature of C for 15 minutes. The test samples for aging were carried out in an autoclave at a temperature of C in an environment of saturated steam at a pressure of 0.2 MPa for 40 hours, and in similar conditions, under constant irrigation with 5% aqueous NaCl solution for 8 hours. As can be seen in figure 1, when using cengizkoy purified sulphur there is an increase in the conditional tensile strength and durability of the tread rubber, which shows an improvement of the strength properties. When using purified sulphur from Tengiz there is an increase in the conditional tensile strength and durability of the tread rubber, which shows an improvement of the strength properties. Significant increase durable properties, characterized conditional tensile strength and bond strength of midreshei and textile cord rubber belt.

Use sulfur from Tengiz leads to the increase of the strength properties of the belt and the tread rubber by increasing the number of intermolecular bonds in lasternas matrix are all used in the formulation of sulfur reacts. Thus the use of sulfur from Tengiz will reduce the environmental burden on the environment and improve the quality of tire rubbers.

**URBANIZATION WAVES IN THE ECOLOGICAL SPACE
AND SUSTAINABLE DEVELOPMENT**

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Rhythms are one of constituent parts of consistent development, and cyclicity is a common pattern of natural processes. Oscillatory processes also regulate climate changes and urbanization processes. Within the scope of the rule of the eco-systemic self-regulation, climate changes are an external factor which controls the population size with the influence of environment. In the subdued form, it results in the decompression of the areal settlement by means of enlargement of spatial boundaries of the urbanization and settlement at earlier unoccupied territories.

Self-oscillation of the global climate system of the planet is also connected with the global oscillating enlargement of ecumene boundaries. The process of the ecological space urbanization is reflected in the millennial spatiotemporal dynamics of ten largest world cities. Within the above-mentioned dynamics, during the period from 1000 till 1900, there was prevailing of the global “northern vector” of the largest cities distribution which has approached the North Circle, i.e. Saint Petersburg. In XX century, the global “southern vector” prevailed. During that period, the largest cities have approached to 40° of southern latitude, i.e. Sao Paulo.

The parallel process of the global urbanization during the period from 1000 till 2000 was the “Eastern-European” regional vector. It is demonstrated via urbanization waves of consistent compression of space of Western European countries and gradual shifting of the urbanization impulse from the West to the East, involving also the territory of Ukraine. The inertance of the general European urbanization impulse was evident in Ukraine in the first half of XX century. Thus, within the period from 1897 till 1939, more populated were the territories of western oblasts of the country. Generation of the urbanization “counter wave” the epicenter of which was Donetsk oblast was promoted by the accelerated industrialization of former USSR and development of eastern mineral deposits of Ukraine. The accelerated economic development of that region has resulted in the situation within which the density of population in Lugansk, Donetsk, and Dnipropetrovsk oblasts has increased by more than 300% for a century period from 1897 till 2001.

Today, analyzing the intensity of the territory development the general density of the population of the country or region is considered as a rule. However, if we analyze the urbanization process in the “double-level plane” and particularly and separately consider the development density of the city and suburban territories of the region, we will see a quite different picture. It has turned out that as well as in the beginning of XX century the most populated are city and suburban territories of western oblasts of the country. Herewith, actually “people-less” are suburban territories of densely populated and

intensively developed oblasts of Ukraine in the ordinary way. The gained result shows certain “inertial stability” of urbanization waves in the ecological space and “magnetic gravitational” ability of the cities to accumulate the population from the regions. The latter results in the accumulation of senior citizens in rural localities, rise in mortality, decline in birth rate and number of inhabitants. The maximum total density of the Ukrainian population was in 1993 when the birth rate was equal to death rate and the proportion of the urban and suburban population of the country was about 2:1 (67.9% and 32.1%). It is suggested to consider this proportion as the limit of the “gravitational contraction” of the population in the cities.

Today, the only city among the largest and large cities of Ukraine where there is the rise in the number of population is Kyiv. Kyiv has never been a top ten of the largest World cities but within the period under analysis the dynamics of their population increase is almost the same. It has been established that the population increase on different levels of the ecological space integrity is of bursting and hyperbolic nature. It also concerns both the population of the Earth and the largest World cities and Kyiv. The increase of the World population on the logarithmic scale and changes of Kyiv population density are characterized by a “step-by-step” increase. As a matter of fact, the bursting and step-by-step increase of the size and density of the population are different manifestations of “elements” of waves and characteristics of the dynamics of the oscillative development multilevel process.

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**STUDY OF SELECTIVE SORPTION OF ^{137}Cs AND ^{90}Sr
 BY NATURAL AND MODIFIED ALUMINOSILICATES
 FROM NATURAL WATER AND SOIL SOLUTION**

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Natural and modified aluminosilicates are proposed to be used as sorbents for rehabilitation of soils contaminated by ^{137}Cs and ^{90}Sr radionuclides. In carrying out rehabilitation activities the effectiveness of sorbents use depends on their selectivity, since soil solutions contain Na^+ , K^+ , NH_4^+ , CO_3^{2-} and Mg^{2+} ions that suppresses sorption of caesium and strontium radionuclides. Humic compounds being a part of soil (in particular humic acids) also affect sorption due to leaching into the soil solution. Humic acids can bind radionuclides of caesium and strontium in the complex forms which are not available for sorbents; however, they are available for assimilation by plants. It is necessary to study the effect of the concentration of analogue ions and humic acids in soil solution on the sorption characteristics of natural and modified aluminosilicates in order to choose the most effective sorbents, prospective for the rehabilitation of radioactively contaminated soils.

In this work a comparative study of the selective sorption of caesium and strontium radionuclides by natural and modified ferrocyanides aluminosilicates from natural waters

and soil solutions was done. The effect of humate on the sorption characteristics of the developed sorbent and the impact of the sorbents on the processes of distribution of caesium in the “nutrient solution - plant” and “soil – plant” systems were also studied

It was shown that the modified sorbents have a higher selectivity in presence of potassium, sodium and ammonium than natural aluminosilicates. The specific sorption capacity (fried edge sites, FES) was defined. It was found that, due to the modification of natural glauconite by ferrocyanides not only the static exchange capacity of caesium (SEC) increases, but also the capacity of selective sorption sites significantly increases from 12 to 65% of SEC. This effect was not observed for clinoptilolite, SEC and the capacity of selective sorption sites are comparable for both natural and modified clinoptilolite. For the clinoptilolite capacity of selective sorption sites was 30-33% of SEC.

It was shown that the humic acids at the concentration of 200 mg/L almost completely suppress the sorption capacity of natural glauconite as well as reduce the effectiveness of other sorbents. For natural clinoptilolite a dramatic decrease of caesium distribution coefficients with the increase of humic acids concentration was typical; the complete suppression of caesium sorption was observed at the humic acids concentration of 2 g/L and higher. Caesium distribution coefficients were not less than $5 \cdot 10^2 - 10^3$ mL/g for the modified aluminosilicate even in solutions with a concentration of humic acids of more than 1.5 – 2 g/L.

It was found that use of natural glauconite and clinoptilolite for soils rehabilitation is not effective and the result depends on the composition of soils and soil solutions. Radiocaesium transfer to oats biomass from soils with high cation exchange capacity (54.5 cmol/kg) and high organic matter content (total organic carbon content was 59.9 g/kg) was decreased by a factor of up to 28 in presence of modified clinoptilolite and of up to 80 after combined use of the modified glauconite and potassium fertilizers.

Thus, it is obvious that ferrocyanide sorbents based on glauconite and clinoptilolite have a high selectivity for caesium and strontium radionuclides, effectively retain radionuclides, preventing their migration and transfer to food chains; these materials may be considered to be perspective sorbents for rehabilitation of radioactively contaminated lands, including soils contaminated as a result of the accident at the Fukushima-1 nuclear power plant in Japan.

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**ECOLOGICAL EDUCATION OF FUTURE PROFESSIONALS
IN THE DUAL FORMAT**

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Reorientation of society to market relations seriously transformed the system of vocational education and training. While hiring for job employer identifies the readiness of graduates

of higher and secondary special educational institutions to carry out professional activities in this field. In connection with these requirements of employers and society introduction of the dual system of education is updated in Kazakhstan.

A lot of enterprises in our country are included in the personnel training based on the dual system. Business structure on the basis of mutually beneficial partnerships with educational institutions takes specialists corresponding to its requirements. For this were formed the program of dual training in a professional academy for Technical and Vocational Training the universities. These programs integrate theory and practically proven know-how. The essence of the reformation is that students acquire the dual knowledge in two different schools, practical training phase associated with the enterprise, theoretical knowledge is connected with educational institutions, institutes or academies. The alternation of practice and theory are planned during the learning process.

The modernization of the education system in Kazakhstan is carried out in three main areas: optimization of educational institutions; modernization of the educational process; improving the efficiency and accessibility of educational services. Youth, as a generation of the future is interested in tomorrow, assess their capabilities, clearly define what knowledge and skills will be useful in the future. Today's young people are one of a kind and an important factor of changing, ideas man. That's why it is required modern public policy to respond to requests of the XXI century.

Dual system of education is an innovative type of organization which targeted training based coordinated interaction of educational and production areas for the training of future professionals. Therefore, taking into account the features of environmental education in the process of preparation of future specialists in the dual training is very important.

The impact of economic activities on the environment is characterized by the production of large amounts of pollutants, waste and other factors that lead to changes in natural landscapes, air pollution and natural water bodies. The rate of increasing of the harmful effects of environmental factors and the intensity of their influence have already extended beyond the biological adaptability of ecosystems to changes in habitat and poses a direct threat to the life and health of the population, a comprehensive study of toxicants and the development of measures to combat their spread of damaging effect is an urgent problem of global importance.

The most important condition, and with it an indicator of the ecological education of future professionals is its practical activity. It is manifested and fixed diverse motives related to the nature and form the positive personality traits that determine the desire to live in harmony with nature. The character of actions, behavior, direction of practice show how stable are the position of the future specialist in dual education in his relation to the environment.

Thus, the pedagogical effectiveness of environmental education of future professionals in process of dual training for the study, protection and improvement of the environment are aimed to the realization of noble and socially useful purpose of their activities by future specialists. Practical activities of the future specialists may be diverse in itself, and in its

content, in general, depending on the local natural and economic conditions, formed experience and traditions, but it is always focused on improving the environment.

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ARCHITECTONICS OF HUMAN ERROR

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Based on the traditional definition of errors it should be emphasized that they are an act which is realized through the acts of human behavior and aims to achieve a certain goal. Therefore, the focus and targeting of human behavior determines the way how the system of sequential methods, actions, and operations in space and time aimed at achieving the goal. A way and the act itself, is impossible without volitional content with emotional overtones that characterize the mental, the inner essence of his own mistakes as a sign of its subjective side. Therefore, the structure of the method can be represented in the form of sequential stages of action: preparatory acts to commit mistakes, in fact commit error, posthostility period, which are the object of knowledge. It should be emphasized that each subsequent phase is absorbed by the subsequent and in this sense, the self does not matter. And structure of the act reflects the way structural error component. However, it is obvious that the inclusion of fashion elements with different signs results in expansion of the whole structure, which predetermines the necessity of introducing the category of mechanism. And both of these concepts complement each other, describing the erroneous act through different properties and characteristics. It is the category mechanism introduces another very important property of the error – interaction, interdependence of elements, phenomena, processes that make up the act. Considering the mechanism of the error as a complex dynamic system can be distinguished: the subject of errors, the relation of the subject to their actions, their consequences, the way of error, false positive, circumstances, relationships, and the relationship between acts and the erroneous result. And means of committing errors are components used by man to influence the object of their activity.

The highest rate of injury occurs in young employees, aged 20-35 years and experienced staff, whose age >50 years, which suggests two phenomena at hazardous production facilities (the phenomenon of “inexperienced worker” phenomenon “experienced employee”). It is the workers in the 20-35 age group are inexperienced, the leading causes of injury are: professional inexperience, lack of knowledge, inability to correctly diagnose emerging disorders and dangerous situation to find the right solutions, the lack of developed automatic skills and actions in a dangerous situation that is largely due to the lack of standard patterns of behavior in unusual situations. The experienced staff is the main reason for occupational injuries is largely due to neglect the use of means of protection

and safety, is due to the formation of a sufficiently large range of model behavior in unusual situations, which do not take into account dynamically changing conditions of the production environment, leading to a certain growth “irretrievable losses”.

For the analysis of problems of production control in the field of labor protection in modern conditions was made a special questionnaire, which surveyed 122 of the employee. Group I – young professionals prefer a strategy of avoidance of problems, largely due to the need to reduce emotional tension in situations of stress. This form of coping is not possible to resolve the situation associated with the accumulation of difficulties and short-term effect of actions to reduce emotional discomfort. Professionals with extensive experience and formed a group II, prefer the strategy of solving the problem, which allows purposefully and systematically to solve a problem. But excessive rationalization of behavior in unusual situations does not provide an adequate assessment of dynamically changing environmental conditions.

Vladimir Kuznetsov

ZWANZIGJÄHRIGE ERFAHRUNG IN DER GETRENNTEN ABFALLSAMMLUNG IN DER REGION MOSKAU - PROBLEME, INNOVATIONEN UND PERSPEKTIVEN

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In den 90er Jahren im Zuge der Zusammenarbeit mit Einwohnerverbänden und bei der Lösung des Abfallproblems im Wohnbereich unter Einbeziehung von Einwohnerverbänden, stellte sich die Frage, wie die Menge von Abfällen, die zur Entsorgung oder zur Deponie ausgeführt sind, reduziert werden kann?

Die Idee, einige Nutzfractionen zu sammeln, zu pressen und zur Entsorgung auszuführen (wodurch das Gesamtvolumen von ausgeführten Abfällen reduziert und den Anteil von verwendbaren Abfällen erhöht werden kann), wurde erstmals bei der Arbeit mit den Deponien verschiedener Verkaufsorten neben den U-Bahn-Stationen in die Tat umgesetzt. (So entstand die Technologie der getrennten Abfallsammlung und wurde die unkommerzielle Gemeinschaft „Zentrum von Umweltinitiativen“ erstellt).

Danach wurde das System der getrennten Abfallsammlung auf den Moskauer Bahnhöfen eingesetzt. Die Leitung von Bahnhöfen stellte die Plätze für Abfallsammlung bereit, schloss Verträge über die Abfallausführung ab, richtete die Stellen für die getrennte Abfallsammlung ein. Als Ergebnis hat sich das ganze bisher existierte System der „Abfallwanderung“ geändert, das Territorium von Bahnhöfen wurde dadurch sauberer.

Im Jahr 2000 wurde die Initiative von getrennter Abfallsammlung von den Bewohnern der Häuser, den Eigentümern der Räumlichkeiten, von verschiedenen Organisationen und der Stadtverwaltung Moskau unterstützt.

Trotz der bestehenden Rechtsvorschriften in diesem Bereich, Technologie und

Erfahrung sowie positive Ergebnisse in diesem Bereich, bleibt das Problem immer noch offen. Die administrativen Hindernisse auf der lokalen Ebene behindern die Entwicklung des Systems der getrennten Abfallsammlung.

Für die erfolgreiche Entwicklung des Systems der getrennten Abfallsammlung und des Abfallmanagements ist notwendig, dass als Hauptauftraggeber die Firma auftritt, die die getrennte Abfallsammlung organisiert, und als Auftragnehmer - die Firma, die die Abfälle ausführt, und nicht umgekehrt.

Am 17.09.2015 fand das Programm der getrennten Abfallsammlung seine Unterstützung beim Patriarchat der Russisch-Orthodoxen Kirche. Im Auftrag vom Frauenkloster der Russischen Orthodoxen Kirche (Moskauer Patriarchat) wurde eine Stelle der getrennten Abfallsammlung eingerichtet.

Im Laufe 2015 wurde leider eine Reihe von Entscheidungen über den Abbruch von Stellen für die getrennte Abfallsammlung getroffen. Das geschah trotz der Unterstützung für das Programm vom Bürgermeister, den Bewohner von Moskau, von verschiedenen Organisationen, von der Abteilung für Naturressourcen und Umwelt der Stadt Moskau, von der Umweltgemeinschaft, von den Behörden vieler Bezirken der Stadt Moskau, vom Patriarchat der Russisch-Orthodoxen Kirche, trotz der positiven Ergebnisse der ganzen Tätigkeit in diesem Bereich.

Die Beamten weisen auf das Fehlen von den registrierten Bodenverhältnissen zur Erstattung einer Stelle für getrennte Abfallsammlung hin.

Das Department des Stadtvermögens Region Moskau erklärt jedoch in seinen Rückmeldungen, dass die Registrierung von Bodenrechtsverhältnissen zur Einrichtung einer Stelle für die getrennte Sammlung von trockenen Siedlungsabfällen nicht erforderlich ist.

Die Zwischenbezirksprokurator Region Moskau traf unter Verletzung aller Verfahrensnormen und Gesetzen ihr Beschluss über den Abbruch von Stellen für die getrennte Abfallsammlung. Dabei kann man die Schaffungen von unverträglichen Bedingungen für Kleinunternehmen verfolgen, nämlich die Korruption Komponente, feindliche Übernahme, Lobbying von Interessen der Abfall ausführenden Unternehmen, usw.

Trotz der Tatsache, dass über 4000 Moskauer ihre Protestbriefe an die Stadtverwaltung Moskau geleitet haben, wurden einige Stellen zur getrennten Abfallsammlung abgebrochen. Es gelang einige Stellen für die getrennte Abfallsammlung Dank der aktiven Position der Bewohner zu bewahren. Die Bewohner haben einen (in richtigem Sinne) Tagesdienst in der Stellen organisiert und haben den Abbruch nicht zugelassen.

Es stellte sich leider heraus, dass die Überwindung des vor Jahren entstandenen Systems der Stadtverwaltung, das die Geburt der "Korruptionskultur" und administrativen Hindernissen gab, eine schwer erfüllbare Aufgabe für die untergeordneten des Moskauer Bürgermeister ist.

Abschließend möchte ich erwähnen, dass innerhalb von 20 Jahren meiner Tätigkeit als Unternehmer im Bereich der getrennten Abfallsammlung mir keine Konkurrenten

erschienen sind. Dies deutet darauf hin, dass der Staat, in dem 95 % der Abfälle bis jetzt deponiert werden, sich nicht um die Schaffung von Voraussetzungen für die Lösung des Abfallproblems gekümmert hat. Solch einen Staat kann man nicht als einen zivilen Staat bezeichnen.

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THE FEATURES OF CATTLE MANURE BIOCONVERSION UNDER COLD CLIMATIC CONDITIONS OF KAZAKHSTAN

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The development of environmentally friendly technologies for energy production in the conditions of mineral resources depletion and the ever-increasing price of fossil fuels is the prerogative of energetic systems and representing a major challenge for researchers.

The objective of this work is to study the working parameters of the experimental model of the biogas fermenter in two modes: psychophilic (23°C) and mesophilic (35°C). Next co-substrates as a green mass were used: straw (normal component of the litter manure) and silo corn with different degrees of size reducing.

Materials and methods. Research was carried out on an experimental mini-biogas plant. The experiment was performed during the winter with three-fold for each of the modes of co-fermentation. Cattle litter manure served as a substrate for the anaerobic decomposition. For the purpose of accurate simulation of the outside temperature setting mini plant was placed in cold indoor environment.

Results and discussion. Directly before the experiment laboratory analysis of the manure on the content of basic chemicals was carried out. The content of phosphorus, potassium, and total nitrogen was as follows: total nitrogen - 4.81%, phosphorus - 3.12%, potassium - 0.39%. In this work as a co-substrate in addition to the straw normally contained in the litter manure, silo corn has been used. It is known that in plants, working primarily on plant raw materials, higher temperatures observed than would be expected. Activation of metabolism and speed of biochemical metabolic processes can be achieved by maintaining and continuously updating the maximum possible magnitude of the boundary interface between the solid and liquid phases. For the first composite substrate size of suspended solid particulars after the dispersion was 15 mm. Since the dispersion is energy intensive task for the second type of complex substrates, co-substrates such as straw and silo corn was reduced to 30 mm from its initial size. Dispersion makes co-substrate more accessible to microbial enzymes and increases the rate and completeness of bioconversion.

Our research identifies three temperature ranges: psychophilic (cold fermentation) - 15–30°C, retention time - abt. 60 d.; mesophilic (warm fermentation) 30 – 50°C retention time - 28–38 d (stable process, low heat consumption, good biogas quality);

thermophilic (hot fermentation) > 50°C retention time - abt. 15 d. (high degradability and speed of degradation, hygienization possible). In order to maintain the anaerobic decomposition process the substrate is heated to a mean temperature value - 23°C under psychrophilic and up to 35°C under mesophilic. This temperature had being maintained until the biogas had been released. Starting biogas production indicated that biothermal processes independently stimulated maintaining of the desired temperature (within +/- 5°C of the set temperature) without needing to maintain it by external heating.

Experimental research has shown that the psychrophilic mode duration of the anaerobic decomposition is within 22 days of the substrate with finely ground green mass and 26 days for the substrate with a green mass of coarse grinding. Meanwhile mesophilic mode duration of the anaerobic decomposition is within 12 days of the substrate with finely ground green mass and 15 days for the substrate with a green mass of coarse grinding.

Due to the fact that the psychrophilic mode of bioconversion required minimal amount of energy for preheating, it is accordingly more advantageous economically compared with mesophilic. The difference values of the gas amount produced is within the range 5%.

Conclusion. Biogas plant, which in psychrophilic mode cattle manure fermented in complex with co-substrates as straw and silo corn - 12% by weight) is the most economically and energetically justified. Although the timing of the fermentation process at psychrophilic increases compared to mesophilic the amount of biogas remains almost unchanged in both modes of a bioconversion.

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**THE OPPORTUNITY TO IMPROVE A BONDING STRENGTH
OF RUBBER TO TEXTILE CORD**

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Rubber-cord parts and their goods are widely used in the technics and different fields of industry. Therefore, strength properties of adhesive compounds are of considerable importance.

A formation of the adhesive compound begins from its elements contact, at that, there is a wetting and spreading of the adhesive on the substrate's surface, that helps to form the molecular contact. Dispersion forces with the formation of other molecular bonds act in the area of contact between molecules of the adhesive and substrate. Chemical bonds are formed due to the molecular contact under the action of heat in the presence of functional groups, capable to reactions with the substrate's functional groups, in the adhesive's elastomeric matrix. The formed adhesive compound is characterized by a

certain strength (static and dynamic or endurance), depending on mechanical and fatigue properties of boundary (transition) layers. To provide the high adhesive strength, it is necessary that the transition layers mechanical and endurance properties approach to the proper characteristics of a nonporous rubber. The transition layers' elastic-liquid properties should be intermediate between the adhesive and substrate proper characteristics to minimize their deformation. At these conditions, the composite failure will occur by the adhesive or substrate solid mass (cohesive character of the failure). If the substrate has a strongly dissected surface, as, for example, a cord thread, stranded from many fine threads (topmasts) or wires, then to achieve the composite high strength, rheological properties will be of considerable importance. To achieve the molecular contact, it is necessary that the rubber mix in a short time, during passage of a cord fabric to a calender clearance, to penetrate the cord thread and replace air and moisture.

A viscose cord refers to the class of textile materials. It is prepared from artificial fibers. A cellulose serves as a material for the fibers. Physical-mechanical qualities of the viscose cord are higher than of a cotton cord. Thus, in comparison with the cotton, the viscose cord has more evenness of the thread, less decrease of the strength at the increase in temperature, less hysteresis losses, better resistance to repeated deformations, less heat build-up at a tire operation. Life of tires from the viscose cord is far above (on 60-70%), than of tires from the cotton cord. Due to the mentioned advantages, the viscose cord is used at the tires production, especially from a synthetic rubber. Depending on the assignment, the viscose cord is produced with different thickness, strength, relative elongation and twist number. Increase in the number of twists to known limits increases the cord's endurance strength. The disadvantages of the viscose cord are weak rubber adhesion, tendency to residual elongation, increased hygroscopic property, considerable loss of strength at the moisture increase. Processes of impregnation and thermomechanical treatment are used to remove these disadvantages. Different impregnating compositions are used in the tire production, which in the thermomechanical treatment process cover fibers from the viscose forming on their surface active functional groups, which later at the cord rubberizing create chemical bonds between the rubber matrix, increasing, by this means, adhesion of the rubber to the textile cord.

The partial substitution of the resin to MEAPAN causes the positive influence on the bonding strength of the rubbers with fibers. The bonding strength of the rubbers with the viscose cord, treated by the impregnating composition with MEAPAN at 150 °C is 30% higher, than with the viscose cord, treated by the common impregnating composition. It was mentioned earlier that the highest strength properties of the rubbers and rubber-cord systems are achieved in formation of a spectrum of vulcanization and interphase bonds of different energy. Apparently, often observed synergistic effect using surfactants with different types of functional groups, as well as in combination of products, improving wetting of the substrate by the rubber mixture and fluidity of the mixture with compounds forming the chemical bonds can be explained similarly.

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WASTE MANAGEMENT EDUCATION PROJECT

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The importance of environmental protection plays a major role in society in present and future. Special prominence is given to waste management to ensure the conservation of natural resources and close substance cycles. Each private person, legal entity and company can actively support waste avoidance and recycling. Waste management is a young and dynamic field of science and needs ongoing research and optimization. Hence, learning processes of society are not limited.

The region around Lake Baikal, designated as specially protected area and UNESCO world heritage site, is chosen as test region for the project TIWaSiC: «Advanced Training in Integrated Sustainable Waste Management for Siberian Companies and Authorities». The test region is rich in natural resources, such as gold, copper, nickel, iron, oil, gas, coal, aluminium, uranium, diamonds etc. and in forests. These various natural resources resulted in high settlements of industries such as paper, chemical, wood, iron, aircraft, shipping, food and leather industry and mining. Accordingly, various environmental damages arise regarding the emission and emergence of non-hazardous and hazardous substances. Negative influences on the local population and on the increasing tourism can be forecasted on a mid-term and long-term basis if no corresponding prevention measures are applied. But Russian companies lack in two requirements to achieve an environmentally sound production/handling:

- missing knowledge about waste avoidance and minimization in production processes
- missing incentive systems to support measures for waste avoidance, minimization, recycling (e.g. tax reduction, funding measures, etc.).

No training courses according to EU - standards exist that train experts regarding e.g. eco-efficiency, conservation of resources and energy, environmental management systems or BAT-Technologies, which ensure awareness and provide information about related topics.

The global objective of the project is to strengthen the collaboration between science and industry while improving the role of Russian universities in operational waste management and improving the mutual transfer of state-of-the-art knowledge between both. The training course “Integrated Waste Management for Russian Companies (and Authorities)” addresses manufacturing industry, service providers and authorities.

Organisation - Applicant of the project - Technical University Dresden.

Partners: University of Natural Resources and Life Sciences, Vienna; Technical University of Denmark; Technical University of Crete; Irkutsk State Technical University; East Siberia State University of Technology and Management; Transbaikalian State University; Far Eastern Federal University; European-Russian Center for Innovation, Ecology and

Economic development “EuroRuss e.V.”; Ministry of Natural Resources of the Republic of Buryatia; Administration of Irkutsk; National Union of Enterprises concerned with Waste Management.

Training for high school teachers have been conducted within the project: «Analysis of material flows and life cycle assessment» in Technical University of Denmark and «Analysis of waste» in Technical University Dresden and in University of Natural Resources and Life Sciences, Vienna; «Contaminated Sites» in Technical University of Crete in 2015.

One of the important activities of the project became online trial courses on waste management. Courses were held in September 2015. European and Russian participants of the project have read on-line lectures for students from Irkutsk, Ulan-Ude, Chita and Vladivostok.

The dissemination of the results of the project shall reach regional, transregional, national and international companies. Especially on an regional and transregional level, the model of a professional centre (Baikal Wasma) offering training courses and services shall be announced to serve as a good example, which can be applied in other regions of Russia.

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S.A. Kolodyazhny

INSTITUTIONAL ASPECTS RISKS OF FORCE MAJEURE CONDITIONS

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The modern role of the state in regulating economic and social processes associated with the existence and development of institutions. From all definitions of institutions in society, we dwell on the definition of D. North: “Institutions are rules, mechanisms to ensure their implementation, and norms of behavior that structure repeated human interactions”. This definition is characterized in that, in addition to the rules and traditions (“the recurring interaction between people”) includes mechanisms to ensure their implementation, that is, includes the organizational relationship and structure.

For us it is especially important that one of the objectives of the study is to identify existing mechanisms of regulation of interaction of people in tackling social risks and the search for better tools and structural transformations of organizational relationships.

For countries with developed market economies characterized by a set of institutions aimed at promoting the coordinated regulation of social processes. Together they constitute the institutional environment. Moreover, the effectiveness of the institutional environment should not be understood straightforwardly. Social institutions reflect a society’s values,

including moral and ethical order. The maintenance of these values and the ability of the state to regulate their permanence in itself means efficiency, although it can not be measured in quantitative (or monetary) indicators.

Countries with economies in transition only shape the institutional environment, defines the values and regulations to preserve these values. Therefore, the institutionalization of the market economy - is the process of establishing formal institutions that restrict the behavior of economic agents, and complementary to them voluntary informal agreements, “rules of the game”, behaviors and traditions of conducting business practices, contractual relations.

Gradually during the transitional period, the replacement of inefficient informal institutions the legitimate standards ensures the transformation of the spontaneous behavior of economic agents in a simulated on the basis of the extension of the institutional field, the achievement of uniformity of institutions, the synchronization of their functioning, localization of high uncertainty of the economy, institutionalizing mechanisms for interaction between business and the state.” – writes, in particular, O. S. Belokrylova.

Fire risks are the first force majeure in the history of mankind due to their almost unpredictable and destructive force. Among the natural risks firefighters were able to precisely destroy material objects created by people, and the economic damage from them has been overwhelming.

Up until the 1649 fire risk remained among the natural and unpredictable until the rules were adopted for the officials responsible for fire safety. In the future, it becomes a fire hazard apply to technological hazards, the risks associated with the human factor. Therefore, the development of fire-prevention institutions presents an important task of human society. The sources of repayment of fire risks are predominantly budget, so the “game rules” defined by society, we need both the state and the victims of the fire element.

S. V. Ovsyannikov
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L.V. Shulgina

**SUSTAINABLE DEVELOPMENT AS THE ABILITY
TO OVERCOME THE CRISIS OF THE ENTERPRISES**

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Despite the dualism of the concepts of “sustainability” and “development”, this category, bearing the interdisciplinary nature, is applicable not only to the state of the national economy, but also to economic actors. There are expressions “the city is bankrupt”, “the country is bankrupt” etc., which means awareness in the understanding of extreme variants of unsustainable development of different economic actors.

Under the crisis resistance of business Economics we understand a state of stability of the organization in the conditions of crisis situations, and optimizing critical business

functions. Management of crisis-resistance not only prevents and eliminates the extreme degree of instability of the enterprise, but also contributes to minimum growth rates and growth performance.

Economic instability is the state of the economic system prior to actual bankruptcy. The management company uses stabilising (adaptation) instruments and controls depending on the stage of the organization life cycle. At any stage of the life cycle may cause economic instability.

Business crisis stage of functioning of economic systems, manifests itself in the overflow of unused capital. The result of the overflow of unused capital is reduced demand, higher costs, lower prices and incomes, resulting in economic instability.

In the course of the study, we considered the volatility of the economy as a condition that in case of inadequate reaction of the management systems goes into crisis. Based on this the author proposes to strengthen the monitoring of fluctuations in the business environment of the enterprise. Thus, to determine the factors that threaten the sustainable development of enterprises, and to take adequate this threat of regulatory action. In the formation of the regulatory action must consider the impact of the crisis.

The business impact of the crisis on economic activity has a versatile character, which is characterized in the form of barriers and incentives to the motion of the economic system. In particular, the effect of the business crisis, as a set of incentives for the development, is involved in the turnover mass of investment and renewal of fixed capital. This update causes the reduction of costs and offers incentive for intensive production.

On the other hand, business crisis is characterized as barriers to the movement of the economic system, manifested in the destruction of those organizational elements which have a low resistance. Crisis as a limit to economic development is expressed in falling prices, Bank interest, in reduction of production, reduction of employment, the fall in the profitability. During the business crisis devalued human, commodity and productive capital of enterprises. However, lower prices means the partial reduction of commodity stocks at low prices. The dismissal of the staff of the enterprise makes it possible to reduce production costs.

The results of research conducted by the author S. V. Ovsyannikov has shown that the degree of influence of economic crisis on industrial companies is differentiated depending on region, industry, scale, organization, form of ownership, etc. most strongly felt the crisis at the enterprises with low economic potential. Also, there are significant industry differences of the impact of the business crisis.

We concluded that the most severe consequences of the crisis facing such industries as engineering, metallurgy, chemical industry, agriculture. Sectors related to personal consumption (food, light) are less prone to crisis. Strong is the impact of the crisis on small and medium businesses.

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MODERN EDUCATION: CONTENT, TECHNOLOGY AND QUALITY

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The international educational programs are the result of the internationalization of higher school, which J. Knight identified as “the process of implementation of the international and intercultural dimension in the global objectives, functions and methods of higher education.” Pedagogical technologies, used in the design and implementation of international programs for a number of its objectives coincide with pedagogical techniques of multicultural education. Among these aims - the development of ideas about the multicultural environment, the development of multi-cultural communication skills, leading to the adoption of the students the value of multiculturalism. In our opinion, the true meaning of multiculturalism is the tolerant attitude of the representatives of all nations and ethnic groups.

With the implementation of educational and extra-curricular activities of international programs, Russian students perform tasks that require organizational and financial responsibility, personal activity of the student, demonstrated ability to make a conscious choice. This means that used educational technology put the student in terms of achieving the top of the professional skills of students, which makes it possible to apply for the analysis akmeological approach. Choices of situations, both the program and the ways of solving the problems, lead to the formation of the students’ needs for self-development, self-improvement. This requirement is based on a system of values that define a person’s attitude towards other people and the world around, as well as decisions taken by a man. Therefore, self-development becomes the basis for social mobility, which is an essential characteristic of the individual in the modern world.

At the Faculty of Secondary Technical Vocational Education at Voronezh State University of Architecture and Civil Engineering of the Russian Federation self-realization of students is realized through an individual project, which is a special form of organization of the activity of students (educational research or training project). Individual project carried out independently under the guidance of a teacher in accordance with the schedule of consultations on a chosen topic within one or more of the studied subjects and courses at any chosen field of activity (cognitive, practical, educational, research, social, artistic and creative, other). The results of the individual project should reflect: Maturity of communicative skills, educational and research activities, critical thinking; the ability to innovate, analytical, creative, intellectual activity; Maturity skills of project activities, as well as the independent use of the knowledge and methods of action in dealing with various problems, using the knowledge of one or more subjects or subject areas; the ability of setting objectives and formulating hypotheses of the study, planning, selection and interpretation of the information, structuring arguments of research results based on the collected data,

the presentation of results. Individual project performed by students for several years within the framework of study time in the specially allotted curriculum, and should be submitted in the form completed of academic research or developed project: informational, creative, social, innovation, design, engineering.

Increased professional mobility becomes the hallmark of Time. The increase in the production of knowledge-based component requires training of highly qualified personnel, development of teamwork skills.

The modernization of higher vocational education is aimed at becoming a specialist in educational institutions, professional, possessing a high level of development of vocational and technological competencies, characterized on the objectivity, interdisciplinary, multi-functionality. In this regard, it should be noted the timeliness of solving the problem of formation of competence of graduates of technical specialties, increased mobility of education related to the labor market. In modern conditions, a graduate of a technical specialty should be prepared to innovative engineering - the development and creation of new techniques and technologies.

At this stage of direction of modernization of national education is largely determined by The Bologna Declaration, contributing to the inclusion of the concepts related to competence in the concept of modernization of higher education and the transition to a competence model of the graduate. In a broader sense, it means a change of paradigm bases the theory and practice of education and the transition to a competence-based approach in education.

Competence-based approach represents today an innovative process in education, in conformity with most developed countries, the general concept of educational standards, and is directly linked with the transition to the system of competences in the construction of the content of education and its quality control systems.

In order to improve the quality of graduates, a professionally-oriented creative independent work of students on the basis of customer requirements and in accordance with the model of professional competence should be polished up. It is also necessary to take into account the difficulties students face in mastering the competencies listed above in the system of continuing professional education.

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A.N. Sova

THE ECONOMIC STABILITY OF THE ENTERPRISE AS A SYSTEM

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The need for protection against adverse external influences and radical internal changes, and the creation of the basis of the conditions for the stable functioning - is a

fundamental need, like the life of an individual as well as associations of people of various system, including enterprise, government and society as a whole. And in the early stages of development of human society “steady state” implies only physical protection from attack by animals and hostile tribes. With the advent of the myths, religions, and then the science of philosophy in the concept of “sustainability” has become a spiritual component included, expressed in the possibility and the need for a moral ideal. However, in philosophy, and later formed different spheres of scientific knowledge category of “sustainability” has long existed implicitly. Moreover, in the works philosophers, mathematicians, lawyers and sociologists have studied only individual aspects of the phenomenon.

At the present stage of development of the science of “sustainability” is presented as the result of social action to ensure the sustainability of the individual, society and state, and as the primary basis for sustainable existence of any system of education of people (whether society, the state or the company) is considered an economic component. But, despite the fact that this element has acquired great significance, research economists of different schools of thought in any way connected with the consideration of the category of “economic stability”, define the conceptual principles of stability mainly at the level of the state and society. While the basics of creating economic sustainability of enterprises are not given due attention, but they (the company) and are one of the major building blocks of the economy of any country. The foregoing suggests that the modern theory of economic stability in its infancy. And until now, within the framework of this theory, there is no clear interpretations of the term “economic resilience” and “economic stability of the enterprise.”

Let’s try to present our understanding of the nature of economic stability of the enterprise.

As a result of the emergence of real and potential harm to the economic activity of the system is necessary to protect the system, i.e., there is need to address risk situations. This creates the concept and selected the appropriate methods and measures. Then comes the evaluation of the effectiveness of methods used. Moreover, the usefulness of the various measures can be both positive and negative. In the case of a positive result the risk is reduced or even eliminated the threat. So, the need is considered to be satisfied. When we get the negative effect it will return to the position of “the need to meet the needs” and the search for more efficient methods. As a result, sooner or later, risk is minimized or eliminated. But if there are no real threats, the potential risk is always there. Thus, the implementation needs in the area of economic stability will take the form of the circuit.

Therefore, economic stability - is the recognition of the economic entity’s ability to meet through various methods that benefit, the need has arisen.

We know that the needs are the internal driving force of active economic activity (in this case a push to achieve economically sustainable state).In other words, they express the relationship of the subject and its activities and appear in a variety of effects on the object and subject.

In the area of economic sustainability as the subjects are: individual, group of people, the

company, the state, society, etc. Because we focus on the study of the economic stability of the enterprise, the main subject will be the company (in the form of a system of education of people, such as the staff, the owners, as well as the machine), and the society, the government, by enterprises, individuals will be related subjects.

The object of the system is to ensure the economic sustainability of the enterprise, and the subject - economically stable state - is a condition of all resources, relationships and connections which will ensure the independence, stability and capacity for self-development.

In the present definition under the ties and relationships implies the interaction in terms of subject - object - the subject of which is shown in the exposure of the subject to the object and the subject in the process of satisfying the need for protection from the negative effects of possible risks and threats. This action is carried out through a specific set of techniques called "economic sustainability status". It (exposure) can be of two kinds of internal (to ensure internal economic stability) and external (to ensure external economic stability). In the first case refers to the impact of flows moving within the organizational structure and coming from the various services, departments, individual employees in the second - the impact of flows exchanged between the enterprise and the state, foreign organizations and individuals. And, between these types of impacts there is a relationship and interdependence.

However, to achieve economically stable state, only the close relationship of the structural elements is not enough, must also conduct a number of activities and the use of various measures to eliminate the possibility of harm to business activity. In other words, a system of maintenance of economic stability, which is understood as functioning as a whole, the collection, which includes the structural units of the enterprise, their relationships and relationships in the various components of economic stability; measures means measures used by these elements in the process of minimizing or eliminating the risks and threats. Driving the system shown in Figure 4, is made on the basis of consideration of the characteristics of the subject, object and subject of the economic sustainability of the enterprise, taking into account the links between them.

Construction of the system begins with the adoption of regulations on the formation of life, and economic security of the analytical division in the economic service. Then, the data are directly structural units and defines the objectives of their work, authority and responsibility through the development of policies to ensure the economic security and stability of functioning of the economic entity. Set the direct subordination of Economic Security Director General. Finally, the interaction of these units is adjusted to the existing structural units of the enterprise.

The procedure for the functioning of this system is as follows: as a result of risky situations, sources of which are external or related entities or internal structural elements of enterprise owners (and sometimes manual) to make management decisions about the need to address them. Then, within the concept of economic sustainability leadership (sometimes owners) are developed ways of increasing the stability of the economic entity controlled by it through a specific set of measures, the implementation of which is held jointly Economic

Security Service and some parts of economic life by the introduction of the activities of the enterprise. And the efficiency of ways to minimize the risks and threats can be both negative and positive (the desired result of the introduction). In the first scenario, the analysis of the failures of a set of measures and a return to the stage of selection of new schemes to counter the negative trends in the second - enhanced economic stability of the enterprise.

So, we have considered the essence of the phenomenon of “economic sustainability” through the characteristics of the object, subject and object. Based on this view, we believe that the company is entering into various relations in the field of their economic sustainability, with its own structural elements and related subjects can be both object and subject of these relationships. In the course of such a relationship, each subject - object interested in receiving only positive effects, and in the absence of a negative impact, which means there is an element of accountability for the quality of the impact of the subject.

In accordance with all the above, we propose the following definition of economic sustainability:

Economic sustainability - the ability of the subject that arises in the subject-object-subject relationship, meet together with the help of certain measures need to address the actual and potential changes in the properties of the object and the subject, with an element of responsibility for the impact in the course of this process on the other subjects.

Hence, the economic stability of the enterprise - the ability of the enterprise, as an organizational system together through certain measures to eliminate (minimize) the real and potential risks and threats, expressed the need to ensure stability of the effective activity, with an element of responsibility for it.

D.A. Streltsov
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THE NEED FOR INNOVATIVE WAYS OF DEVELOPMENT OF AGRICULTURAL ENGINEERING IN RUSSIA

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Over the past ten years Russia’s economy has undergone fundamental changes, which have affected the agricultural engineering industry. In the past, one of the leading engineering in recent years, is in deep crisis. Its capacities are loaded only by 5-10%, making the financial situation of enterprises in the industry for several years, it remains difficult. It is characterized by the acute shortage of working capital, significant debt to the federal budget and extra-budgetary funds. Low wages. Several times to reduce the number of industrial personnel. Lost a significant part of qualified personnel. Significantly affected experimental design and research base of the industry. A number of leading research institutions after the privatization of virtually ceased to exist. Provision of agricultural producers with necessary equipment of the regulatory requirements of 50-70%

Falling in effective demand contributed to a sharp reduce the volume of domestic

market of agricultural machinery, and the difficult financial situation of the domestic enterprises and related backlog updating the of the process equipment and manufacturing techniques satisfying modern requirements, has led to considerable loss of competitiveness even in the domestic market.

The basic problems of development of agricultural mechanical engineering in the backdrop of the crisis in the Russian economy are the following:

technological backwardness of a number of industries, high material and energy intensity, low productivity and, consequently, high cost of production;

- lack of financial resources, including for R & d that significantly reduces the number of new competitive developments;
- lack of qualified personnel.

At the same negative trends of development of this industry are:

- Aggressive pricing policies of large multinational companies entering the domestic market;
- Unfavorable macroeconomic environment, reducing the impact on the profitability of production;
- High use of imported components in production of agricultural machinery industry.

At the same time, the agricultural machinery industry has maintained a high scientific and production potential. While creating favorable conditions it is able to recover quickly and become the basis of recovery of material-technical base of agriculture of the country. This process has already begun and led to the formation of large domestic corporations (concern “tractor plants”, “Agromashholding”, JSC “Kirov plant”, JSC “New Commonwealth”, CJSC “eurotechnica”), having qualified management, conducting the restructuring of production facilities, developing a programme of recovery and development of production.

Therefore, at present the development of agricultural engineering will take place against the background of the following trends:

- Consolidation of the assets of manufacturers of engineering products and the creation of large integrated structures in the fields of mechanical engineering;
- Increase the volume of state support for high-tech sectors of the economy, as well as the development of industrial infrastructure.

The very specificity of agricultural engineering, expressed his high capital- and knowledge-intensive, is the need to consolidate manufacturers to enhance their competitiveness.

Because of a long idle production capacity and technological backwardness of agricultural machinery today in dire need of investment. Increased production and release of a new generation of products in the required volume can not be done only on the basis of the available.

In the context of the ongoing crisis, additional measures, including those due to the need to implement long-term priorities. Taken at different levels of the federal government

and regional authorities, as well as on each individual company's anti-crisis measures will not be effective without a conceptual approach that defines the strategically important for the country's national economic chain.

Therefore, at this stage, the main task is the creation of a large company in the field of engineering, able to compete with leading Western manufacturers. But this is impossible without the development of business entities, without investment programmes, without creating its own design office, able to design equipment and state of the art technology, and without training of highly qualified personnel.

To obtain the desired results necessary large-scale investment program for the comprehensive modernization of the largest companies in the industry with the introduction of new production facilities.

The necessity of transition to innovative way of development of the Russian economy, the trend of development of agricultural machinery industry, determine the objective need in the formation in Russia of the market of services for managing risk during the creation of the infrastructure of risk management, allowing to reduce the level of risky enterprises.

European Academy of Natural Sciences (Hanover)
European Scientific Society (Hanover)
Russian Academy of Natural Sciences, Moscow

International Forum “Euro-ECO - Hanover 2016”:
Environmental and Engineering Aspects for Sustainable Living

29 - 30 November 2016
ANDOR Hotel Plaza, Hanover, Germany

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Closely connected economic and legal aspects will be also discussed. Special attention is to be paid to developing environmental mentality in students alongside with drawing educational environmental programs for the countries of Eastern Europe.

Scientists, experts and specialists in environment, ecology and economics, law and public health, as well as representatives of politics and business are cordially welcome to attend.

Deadlines:

Deadline for submission of abstracts: October 15, 2016

On-line Submission: info@eu-eco.eu

Application Deadline (specifying a form of participation: abstract, oral presentation, poster, no presentation etc): October 15, 2016.

The best accomplishments in the field of ecology and their authors are to be rewarded with diplomas and medals of the European Academy of Natural Sciences.

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During the Forum a number of professional excursions and a tour of Hanover as well and social events and will be offered.

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