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O‘ZBEKISTON RESPUBLIKASIDA KIMYO SANOATI VA O‘G‘IT ISHLAB  
CHIQRISHNI BAHOLASH

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**Annotatsiya.** Ushbu maqolada O‘zbekiston kimyo sanoatini baholash va tahlil qilish o‘rganilib, respublika kimyo sanoati rivojlanishiga to‘sqinlik qilayotgan asosiy muammolar va omillar aniqlangan. O‘g‘itlar va umuman, kimyo mahsulotlarini ishlab chiqarish va qayta ishlash tahlil qilinadi.

**Kalit so‘zlar:** kimyo sanoati, ishlab chiqarishning texnik holati, tarkibiy o‘zgarishlar, modernizatsiya, kimyoviy moddalar, o‘g‘itlar, tahlillar, global kimyoviy moddalar, strategiya.

ОЦЕНКА ХИМИЧЕСКОЙ ПРОМЫШЛЕННОСТИ И ПРОИЗВОДСТВА УДОБРЕНИЙ В  
РЕСПУБЛИКЕ УЗБЕКИСТАН

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**Аннотация.** В данной статье рассматривается оценка и анализ химической промышленности Узбекистана, выявлены основные проблемы и факторы, сдерживающие развитие химической промышленности республики. Проанализировано производство и переработка удобрений и химической продукции в целом.

**Ключевые слова:** химическая промышленность, техническое состояние производства, структурные преобразования, модернизация, химия, удобрения, аналитика, глобальная химия, стратегия.

ASSESSMENT OF THE CHEMICAL INDUSTRY AND FERTILIZER PRODUCTION  
IN THE REPUBLIC OF UZBEKISTAN

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**Annotation.** This article examines the assessment and analysis of the chemical industry of Uzbekistan, identifies the main problems and factors hindering the development of the chemical industry of the republic. The production and processing of fertilizers and chemical products in general is analyzed.

**Keywords:** chemical industry, technical condition of production, structural transformations, modernization, chemicals, fertilizers, analytics, global chemicals, strategy.

**Introduction.** Today, the chemical industry of Uzbekistan is one of the basic branches of the country's economy and a major supplier of raw materials, various materials and products to almost all industries and has a significant impact on the scale, direction and efficiency of their development.

The chemical sector is the main sector in which Uzbekistan has unique resource advantages. At least one of the more than 70,000 chemical products used today is the direct or indirect raw material of 96 percent of all manufactured goods, making up an important raw material share of even very complex goods such as aircraft. Chemical products are used as raw materials in almost all agricultural, industrial and service activities: food production, water purification, healthcare and pharmaceuticals, housing construction, clothing manufacturing, transportation, electrics, electronics and communications will be impossible without chemical products.

**Literature review.** The improvement of mechanisms should ensure the formation of transparent integrated corporate structures and the creation of investment attractiveness of chemical industry enterprises. The problems of industrial production growth, active development of enterprises, their adaptation in the conditions of socio-economic transformation are reflected in the works of domestic and foreign scientists.

"We live in the material world, we are surrounded by substances. We ourselves are essentially some kind of chemical factories where billions of chemical reactions occur every second," Mikhail Egorov, the director of the Zelinsky Institute of Organic Chemistry, Academician-Secretary of the OHNM, took the floor. – Today, more than 100 million chemical compounds are known all over the world, and their number increases by at least 20 thousand every day. That is, chemistry has almost unlimited possibilities, and the future of our country will largely depend on how developed it is. Let me remind you of the words of the scientist Leonid Kostandov: "What chemistry is, so is life." [12]

Egorov noted that from 1965 to 1980, when Kostandov was the Minister of Chemical Industry, the largest program of chemicalization of the national economy of the country was implemented in the USSR: over 400 new enterprises were built, as a result of which the chemical industry in the Soviet Union was one of the best in the world, and the country ranked first in terms of production of fertilizers and products of high processing.

The academician said that the total volume of chemical production in the world is 4 trillion US dollars, which is about 8.3% of global GDP. One workplace in the chemical industry provides 8 jobs in related fields. Global investments in production amount to more than 190 billion dollars a year, more than 52 billion are allocated annually for

research and development. The production of chemical products is broadcast on 98% of goods. Chemistry is a stimulating industry: the aerospace industry depends on chemistry by 100%, the automotive industry by 100%, resource extraction by 100%, etc.

A significant contribution to the historiography of the formation of the chemical industry of Uzbekistan is made by the works of A.D. Dulman, which reveal various aspects of the development of the chemical industry, the problems of the industry, the ways of their development [1].

However, it should still be noted that the issue of the creation of the chemical industry is disclosed unilaterally. They did not cover the consequences of intensive construction of chemical production. In addition, chronologically they cover the period mainly before the chemical industry in the USSR (under the general ed. Kazaryan P.E.).

The historical experience and problems of the development of the chemical industry at different stages of the history of Uzbekistan are studied in special dissertations. These are the dissertations of M.R. Sharifkhotszhayeva, H. Sahabuddinova, M. Urinbaev, S. Badretdinov, Sh. Askarov [2].

Among the dissertation studies, it should be noted the works of S. Badretdinov and Sh. M. Askarov, written in the conditions of the real changes that have begun, the ideology of society. They differ in new approaches and give a clearer and more correct idea of the problems associated with the development of the chemical industry in Uzbekistan.

Among domestic economists, this problem was dealt with by: L.I. Abalkin, V.N. Voitlovsky, D.S. Lvov, B.Z. Milner, V.M. Proskuryakov, A.G. Porshnev, Z.P. Rummyantseva and others. V.D. Yakobson, M.E. Savinskaya, V.E. Elizariev devoted their works to economic problems in the chemical industry.

Nizhny Novgorod scientists made a certain contribution to the development of theoretical issues in certain areas of the problem: Yu.I. Efimychev, O.P. Korobeynikov, F.E. Udalov, B.V. Shchurov, F.F. Yurlov and others. Among the foreign scientists of economists should be named: N. Ansoff, K. Bowman, J. Stigler.

At the same time, the research of these authors considered, as a rule, individual problems of the functioning and development of the chemical industry at various levels of management, or considered these issues related to other industries.

The improvement of organizational and economic support for the development of chemical industry enterprises should be carried out within the framework of a single strategy by implementing interrelated measures at all levels of management related to this area, including industry as a whole, the petrochemical industry, regional industrial complexes and individual economic entities.

In the works of Professor Mikhma I.B. Zhilinsky[3], the same idea was concretized: "The reliability of mechanical properties cannot fully characterize the qualitative side of the functioning of chemical production equipment, because the operability of the equipment in this case is also determined by the nature of the parameters necessary to perform certain processes, i.e. parametric reliability."

For example, in the work of Orlov M.A. etc [5]. a comparative analysis of the level of reliability of the same type of sulfuric acid production from pyrite (Cherepovets Chemical plant, Meleuz chemical plant, Dorogobuzhsky nitrogen fertilizer plant) was carried out, based on statistical material. A group of devices has been identified, the technical level of which significantly reduces the reliability of production as a whole. Quantitative indicators of reliability of technological departments and individual devices of systems are given.

**Research methodology.** This work is an abridged version presenting the results of the research work carried out by the author in the direction of research on the evaluation of the chemical industry and the production of fertilizers. The paper uses the following methods: content analysis, which allo-

wed aggregating existing approaches to understanding the essence and tasks of development mechanisms; scientific synthesis aimed at developing practice-oriented solutions on the stated topic.

**Analysis and results.** The central position of the chemical sector in modern industrial production explains its large economic size and good growth rates: This is a \$4 trillion industry that directly contributes 5 percent of global GDP and, with growth of 4 percent per year, is expected to double its nominal value in the next 15-20 years. The unique advantage of Uzbekistan is the availability of raw materials necessary for the production of all types of mineral fertilizers – nitrogen (from natural gas), potassium and phosphorus (from ores) – as well as natural gas for energy production and crude oil reserves for the production of methanol, petrochemical products and secondary chemical products in these value chains. With appropriate reforms and investments in skills and technology, Uzbekistan's chemical industry has the potential to create jobs with higher added value, develop other industries and services, create more opportunities for companies and develop exports, including SMEs in secondary production and services.

Table 1

Production of chemicals and chemical products by category

Type of chemicals	Production, thousand tons		
	2018	2019	2020
Pesticides-agricultural (chemical plant protection products in 100% calculations according to the active substance)	2,5	5,2	5,5
Fertilizers (mineral fertilizers in terms of 100% nutrients)	1065,0	1073,2	1134,5
Petroleum products:			
Oil, including gas condensate		4400	4000
Primary oil refining		4900	4300
Industrial chemicals (used in production/processing):			
Synthetic ammonia	1280,1	1265,6	1343,9
Sulfuric acid in monohydrate	925,2	1024,2	1192,6
Caustic soda		18,1	23,1
Soda ash	71,0	76,8	90,4
Other chemicals (unknown/mixed use), incl.:			
Synthetic resins and plastics	143,1	145,5	146,4
Paint and varnish materials	53,1	75,5	80,5
Chemical fibers and filaments	13,0	15,2	24,6

The availability of natural resources is a key advantage in industry, where raw materials and utilities account for 40 to 90 percent of production costs. Uzbekistan ranks 20th among the countries of the world rich in natural gas reserves. It has 1.84 trillion cubic meters and 246 fields of already discovered natural gas, covering more than 60 percent of its territory (Documented oil and gas reserves exist in the regions of Ustyurt, Bukhara-Khiva, Surkhandarya, Hissar and Fergana, with the prospect of

three more regions: Khorezm, the middle part of the Syr Darya and Zarafshan).

While the chemical industry and fertilizer production in Uzbekistan currently provides employment for only 50,000 people, it can provide a larger number of more qualified jobs. The chemical industry has average direct employment per dollar of investment. Nevertheless, the catalytic effect of industry on the economy is well documented, with multipliers from 15 to 20 for secondary and indirect jobs created depending on the state of develop-

ment of the country. According to IFC estimates, every 1 million US dollars invested in the chemical industry creates about 450 jobs: 21 direct jobs and 427 indirect jobs. For example, in Nigeria, an IFC-funded project – Indorama Eleme Petrochemicals Ltd. - added 1,580 full-time permanent jobs for staff and contractors and indirectly created 32,000 secondary jobs in companies using its raw materials to produce goods such as packaging films, containers and furniture. A significant proportion of jobs in chemical plants and related services are places for qualified or semi-qualified employees. This is due to the fact that the chemical industry is technology-oriented and capital-intensive, which requires highly skilled workers for R&D activities and continuous development programs. Thus, the presence of chemical plants in a certain location also triggers the demand for education and vocational training. A large chemical plant stimulates the development of the community and infrastructure around it, as well as the entire ecosystem of supporting services, from logistics and transportation to electro-mechanical products, food services, housing and landscaping. Based on data provided by the Eleme Petrochemicals Ltd. project in Nigeria and similar IFC investments in other countries, each formal chemical industry workplace can create 21 to 32 additional jobs in the wider local community. Chemical products and fertilizers have significant potential to contribute to the achievement of other fundamental results of Uzbekistan's development – entrepreneurship, exports and energy efficiency.

Successful country examples include the Republic of Korea in the 1970s, Thailand in the 1990s, Poland in the 1990s and 2000s, and Nigeria in recent years. The chemical industry is highly globalized, with international trade accounting for about 38 percent of global production. The industry is already a key one for Uzbekistan's exports. The chemical sector, as well as related industries, is the third largest export sector in Uzbekistan by volume, as well as the national industry with the highest economic complexity. Despite this importance, there are significant opportunities for Uzbekistan to expand the production and export of secondary products.

Opportunities for export and entrepreneurship. Today, Uzbekistan produces natural gas for domestic consumption and export and has enough fertilizers for its agricultural needs for cotton and wheat, but not for fruit and vegetable growing. At the moment, the country produces 57 billion cubic meters of natural gas, of which 11.4 billion cubic meters are exported. There are three export destinations: Russia, which imports 5.6 billion cubic meters, China (4.3 billion cubic meters) and Kazakhstan (1.5 billion cubic meters) Uzbekistan is also a major producer of fertilizers, but they are fully used for domestic consumption. Most of the

fertilizers produced in Uzbekistan are nitrogen fertilizers, which are well suited for the production of grain and cotton. Other segments of the chemical value chain in which Uzbekistan could have a comparative advantage have not yet been developed. The strategic priorities of the planned economy during and after the Soviet era were mineral fertilizers: wheat was important for food security, cotton for export, and local demand for many consumer goods simply did not exist. The demand of the wheat and cotton industries is fully satisfied by the domestic production of fertilizers by four companies (Navoiyazot, Maxam-Chirchik, Ferganaazot and Ammophos-Maxam), whose plants range in age from 50 to 80 years. Fruit and vegetable growing, a growing and strategic sector of Uzbekistan, requires phosphate fertilizers.

Domestic production of phosphate fertilizers (250,000 tons) is not enough to meet domestic needs. It is based on manufacturing plants that are outdated and need significant modernization to operate at full capacity. According to the estimates of the Ministry of Agriculture, 3 million tons of phosphate fertilizers are currently needed for the domestic agricultural sector. Pesticides, fungicides and insecticides that can be produced locally are also imported at significant prices at the moment.

For Uzbekistan, the best way to monetize natural resources is the production of processed products through chemical processing, which are both exported and can be used domestically. In the case of Uzbekistan, limited export infrastructure and lack of direct access to seaports makes it difficult to monetize resources such as natural gas. In the past decade, production growth was expressed in single digits, which indicated modest improvements at existing plants and the absence of expansion of production capacities. Uzbekistan has recently increased its ambitions in the production of chemical products and fertilizers. The Chemical Industry Development Strategy for 2017-2021 provides for the modernization and expansion of existing facilities and investments in new enterprises, including in some secondary segments, such as melamine/formaldehyde, methyl tert-butyl ether (MTBE) and PVC. Economic complexity refers to a new line of research that reflects economic growth as the evolution of an ecosystem of technologies and industrial capabilities. Analytical approaches offer new opportunities for empirical mapping of ecosystem data within countries and industries in order to understand their dynamics and measure their compliance. More can be done by strengthening exports and private investment. At the moment, Uzbekistan's most complex exports of chemical products include cellulose acetate, molybdenum oxides and hydroxides, vegetable alkaloids, monoflament and disodium carbonate (Table 2).

Table 2

Uzbekistan's exports of chemical products ranked by product complexity

Description	Export volume, \$	Industry complexity	Growth differential relative to the world 3-year cumulative annual growth rate (% parts)	Growth differential relative to the world 5-year cumulative annual growth rate (% parts)	3-year cumulative annual growth rate (%)	5-year cumulative annual growth rate (%)
Cellulose acetate, oil-plasticized, in primary forms	1365187	1.00	36	-23	42	-11
Oxides and hydroxides of molybdenum	2026406	0.67	155	22	155	10
Vegetable alkaloids, natural or synthetic, and salts, and esters, and so on	2294814	0.65	11	9	7	13
Monofilament, with any crosssectional diameter of more than 1 mm in the form of rods, rods and profiles, with /without surface treatment or otherwise treated, made of vinyl chloride polymers	5911408	0.57	17	5	18	7
Disodium carbonate	3885701	0.56	263	-15	264	-6

Strengthening Uzbekistan's export competitiveness in these products will reduce the country's high dependence on gold and other commodities, as well as open up new opportunities for diversification in the future. Exports will grow if factories can operate at full capacity: chemical processes are capital intensive and large plants improve competitiveness by reducing production costs. A reduction in production costs is mandatory for Uzbekistan, provided that it is necessary to compensate for the high transport costs caused by the lack of access to the sea and insufficient transport and export infrastructure. Exports will become more efficient if current production assets are upgraded with updated technologies and energy efficiency improvements, since these assets are old and among the most inefficient in the world.

After Uzbekistan modernizes its existing chemical production base, it will be able to easily deve-

lop a wide range of basic chemical products, special chemical products, petrochemical products and plastics of various types for the production of consumer goods. The availability of natural gas and ores gives the country a comparative advantage in the production of general-purpose chemical products necessary for the production of a wide range of chemical products for use in various fields, including food processing and storage, health and hygiene, textiles, household items and transportation (segments of the value chain are marked in blue). The current specialization – mainly on raw materials and the most basic chemical products – means low profitability, high dependence on oil and gas prices, and the share of oil and gas at the level of 15 percent of total production costs. Moving further into the secondary sector, chemical companies in Uzbekistan will be able to more than double their profitability indicators (Figure 1).

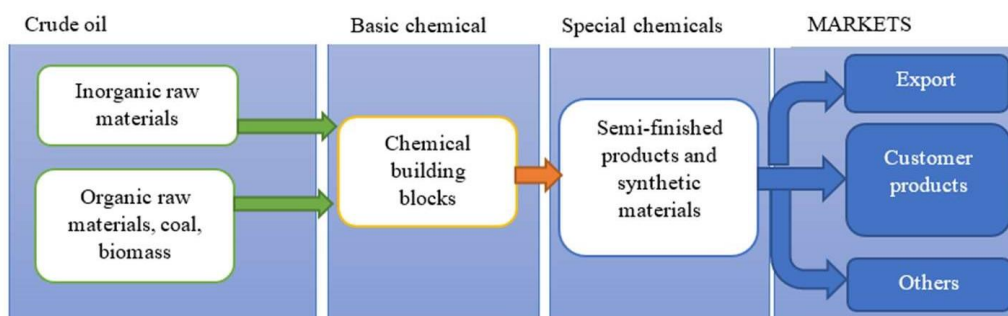


Fig. 1. Standard cost structure in the chemical sector, by segment

After they switch to secondary production, the structure of their expenses will also become more predictable. Since the impact of crude oil and

energy reserves is significantly lower on products that are closer to the final consumer, the correlation between oil and gas prices and the prices of the

final product is significantly reduced. In short, moving to the secondary sector from the current position in the value chain, the chemical industry of Uzbekistan can achieve higher and more stable profitability indicators and become less affected by the prices of consumer goods.

The chemical industry creates opportunities not only for several large companies operating chemical plants, but also for the entire ecosystem of large and small enterprises specializing in secondary activities and ancillary services. Smaller companies are important beneficiaries of the development of the chemical industry, in areas ranging from farming to the production of mass-produced plastic products, packaging, transportation, retail, gas stations, clothing, carpets and yarn.

The development of SMEs creates additional indirect employment and improves competitiveness in secondary sectors.

Export potential to the Central Asian region and to China, countries where raw materials (oil, gas, ores) are available, produce chemical products and sell them to countries where oil and gas are not available. Thus, for example, Qatar is one of the largest exporters of urea, and Saudi Arabia is one of the largest exporters of polyethylene. However, over the past 60 years, Malaysia has transformed from a raw materials economy into a chemical and engineering hub, strengthening the development of trade ties with the main markets of Asia and the Middle East. The chemical industry of Uzbekistan can follow a similar strategy of exporting basic chemical products and special chemical products for the entire region of Central Asia and China.

Uzbekistan's modernized chemical industry can export both fertilizers and other chemical products to neighboring countries and to some extent to China. The chemical sector is mainly regional in nature due to high transport costs. This is confirmed mainly by the regional nature of imports and exports by countries around the world. Nevertheless, Uzbekistan's exports to the region are minimal. With the exception of Kazakhstan, its immediate neighbors import goods from places much further away than Uzbekistan. However, recent improvements in political relations with some of these countries are leading to rapidly growing regional trade. Further, Uzbekistan has good opportunities to export products to neighboring countries based on three main groups of chemical products consumed: ethylene and propylene, ammonia and methanol. These are substances that are widely used in various applications, from food to packaging, in electronics, in carpets, household items, clothing, shoes and tires, in pipes, window frames, plywood, insulation, latex paints, coatings of various types, silicones and other acrylics and, obviously, in fuel and fertilizers. Ethylene and propylene are used for many purposes, from food packaging to antifreeze,

carpets and clothing, tires, shoes, tool lenses, pipes and window frames, and so on. Ammonia is a key ingredient in fertilizers, carpets, home furnishings and clothing, and methanol is used in fuel, plywood, insulation, latex paints, coatings of various types, electronics, silicones, glazing, signs and other acrylics. The proximity of coal plants in China represents an additional export opportunity for Uzbekistan in the field of products based on methanol and propylene.

However, it will be difficult for Uzbekistan to compete in medium- and longdistance markets. The development of fertilizer markets is an example of the problems faced by Uzbekistan. Its fertilizer export market is limited to Central Asia (including Afghanistan). Some nitrogen-based fertilizers were exported to Turkey in 2018, after Turkey stopped imports from Qatar. However, the medium-term probability that Turkey will import goods from Uzbekistan in large quantities is small. Azerbaijan and Turkmenistan, which are closer to Turkey than Uzbekistan, are building large carbamide-producing plants with a capacity of 700,000 tons and 1 million tons, respectively. Uzbekistan will not be able to compete with the Turkish market when these global investments are put into production.

There are six important product groups that Uzbekistan currently imports, but which it can produce and sell both to the domestic market and to the Central Asian region. Uzbekistan is a net importer of ethylene polymers, propylene, plastic pipes, plastic caps, raw polymer film and other polymer films and raw plastic. With the modernized chemical industry, Uzbekistan will be able to produce these products locally. It is a key raw material for the production of many other mass-produced goods. For example, it accounts for 45 to 57 percent of the production of plastic pipes and plastic fittings, products made of expanded polystyrene, plastic bottles and packaging materials and rolling mills for linen, yarn and thread. Regional value chains play a key role in all these products. Uzbekistan will have a significant distance advantage in servicing the regional market of these products compared to operators from Europe, the Middle East and even from more remote parts of Asia. The main comparative advantage of Uzbekistan over neighboring countries is the availability of gas and ores. Unlike its competitors in the chemical sector, Uzbekistan also has gas pipelines and electrical networks throughout the country, a relatively inexpensive labor force (the average salary is \$200 per month) and a large and growing domestic market that can help achieve a scale of production sufficient to ensure profitability.

High transportation costs, worn-out equipment and high energy costs are the main problems for exports. Transportation costs are a key constraint. Uzbekistan's exporters currently ship their

products by rail and through the main ports of Russia (St. Petersburg and Vladivostok) or Turkey. Exports to Europe, according to one company, cost \$2,700 per 20-ton truck. Fertilizer companies also suffer significant losses of competitive advantages due to several factors. The production of chemical products is energy-intensive, so high electricity costs in Uzbekistan are an important cost factor. Equipment wear and further obsolescence of plants built between 1940 and 1969 also reduce the competitiveness of Uzbekistan's fertilizer production. And, finally, losses caused by low efficiency of energy and raw materials use. In winter, gas is used irrationally due to inefficient use of energy by households, which leads to a shortage of gas for industrial activities.

Modernization of chemical facilities will make a great contribution to improving Uzbekistan's low indicators in the field of energy and resource efficiency on a global scale. Chemical and petrochemical production make a significant contribution to this result due to inefficient functioning. Upgrading Uzbekistan's chemical facilities to world industrial standards will not only help increase the profitability of manufacturing companies, but also stimulate efforts to mitigate the effects of climate change. The production efficiency of raw materials, cleaner fuels, modernization of refineries, emission control and energy efficiency in general are critical to significantly reduce production costs (and thus increase export competitiveness). Additional results of efforts to mitigate the effects of climate change can be achieved through the implementation of advanced industrial practices, such as precision farming, approaches to concentration on some kind of crops and fertilizing irrigation (fertilization).

Being once relatively developed, the chemical industry of Uzbekistan is in great need of a radical revision of the regulatory framework, new investments and new technical expertise. The existing plants in Uzbekistan are outdated, consuming significantly more energy than needed per unit of production, and need to be replaced or significantly modernized.

Global fertilizer production is a cyclical, capital- and knowledge-intensive, as well as an oligopolistic industry - the 15 largest suppliers satisfy two-thirds of total global demand. This means that Uzbekistan's chemical industry must strictly assess its available capacity, capacity utilization, raw materials and transportation costs, government policies and global and regional demand. With its natural resources, Uzbekistan has the potential to become an exporter of chemical products and plastics, and not an importer, which it is at the moment. Now imports amount to 666 million US dollars. With the right policies and investments, net exports of 600 million US dollars by 2022. These low export figures exist despite the fact that enterprises in the chemical sector receive subsidized fuel and resources.

Now the production is in an unsatisfactory state, but, with its natural advantages, the chemical industry of Uzbekistan can be made profitable with the help of wellthought-out investments. There is no need to create new enterprises in the country. There are enough existing sites in Uzbekistan where it is possible to modernize and increase chemical production at the expense of 40-50 percent of the cost of creating a new enterprise (see the description of existing facilities in Block 3.6: Existing infrastructure of the chemical industry of Uzbekistan Block 3.6). The chemical industry is capital intensive all over the world, and large plants increase competitiveness by reducing production costs. The lack of capital investments and modernization of existing facilities and poor maintenance hinder the development of the sector in Uzbekistan. For example, at three oil treatment plants in Uzbekistan (all of them are state-owned), the lack of modernization and investment led to a decrease in the level of utilization by more than 30 percent of full capacity (BMI, 2018).

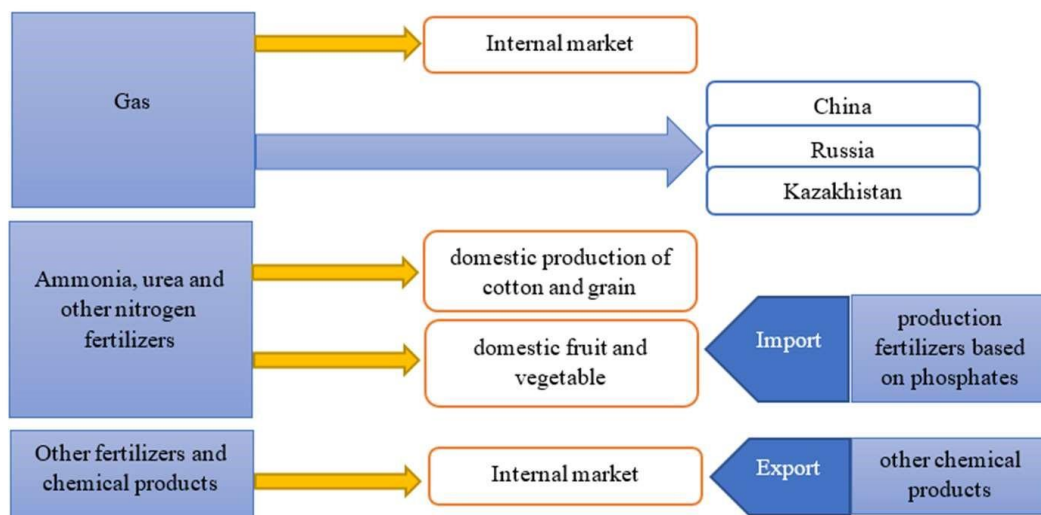


Fig. 2. Chemical industry in Uzbekistan for this year

The chemical industry is divided into two parts and self-regulated, in much the same way as the air transport and ICT industries. Control over the chemical industry is carried out by two state-owned companies equated to ministries: Uzkimyosanoat JSC (UKS) for all fertilizers and inorganic chemicals, as well as Uzbekneftegaz (UNG) for oil and gas, refineries and polymers. These state-owned enterprises manage the chemical assets of the Government (the assets are mainly owned by the State Property Committee). Uzkimyosanoat and Uzbekneftegaz operate independently, without

coordination or cooperation. This is an unusual device for state-owned enterprises in the chemical sector. In other countries, there is usually one agency responsible for all oil and gas production, and another for the processing of petroleum products, fertilizers, polymer products. Uzbekneftegaz and Uzkimyosanoat are both regulatory bodies and shareholders and control production, transportation, logistics, maintenance and all other aspects of the chemical sector (figure 2) (IFC Industry Experts).

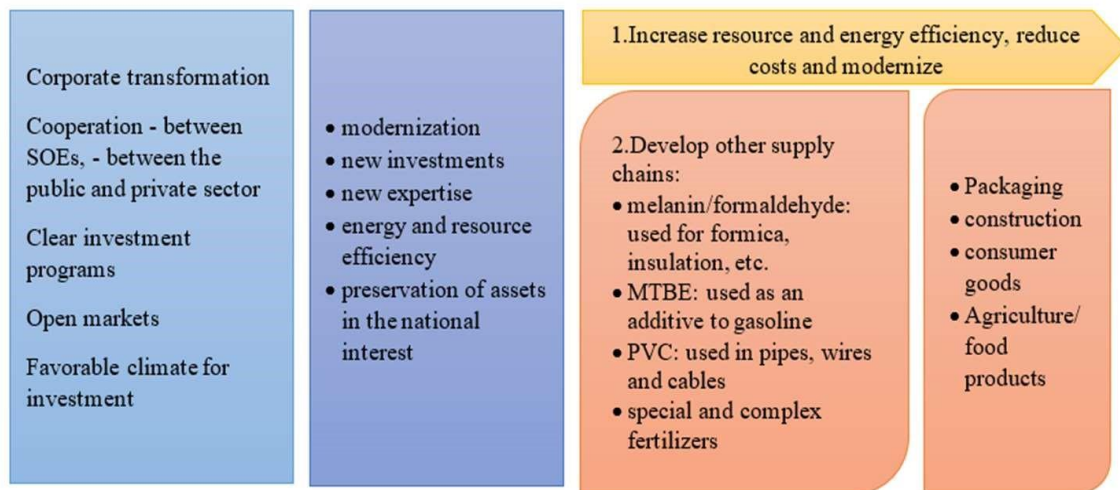


Fig. 3. The potential of Uzbekistan with the reform of the chemical industry and fertilizer production

There are private sector players engaged in sequential processing (for example, phosphate-based fertilizers), but the current scheme of production of initial products and processing suppresses competition and innovation in the market. There is an internal conflict of interest between regulatory, political and operational bodies. Given that regulators are also the main stakeholders, they set the rules of the game in their favor, and this creates distorted incentives in terms of optimizing activities in this sector (for example, commodity pricing, explicit and hidden subsidies and cross-subsidization between individual enterprises, all this contributes to market distortion and inefficiency, and also low power usage).

**Conclusions and suggestions.** The Government's strategy for chemicals and petrochemicals, which is currently being developed, provides for large-scale investments in this sector. However,

exploration and production at the top of the value chain in certain areas are still considered strategically important and may remain under state control. This applies to all largescale projects in the strategic sectors of cotton and grain production and fertilizers. According to the forecasts of Uzkimyosanoat, they should remain in full state ownership, but it is possible to consider organizing the production of final goods together with private investors. Meanwhile, Uzbekneftegaz has shown a clear interest in a large share of investments in the share capital of gas processing enterprises and subsequent production cycles in petrochemicals and polymers. Since these two enterprises use the same natural resources, have products that are transferred through their value chains, and the government controls the supply of raw materials, energy supply and, to some extent, the sale of products, proper coordination is justified, provided the sector develops.

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**СANOAT KORXONALARIDA RESURC TEJAMKORLIGINI  
ОШИРИШ ЙЎЛЛАРИ**

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**Аннотация.** Мазкур мақолада саноат корхоналарида ресурслардан самарали фойдаланишни таъминлашнинг “интеграциялашган ресурс оқими” замонавий концепцияси корхона ресурсларидан самарали фойдаланишдаги роли очиб берилган ҳамда уни жорий этиш бўйича тадбирлар келтирилган. Саноат корхоналарида ресурслардан самарали фойдаланиш бўйича бир қатор муаммолар ўрганилган ва уларнинг олдини олиш бўйича таклифлар ишлаб чиқилган.

**Калит сўзлар:** ресурс тежамкорлиги, самарадорлик, саноат корхоналари, омиллар, диверсификациялаш, ички имкониятлар, асосий ишлаб чиқариш қувватлари, модернизациялаш.

**ПУТИ ПОВЫШЕНИЯ РЕСУРСОБЕРЕЖЕНИЯ НА ПРОМЫШЛЕННЫХ  
ПРЕДПРИЯТИЯХ**

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**Аннотация.** В данной статье раскрыта роль современной концепции «интегрированный ресурсный поток» в эффективном использовании ресурсов предприятия по организации эффективного использования ресурсов на промышленных предприятиях и приведены меры по их внедрению. Изучены ряд проблем по эффективному использованию ресурсов на промышленных предприятиях и разработаны предложения по их предупреждению.

**Ключевые слова:** экономия ресурсов, эффективность, промышленные предприятия, факторы, диверсификация, внутренние возможности, основные производственные мощности, модернизация.