Assessment Report on Classification of Energy and Mineral Resources and its Management in the Republic of Uzbekistan

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Contents

Executive Summary

The geological industry of the Republic of Uzbekistan is designed to ensure the mineral and raw material security of the country, the realization of its geopolitical interests in the region and on the world stage.

The nature of the geological industry is inextricably linked with the basic industries of the Republic, dealing with:

1. extraction, primary processing, transportation and sale of mineral raw materials;
2. the use of mineral raw materials for the production of consumer goods and products, including export-oriented.

The geological industry is the basic component of the dynamically developing economy of the country. Various sectors of the national economy and scientific and technological progress are putting forward to the geological prospecting all the new demands for the types of mineral raw materials and products of its redistribution.

The main tasks facing the geological Republic are:

- ensuring high-quality implementation of comprehensive studies on regional geological study of territories, conducting on a systematic basis state geological surveys of the territory of the country for the timely updating of cartographic foundations and creating standard maps of the new generation;
- high-quality forecasting of exploration work, ensuring an increase in the efficiency of prospecting, evaluation and exploration of deposits:
    - hydro mineral resources,
    - solid non-metallic minerals (including noble, non-ferrous metals and uranium),
    - ferrous and rare metals, rare earth elements,
    - new (non-traditional) types of minerals;
    - hydrocarbon raw materials;
- assessment and forecast of the state of the subsoil in the territories subject to dangerous geological processes and phenomena;
- the introduction of modern advanced technology and technology in the industry;
- scientific substantiation of the priority areas of the industry (research, thematic, developmental works, technological studies of ores of solid minerals), based on normative documents and developed techniques that provide the basic requirements of modern geology to the study of mineral resources;
- implementation on a systematic basis of training and retraining of personnel for the geological industry using the best practices, as well as making proposals for further training in higher and secondary educational institutions of the Republic;
- introduction of modern methods and mechanisms for organizing and conducting work on the geological study of the subsoil, their financing and monitoring.

In general, geological studies, being in the initial chain of identification and development of raw materials, are inextricably linked with the activities of the industries engaged in the extraction, processing and production of mineral raw materials with the further organization of high value-added industries based on them.

The beneficiaries of mineral raw materials are energy producers, fuel and raw materials resources, the metallurgical and chemical industries, the construction industry, the agro-industrial complex and many other basic sectors of the economy.

Introduction

The geological industry is a basic component of the national economy, which is a combination of management structures, industrial and scientific organizations that satisfy the state and society demand in the field of geological study of the territory of the Republic of Uzbekistan; replenishment of the mineral resource base of the country, monitoring and conservation of mineral resources, as well as running the mining relations.

The State Committee of the Republic of Uzbekistan on geology and mineral resources (hereinafter Goscomgeology) is entrusted with the system of state management of the geological industry in the Republic. It implements a unified state policy and legal regulation in the field of study, use, rehabilitation and conservation of mineral resources, as well as monitoring the state of the subsurface resources.

Searching and valuation of deposits is carried out both at the expense of the State budget and the special account of Goscomgeology (it is formed from the assets of the Navoi and Almalyk MMC) under the state programs, and at the expense of the subsoil users on a license basis. Oil and gas exploration works is carried out by "Uzbekneftegaz" JSC.

The Committee provides government services for the geological subsoil study with approval of solid mineral resources and groundwater (except for oil and gas); geological records and funds collecting, generation and storage; licensing of subsurface resources; governmental accounting and state expertise of reserves, information and appraisal of the exploration projects. Supervision functions in the field of government control over the geological study, use and conservation of mineral resources are carried out.

Role of energy and minerals production in national economy

Mineral resources are important and play huge role in the national economy. With further deep processing of raw materials and production of high value-added products on their basis, the share of mineral resources in terms of budget revenues increases significantly.

Today, in the structure of the primary fuel and energy resources of the country, 97% are oil and gas, 2.3% – coal, 0.7% – hydropower. One of the largest companies in the country is UzTransGaz. Over 85% of coal fuels are used in the electricity sector. Electricity production in Uzbekistan in 2016 amounted to 59 bln kWh. In the electric energy system of Uzbekistan, there are 45 power plants with a total capacity of more than 12.4 thousand MW, including the total capacity of 16 power plants of the "Uzbekenergo" SJSC – more than 12 thousand MW. The potential for electricity production is 56-57 bln kWh.

The installed capacity of power plants in Uzbekistan is about 50% of the generating capacity of the entire Unified Energy System of Central Asia.

Electric power generation is carried out mainly at thermal power plants, including the Angren, Novo-Angren, Navoi, Talimarjan and other stations. The largest power station in Uzbekistan and throughout the Central Asia is the Syrdarya TPP at an installed capacity of 3000 MW (commissioned in 1966).

Hydroelectric power plants of Uzbekistan are as follows: Gissar hydroelectric station (45 MW), Farkhad hydroelectric station (126 MW), Andizhan hydroelectric station (190 MW), Charvak hydroelectric station (600 MW), Chirchik-Bozsu cascade of hydroelectric station (1200 MW).

Uzbekistan is among the world leaders in the supply of certain types of minerals: gold, uranium, copper, phosphate, molybdenum, etc. At present, Uzbekistan ranks 7th in the world in terms of uranium reserves (4% of world uranium reserves), holds 4th place in the world in terms of total gold reserves, and 7th place in terms of gold production. Uzbekistan is in the 15th place in terms of gold reserves in tons (data of the World Gold Council as of December 2018).

Production

The state balance of mineral reserves is formed in Goscomgeology and annually approved, and the relevant data are provided to the Ministry of Economy, the Cabinet of Ministers of the Republic of Uzbekistan, to interested ministries, departments, local authorities, etc., in order to plan the development programs and organize production on the basis of local raw materials (Table 1).

Table 1 – Place of Uzbekistan in the world in terms of reserves and production by major types of minerals (as of January 1, 2018)

№	Mineral	Unit of measurement	Reserves		Production (2017)	
			Quantity	Place in the world	Quantity	Place in the world
1	Gold	tons	5990.5	3	89.9	9
2	Silver	tons	21559.9	9	232.3	22
3	Uranium	thousand tons	96.7	11	3.5	7
4	Copper	thousand tons	16336.2	12	137.1	24
5	Tungsten	thousand tons	123.6	6	-	-
6	Oil	million tons	177.2	44	0.9	47
7	Natural gas	billion m^3	2276.5	21	54.4	24
8	Coal	million tons	1950.1	16	3.5	30

Reserves of Phosphorite ores, Potassium Salts and Kaolin are also present (71758.9, 68896.2 and 249992.3 thousand tons, respectively), and their annual production amounts 325.6, 310.6 and 3519.0 thousand tons, respectively.

The growth of industrial production in the metallurgical, construction and other industries, as well as the integrated development of territories, requires proper provision of their additional industrial reserves of minerals, taking into account the significant expansion of geological exploration.

Geological exploration at the rate of production at the level of 2017, in the main areas focused on maintaining the current balance and expansion of the mineral resource base for gold and uranium by "Navoi MMC" SE, for gold and non-ferrous metals (copper, lead, zinc) by "Almalyk MMC" JSC, for agricultural products by "Uzkimesanoat" JSC (phosphorite ores, potassium salts), etc. For tungsten, rare metals and rare earth elements, quartz and the expansion of the mineral resource base is aimed at the creation of new industries.

Annual production of natural gas in the Republic amounts to 54.4 bln m^3, oil – 0.9 mln tons, coal – 3.5 mln tons. Along the way, sulphide sulphur is extracted from ore deposits – 842.1 thousand tons, bismuth – 22 tons, cadmium – 237.2 tons, rhenium – 5.3 tons, indium – 1.1 tons, tellurium – 48 tons, selenium – 101.1 tons, molybdenum – 1457.7 tons. Also, annually Navoiazot JSC produces ammonia – 550 thousand tons, ammonium nitrate – 950 thousand tons, nitrogen-phosphate fertilizer – 180 thousand tons.

Other valuable minerals include copper, gypsum, silver, tungsten and zinc.

Copper is mined at one of the largest deposits in Central Asia, the Kalmakir deposit, at least of 130 thousand tons per year. Lead and zinc are mined in the Handiza own field, and as associated components in other complex fields.

Phosphate rock (Jeroy) and potassium (Tyubegatan) deposits are being developed. And also, the main part of the population is provided with groundwater sources. Currently, geological exploration is underway to provide inaccessible settlements with potable groundwater.

In general, the state of the mineral resource base of the Republic for a number of strategic minerals (precious metals, uranium, oil and gas, mineral fertilizers, groundwater, building materials, etc.) is assessed as satisfactory.

The Republic also has deposits of iron (Tebinbulak), tungsten (Ingichke, Koytash, Lyangar, Sautbay and others), manganese (Dautash, Takhtakaracha), combustible shale (Aktau, Sangruntau), graphite (Taskazgan), which are currently not mined.

During 2017, gold was mined – 89.9 tons, silver – 232.3 tons, uranium – 3.6 thousand tons, copper – 137.1 thousand tons, oil – 0.9 mln tons, gas – 55.4 bln m^3.

The subsoil of the Republic possesses still unexplored types of minerals (platinoids, chromium ores, rare and other metals, abrasives, perlites, caustic soda, mineral wool, basaltoids, etc.) that require the formulation of a complex studies such as: geological, physico-chemical, experimental-technological and technical-economic.

Provision is made by the strategic concepts till 2030 for increase in gold, uranium and copper production. Since 2017, the development of the Nukrakon silver deposit has begun with metal production of at least 5 tons.

Until 2030, the project implementation for involving the Yoshlik-1 copper porphyry deposit in the processing of ores is contemplated. By 2021 it is planned to develop the Uch-Kulach polymetallic ore deposit by open mining with zinc output of 5.2 thousand tons per year.

Investigations for extraction of petroleum resins and associated metals from oil shale are in progress.

In particular, the identified deposits, based on the results of geological exploration are further involved in the development by the State Enterprise “The Navoi MMC”, the “Almalyk MMC” JSC, the “Uzkimyosanoat” JSC and other organizations, as well as by the private sector.

Geological exploration at production rates on the level of 2018 in general guidelines are focused on existing balance maintenance and scoping studies for gold and uranium at the State Enterprise “The Navoi MMC”, and for gold and non-ferrous metals (copper, lead, zinc) at the “Almalyk MMC” JSC. The expansion of the mineral resource base for tungsten, rare metals and rare-earth elements, quartz and basalt raw materials is aimed at creating new producing departments.

Uzbekistan has proven reserves of coal in the amount of 1872.4 mln tons, including: brown coal - 1822.5 mln tons, and bituminous coal - 49.8 mln tons. Inferred resources amount to 323.4 mln tons of coal. Coal production in the Republic is carried out at three fields: Angren (brown coal), Shargun and Baisun (bituminous coal). "Uzbekugol" JSC is the only company representing the coal mining industry in the country. The main activities are exploration, production, supply, storage, processing and sale of coal products, as well as a number of related minerals.

In 2017 Uzbekistan increased coal production by 4.4 % compared to 2016 to 4,038 mln tons. The main consumer of coal fuel is the electricity sector, which accounts for over 85% of total coal consumption.

Structure of the industry

The sectoral structure of industrial production in Uzbekistan is composed of the following industries: electric power, fuel industry, ferrous metallurgy, non-ferrous metallurgy, chemical and petrochemical industries, metal-fabricating industries, forestry, woodworking and paper-pulp industry, construction materials producing industry, light industry, food processing industry and other industries.

The industrial composition of Uzbekistan's production sector is improving and taking the form of an interconnected complex. Machine-building, electric power, non-ferrous metallurgy, chemistry, metalworking were developed by priority rates; that is, those industries that determine scientific and technical progress, developed at a faster pace. Only within the last few years, such major industrial enterprises as the Tashkent and Syrdarya state district power plants, the Navoi electrochemical plant, the Almalyk chemical plant, the Angren rubber plant, the Tashkent motor plant, the Samarkand factory of household refrigerators, the Kuvasay porcelain-faience factory, etc were constructed in the Republic.

Uzbekistan is one of the industrialized Republics of the Central Asian region. About 24% of its GDP is formed in industry. According to preliminary data of the State Committee of Statistics of the Republic of Uzbekistan, in 2017, industrial production in Uzbekistan increased by 1.1% compared with the previous year. According to analysts of the agency, growth in industry in 2017 as a whole was achieved due to the growth of the added value of the mining industry and the development of quarries (+14.6%) and the manufacturing industry (+2.8%). The share of industrial production in the GDP structure made up 26.7%.

As previously reported with reference to official sources, Uzbekistan’s GDP in 2018 was forecasted in the amount of 290.6 trillion soums, the GDP deflator is 14.1%, the consumer price index is 12.4–13.4%.

Major companies and facilities

In particular, the discovered fields, as a result of geological exploration, are further involved in the development of Navoi MMC, JSC Almalyk MMC, JSC Uzkimyosanoat, JSC Uzbekneftegaz, JSC Uzbek Metallurgical Complex and other organizations, as well as the private sector.

SE "Navoi MMC" work off deposits of gold by hydrometallurgical plant (Mining and Metallurgical Plant):

- MMP-1 - Aristantau, objects of Ziaetda ore field (Karakutan, Yangi-Davon, Yambash),
- MMP -2 - Muruntau, Myutenbay
- MMP -3 - Kokpatas, Daugyztau,

- MMP -4 - Charmitan, Guzhumsay, Urtalik,
- MMP -5 - Amantaytau,

Marjanbulak gold recovery plant – Marjanbulak.

SE "Navoi MMC" in 2018 began practicing silver field Kosmanachi. The main part of silver mining is carried out simultaneously from complex deposits of gold, copper and polymetals.

JSC "Almalyk MMC" fulfills deposits of gold, copper and polymetals (lead, zinc):

- Angren mining administration-Kochbulak, Kyzylalmasay, Kairagach
- Chadakskoe mining administration – Guzaksay, Pirmirab
- Kauldinskiy mining administration – Couldi
- Kalmakyr mining administration – Complex-Kalmakyr, Sary-Cheku, Eshlik 1,
- Khandisa mining administration – Base metals – Khandisa

JSC "Uzbekneftegas" fulfills all hydrocarbon deposits (264 field: 213 deposits of gas, 137 oil and 176 condensates. Of the total number 107 fields is in development).

JSC "Uzkimesanoat" fulfills deposits of agricultural raw materials:

- phosphorite ores-Djeroy
- potassium salts-Tubegatan.

JSC "Uzbek metallurgical complex " is still working on secondary metal.

Government policies and programmes in energy and mineral resources

Policy and legal framework

Subsoil use, regulation of relations arising from possession, use and management of subsoil (mining relations) are considered by the Law of the Republic of Uzbekistan “On Subsoil” [Law of the Republic of Uzbekistan “On Subsoil” dated September 23, 1994 No. 2014-XII].

The baisic objectives of this Law are to ensure rational, integrated use of mineral resources for meeting minerals requirements and other needs, conservation of mineral resources, protection of the environment, safe conduct of works when in subsoil use, as well as the preservation of subsoil users’ rights, and protection of interests of the individuals, society and state.

The State Committee of the Republic of Uzbekistan on Geology and Mineral resources is responsible for the implementation of a unified state policy in the field of geological study, subsoil use and protection, as well as the management of mining relations.

A process of mineral resources concentration in the hands of individual large corporations is observed at the world. In the Republic of Uzbekistan, the main or strategic types of mineral raw materials are concentrated in the government sector.

This stresses the dynamic development of geologic branch both in present conditions and current economic situation. At the present time, exploration work is being conducted by Goscomgeology (for solid minerals and groundwater) and "Uzbekneftegaz" JSC (for hydrocarbon raw materials).

The annual financing of exploration for solid minerals amounts at least US$ 80 mln.The main volumes of geological exploration are associated with the replenishment of gold, uranium and metallic mineral reserves (up to 72% of the total amount of financing). In addition, in recent years, exploration works for iron, manganese, coal, oil shale, rare metals and rare earth elements, uranium, etc. has been re-launched or enhanced. About 45% of the total provision for geological exploration are directed to prospecting evaluation and exploration for gold, about 17% for uranium, 10% for other metallic minerals, 4% for

groundwater, 3% for non-metallic minerals, 7% for areal study, 5% for research scientific works, etc. Every year, over US$ 200 mln are expended in exploration for oil and gas.

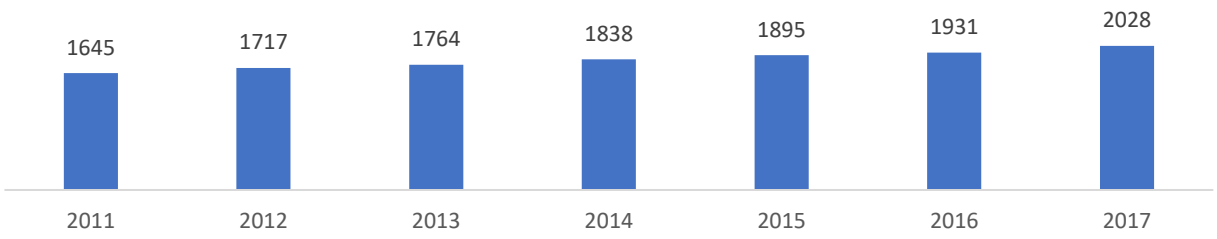
A stable rate of growth is ensured in all areas; and exploration for non-conventional and new types of minerals, which have not been previously explored, is also being conducted.

To date, Goscomgeology is carrying out geological exploration for more than 30 types of minerals, whereas this figure did not exceed 3-4 types 20 years ago. Goscomgeology is engaged in an increase of works for various types of minerals (in addition to strategic ones) in order to achieve complete self-sufficiency of the Republic with mineral raw materials. Thus, geological exploration is aimed primarily at assurance of stable and long-term work of operating and emerging capacities of mining and-metallurgical combines, creating a reliable mineral resource base of needy industries for new types of minerals (rare metals, nickel, cobalt, bauxite ore, celestin and others) with the creation of a competitive climate on the domestic and foreign markets. From year to year the number of discovered deposits in the Republic increases (Figure 2).

One of the key tasks of Goscomgeology is to attract private partners for growing scopes and increase the efficiency of geological exploration. Efficiency of geological exploration with least costs is ensured. For example, about US$ 0.5 is expended in gold mining gain.

At present, long-term exploration programmes for geological exploration, covering the years 2017-2021, have been developed. A conceptual framework for geological exploration expansion until 2030 and 2035 is under development.

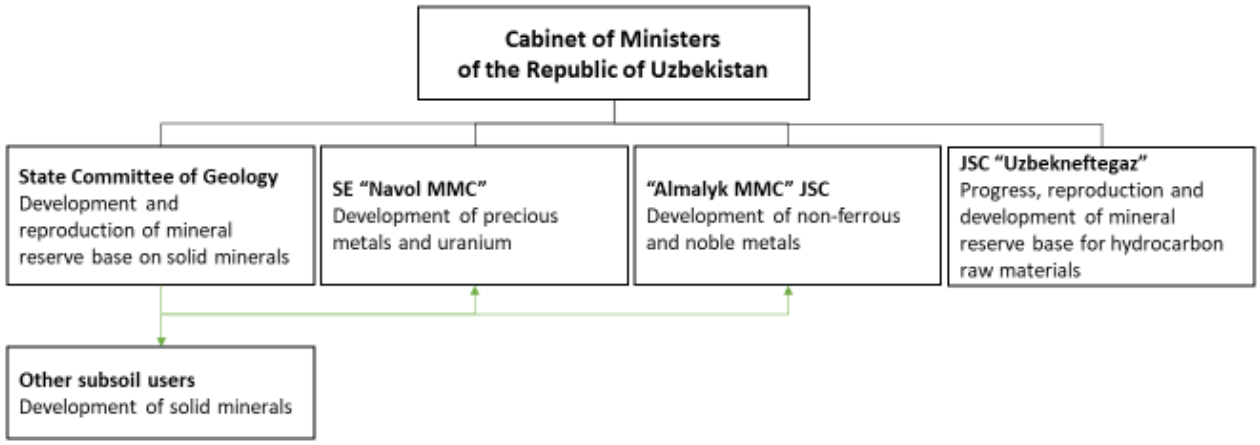
Figure 2 – Total number of deposits in Uzbekistan



Sector organization and regulatory institutions

The state policy on the management of the subsoil has the following form (Figure 3).

Figure 3 – Sector organization and regulatory institutions in Uzbekistan



Fiscal design and administration

Due to the extraction and processing of mineral resources, the contribution of energy and mineral reserves and resources to the economy of Uzbekistan will be more than 16% of national GDP.

GDP structure by branch of economy (2017) is: the share of agriculture in the country's GDP amounts to 19.2%, the share of services in GDP is 47.3%, and industry in GDP is 33.5%.

The proceeds from royalties in the form of tax on the use of mineral resources (except hydrocarbons) for 2017 amounted to 3,484.3 bln soums. With 2017 GDP – 254,043.1 bln soums, respectively, the contribution of the industry in the form of taxes for the use of subsoil resources is 1.37% of the total GDP.

In addition, a further annual increase in the tax on the use of subsoil is expected, taking into account the growth trend in attracting foreign and local investors for geological exploration and development of mineral deposits.

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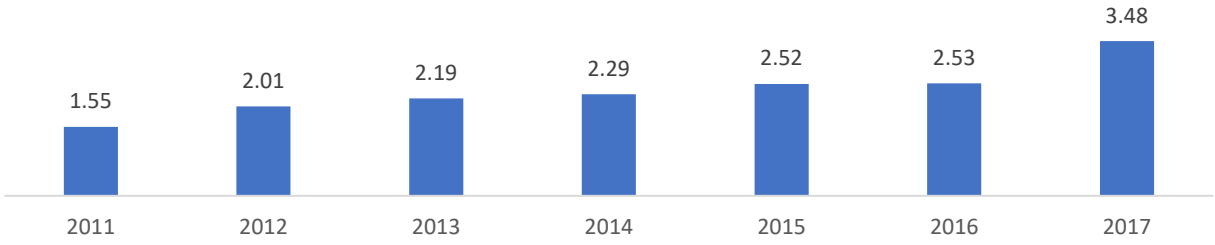
Receipts from royalty in the form of subsoil use tax for minerals (except for oil and gas) for 2017 amounted to US$ 435.5 mln. At GDP in 2017 composing more than US$ 30 bln, respectively, the contribution of the industry in the form of taxes for subsoil use makes up 1.37% from the overall volume of GDP. Moreover, a further annual increase of the subsoil use tax is expected, with allowance for the growth trend in attracting of foreign and local investors for geological exploration and development of mineral deposits (Figure 4).

Along with this, with the further deep processing of raw materials and output of high added value products on their basis, the share of mineral resources in terms of budget revenues, increases significantly.

Figure 4 – Subsoil use tax funds history (trillion sums)



Revenue management and implementation

Exploration for solid minerals and groundwater by the State Committee of the Republic of Uzbekistan on geology and mineral resources is carried out 100% of the budget. For 2019, the program plans to allocate 788.0 bln soums (or US$ 93.8 mln) for geological exploration. It is planned to increase gold reserves by 89.7 tons, silver - 174.1 tons, uranium - 5000 tons, lead - 22 thousand tons, zinc - 24.5 thousand tons, copper - 39 thousand tons, tungsten – 3.5 thousand tons, etc.

Geological exploration for hydrocarbon raw materials is carried out mainly by own funds of JSC "Uzbekneftegaz". For 2019 prescribed 2179,9 bln sums (or US$ 259.5 mln). At the same time, it is planned to increase gas reserves – 60.0 bln m^3 and liquid hydrocarbons (oil and condensate) – 3.6 mln tons.

Sustainable Development Goals implementation

Subsoil use, regulation of relations arising from the possession, use and disposal of mineral resources (mountain relations) are considered by the Law of the Republic of Uzbekistan “On Subsoil” [Law of the Republic of Uzbekistan “On Subsoil” dated September 23, 1994 No. 2014-XII].

The activities of the companies of the mining and metallurgical complex are regulated by the following legislative acts: Key Law –Law of the Republic of Uzbekistan “On Subsoil”, adopted in 2002

In recent years, the country has adopted a number of legal acts expanding investment cooperation in the mining and geological industry:

- Cabinet of Ministers Resolution No. 328, which approved lists of promising areas of strategically important types of solid minerals
- Presidential Decree No. 3479 "On measures for the stable supply of industries of the country with popular types of products and raw materials"
- Presidential Decree No. 3578 "On measures to fundamentally improve the activities of the State Committee of the Republic of Uzbekistan on geology and mineral resources".

It should be noted that at present, regulatory and legal acts are being updated in all sectors based on the relevance of the country's development at a rapid pace.

Classification and management framework for energy and mineral reserves/resources

Description and details of the classification and management system in Uzbekistan

Currently, the Methodological guidelines on the exploration of the stages (solid minerals) adopted by the State Committee on Geology in 1999 are in force in the Republic of Uzbekistan.

Classification of mineral reserves (resources) of Uzbekistan is as follows (Table 2):

Stage 1. Regional geological study of the territory of the Republic of Uzbekistan
Stage 2. Geological survey of 1:50,000 (1:25,000) scale
Stage 3. Prospecting
A. Specialized advanced prospecting works
B. Prospecting works
Stage 4. Evaluation
A. Preliminary assessment
B. Detailed field assessment
Stage 5. Exploration
Stage 6. Supplementary exploration
Stage 7. Operational exploration

Table 2 – Stages of geological exploration for solid minerals of Uzbekistan Republic

Stage 1. Regional geological study of the territory of the Republic of Uzbekistan			
A. Regional geological and geophysical surveys on a scale 1:1000000-1:500000	**B.** Regional geological survey, geophysical, geoecological, geodynamic, geochemical, aerospace geological, hydrogeological and engineering-geological works of a scale 1:200000 (1:100000)	**C.** Local conventional ultradeep work	**D.** Other small-scale studies and generalizations in terms of international cooperation in the study of the geological structure of the Earth, etc.
Stage 2. Geological survey scale 1: 50000 (1: 25000) (Possible P_2 - (P_3))			
Stage 3. Search			
A. Specialized early search works operations (possible P_2 (P_3))		**B.** Prospecting works (P_2 – $P_{1)}$	
Stage 4. Valuation			
A. A priori estimate (C_2, FS)		**D.** Detailed assessment minefield (C_2 – C_1, FS)	
Stage 5. Prospecting (C_2 – C_1, FS)			
Stage 6. Additional exploration			
Stage 7. In-mine exploration			

Relationship with other international systems

Comparison of national classification and CRIRSCO (Table 3).

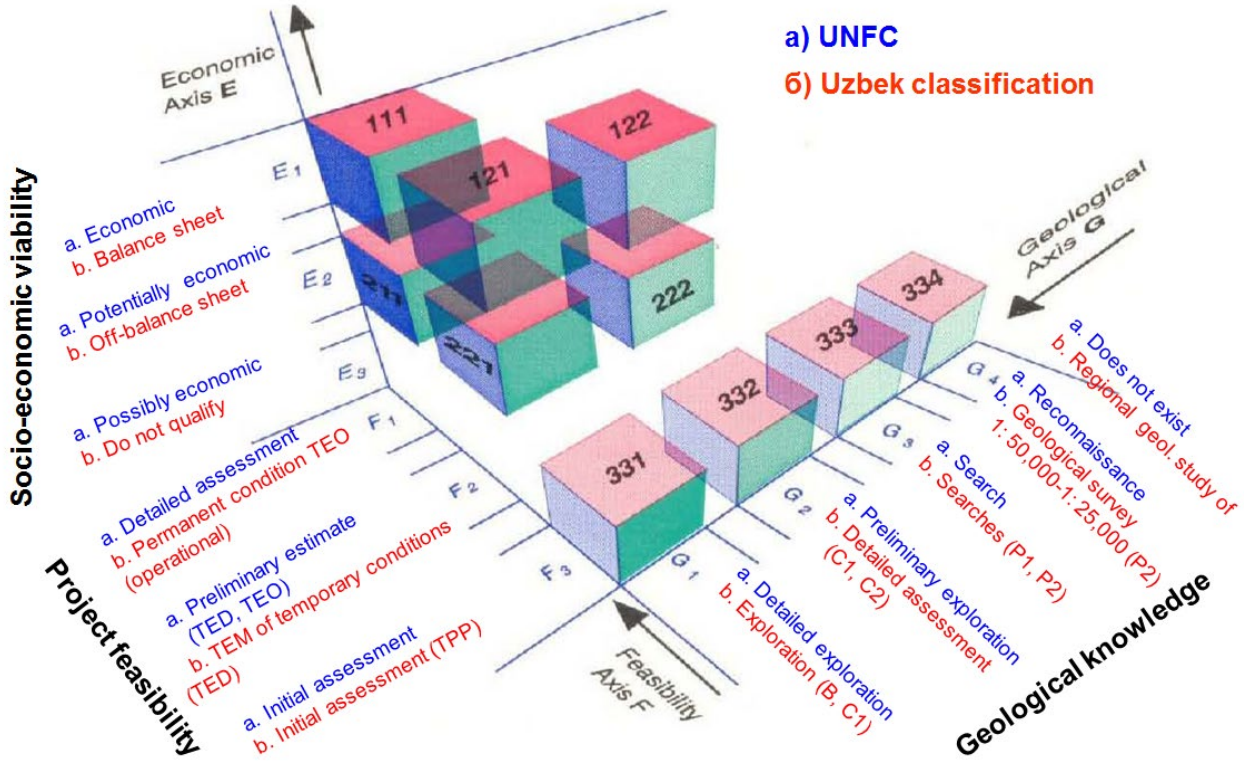
Table 3 – Comparison of national classification and CRIRSCO

National Classification	**A+B+C_1**	**C_1+C_2**	**P_1**	**P_2+P_3**
Template categories CRIRSCO	measured resources (измеренные ресурсы)	indicated resources (исчисленные ресурсы)	Inferred (предпола-гаемые ресурсы)	Exploration results (результаты геологических исследований)

Relationship with UNFC

The comparison of UNFC and new Uzbek classification shows generally the similarity of the proposed approaches to the categorization of reserves (resources) based on the three main characteristics considered above. For each category of reserves (resources) allocated in UNFC, there is a corresponding analogue of the Uzbek classification (Figure 5).

Figure 5 – The principle of coding reserves (resources)



As regard the reserves (resources) separation into categories of economic efficiency proposed by UNFC - “economic” and “potentially economic” it coincides with the groups of reserves identified in the Uzbek classification as “balance” (economic) and “off-balance“ (potentially economic). "Intrinsically Economic" is not qualified in the Uzbek classification (Table 4).

Table 4 – Social and economic viability

Cat.	UNFC Definition	Definition by Classification of the Republic of Uzbekistan
E1	Economic expediency of mining and marketing is confirmed	Balance sheet
E2	Assumed economic expediency	Off-balance-sheet
E3	Economic feasibility cannot be assumed	Do not qualify

Three stages of economic and technological study of the reserves (resources) of UNFC correspond to three stages of technical and economic assessment of reserves approved in Uzbekistan and realized within the framework of working out the feasibility study, engineering and economic report, technical and economic substantiation, permanent or operational conditions, the requirements for which are generally consistent with the UNFC (Table 5).

Table 5 – Project feasibility

Cat.	UNFC Definition	Definition by Classification of the Republic of Uzbekistan
F1	Mining validity is confirmed	Feasibility study of permanent conditions (operational)
F2	Expediency of mining requires further evaluation	Technical and economic assessment of temporal conditions (Feasibility study of provisional standards)
F3	Mining validity cannot be assessed due to lack of technical data	Initial assessment (Feasibility Study)
F4	Development project or mining operations project is not available	Not qualified or considered as reserved - explored

The four stages of geological knowledge of reserves of the UNFC are basically similar to the stages of geological exploration, in the framework of which the reserves (resources) of various categories are justified (B, C_1, C_2, P_1, P_2) (Table 6).

Table 6 – Geological knowledge (State of geological exploration)

Cat.	UNFC Definition	Definition by Classification of the Republic of Uzbekistan
G1	Quantities can be estimated with a high degree of confidence	Exploration (B, C_1)
G2	Quantities can be estimated with an average degree of confidence	Detailed assessment (C_1, C_2)
G3	Quantities can be estimated with a low degree of confidence	Prospecting (P_1, P_2)
G4	Estimated quantities attributed to a potential deposit, which are mainly based on indirect data	Geological survey of 1:50000-1:25000 (P_2, P_3)
		Regional Geological Survey

It should be noted that when comparing the classifications under consideration, it should be borne in mind that the “detailed assessment” along the axis of geological knowledge in the classification adopted in Uzbekistan coincides with the stage of “preliminary exploration” at UNFC. Reserves explored and qualified in Uzbekistan, can be identified within the framework of the Republic of Kazakhstan with the assignment of appropriate codes.

The main conclusions are as follows. The UNFC principle of codification, based on the priority of the index of “economic effectiveness” is somewhat subjective. The reserves, quantity and quality of which allow them to be qualified as economic in one country, may be non-economic in another, and vice versa.

Compliance of the Uzbek classification with UNFC is rather high.

The main difference of UNFC approach is to give economic factor a leading value. Other differences include:

- At staging of geological study, the term «*Regional geological study»* in UNFC does not exist.
- As noted above, preliminary exploration (reconnaissance) of UNFC corresponds to a detailed assessment of the Uzbek classification.
- «Detailed exploration» of the UNFC is similar to the term «exploration».
- The term «Additional exploration and Operational Exploration» of UNFC is not covered.
- The “reserves” and “resources” at UNFC are applied to codified reserves classes 111, 121, 122; the Uzbek classification also includes 211, 221, 222, 331 and 332.

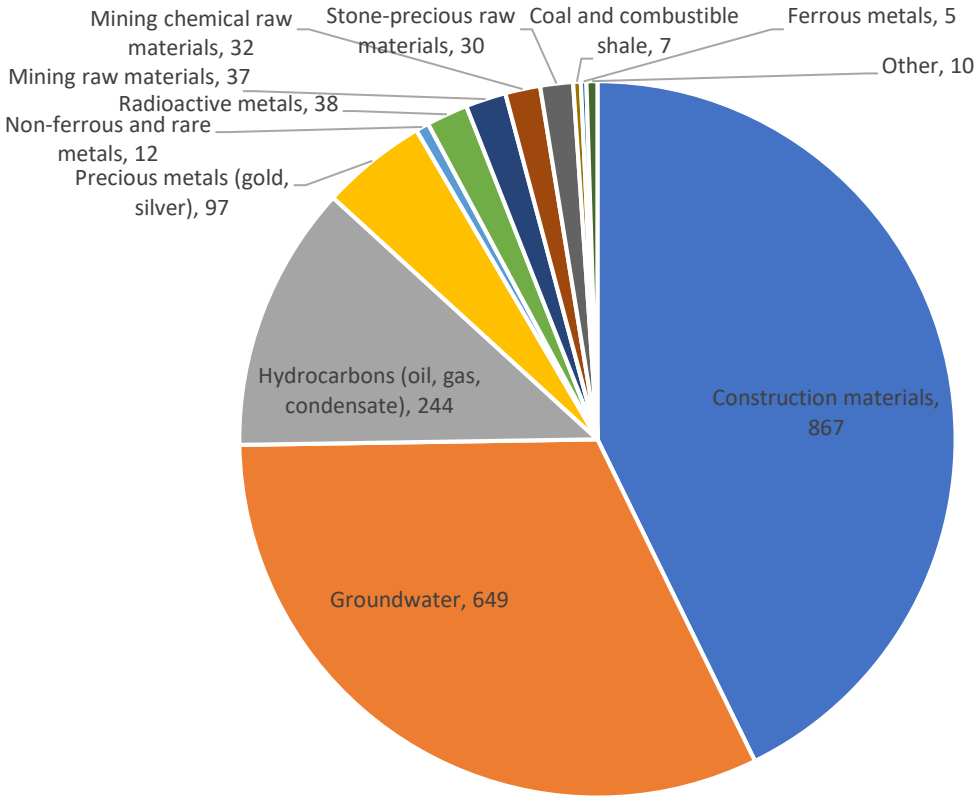
Application of UNFC at geological exploration in Uzbekistan will require a reassessment of solid mineral reserves of all previously explored deposits based on market economy criteria.

Energy and mineral resource endowments

The Republic of Uzbekistan is among the world leaders by range of coverage of selected types of minerals: gold, uranium, copper, phosphate, molybdenum, and etc.

As of January 1, 2018 the State balance of minerals of the Republic of Uzbekistan includes 2028 deposits, of which: construction materials – 867, groundwater – 649, hydrocarbons (oil, gas, condensate) – 244, precious metals (gold, silver) – 97, non-ferrous and rare metals – 12, radioactive metals – 38, mining raw materials – 37, mining chemical raw materials – 32, stone-precious raw materials – 30, coal and combustible shale – 7, ferrous metals – 5 (Figure 6). There are 90 gold deposits and 40 uranium deposits in the Republic, which are being developed at about 50%.

Figure 6 – Deposits in accordance with the State balance of mineral reserves of the Republic of Uzbekistan



Copper

Total reserves of copper amount to 16336.2 thousand tons, gold extraction made up 137.1 thousand tons, at the current rate of production-reserves are sufficient for more than 100 years.

The copper producer in Uzbekistan, the "Almalyk MMC" JSC is one of the largest producers of non-ferrous metals in the Central Asian region.

The share of AGMK accounts for about 90% of silver production and 20 percent of gold in the country.

The plant includes two mining enterprises, two concentrating mills and two metallurgic plants with their infrastructure. The total volume of production is estimated more than US$ 300 mln per year.

The plant has the right to develop deposits of copper-molybdenum and lead-zinc ores in the area of Almalyk town (Tashkent region). The raw material base of AGMK is the "Kalmakyr" and "Sary-Cheku" deposits of copper-porphyry ores (Tashkent region) and the "Uch-Kulach" (Dzhizak region) deposit of lead-zinc-barite ores.

Gold

Uzbekistan ranks third in the world in terms of total gold reserves and ninth in terms of production. In 2017, 89.9 tons of gold were mined. Total gold reserves are 5990,5 tons, at the current rate of production reserves are sufficient for more than 50 years.

Currently, 81 gold deposits have been discovered in the Republic, 25 of which are being developed.

Gold mining in the country is concentrated in 2 major enterprises — the Navoi and Almalyk mining and metallurgical combine (AGMK and NGMK). In recent years gold production at the "Navoi Mining and Metallurgical Combine" state enterprise (NMMC) amounted to more than 60 tons with the total production

of this metal in the Republic of about 90 tons. The NMMC production complex unites five metallurgical plants in Navoi (Mining and Metallurgical Plant-1), Zarafshan (Mining and Metallurgical Plant-2), Uchkuduk (Mining and Metallurgical Plant-3) and Zarmitan (Mining and Metallurgical Plant-4), Mardjanbulak gold recovery factory (MGRF) in the Mardjanbulak village of the Samarkand regionTungsten

Known reserves of tungsten are 123.6 thousand tons in 8 fields. Currently, geological exploration is being carried out on 4 promising areas. Deposits are not worked out. In accordance with the order of the President of the Republic of Uzbekistan, a tungsten cluster was created, which covers all known tungsten deposits.

Cement

Cement production accounts to 76% of the total construction materials production sector; and increased from 3.7 mln tons in 2002-2014 to 7.5 mln tons in 2014 (Table 7).

Table 7 – Designed capacity of cement enterprises, thousand tons

Operating plants		**Designed and under construction plants**	
Enterprise *	**Capacity**	**Enterprise ***	**Capacity**
JSC "Kizilkumcement"	3 500	IP TITAN CEMENT LLC	221
JSC "Akhangarancement"	1 740	JV Shangfeng Bridge of Friendship	1 200
JSC "Bekabadcement"	1 250	OOO Yaypanshifer	100
JSC "Kuvasoycement"	1 080	DP "Gallaorocement"	100
Jizzak Cement Plant	1 000	Sherobod Cement Plant	1 500
JV Fergana Cement LLC	120	SP LLC "Surkhantsementinvest"	360
Turon Eco Cement Group LLC	100	Total	3 531
OOO Farhadshifer	100		
Everest Metal Favorite LLC	100		
Kezar LLC	60		
JV LLC "Sing Lida"	100		
PE "Buyuk"	60		
Total	9 210		
Grand total		**12 482**	

* All operating, designed and under construction enterprises are full-cycle production plants.

According to the parameters laid down in the program of measures to ensure structural reforms, modernization and diversification of production for 2015-2019, it is planned that the production of cement in Uzbekistan will grow annually by an average of 3.5% and reaches 8.9 mln tons by 2019 of 15 varieties.

The program provides technical re-equipment of the key player in the cement market of Uzbekistan, the «Kyzylkumcement» JSC priced at US$ 30.7 mln at its own expense and modernization of the grinding department of «Bekabadcement» JSC priced at US$ 5.5 mln.

Currently, according to «Uzstroymaterialy» JSC, there are 4 cement plants operating in the company's system. More than half of the production - more than 3 mln tons of cement per year, using an economical dry method, is produced by «Kyzylkumcement» JSC, the youngest cement enterprise of Uzbekistan, founded in 1978.

The second largest plant, the «Akhangarancement» JSC, this year will mark the 72 year's anniversary; its capacity allows producing more than 1.7 mln tons. «Kuvasaicement» JSC designed for production of 1 mln tons cement, this year will be 52 years old.

Foreign capital exists in «Akhangarancement» JSC; the controlling stock interest belongs to the large Russian holding company Eurocement Group.

According to experts' opinion, the cement industry is fuel-and energy-intensive. The share of fuel and energy in the structure of costs of production and sales reaches 50%. Currently, at three Uzbek plants, with the exception of the largest "Kizylkumcement", the energy-intensive wet method of production is dominated. Fuel consumption in the wet method is much higher than at the "dry" method.

Increase in cement production in Uzbekistan is also due to the efforts of the Almalyk MMC, which in 2014 together with the Turkish company Dal Teknik Makina Ticaret ve Sanayi A.S. put into operation a plant for the production of portland cement and white cement in the Zafarobad district of the Jizzak region. The plant's capacity is 350 thousand tons of white cement and 760 thousand tons of portland cement. The total cost of the project amounted to US$ 120.3 mln. The project was funded at the expense of the plant's own funds (US$ 46.1 mln) and a loan from the Fund for Reconstruction and Development of Uzbekistan (US$ 74.2 mln).

According to the forecast, «Almalyk MMC» JSC before the 2019 year will build another cement plant in the Sherabad district of the Surkhandarya region by a capacity of 1.5 mln tons of portland cement and at a preliminary cost of US$ 225 mln. Financing sources were set up the plant's own funds in the amount of US$ 24.4 mln, funds from the Fund for Reconstruction and Development of Uzbekistan equal to US$ 90 mln and loans from Uzbek commercial banks in the amount of US$ 110.6 mln.

The global indicator characterizing the degree of industry development is the level of cement consumption per capita. At 2014 year-end, it was amounted of about 234 kg in Uzbekistan. For comparison: cement consumption in the Czech Republic, Poland, and Egypt is at the level of 200 - 400 kg per person, in Germany, Italy, Spain is at a level of 400- 800 kg. By 2019, Uzbekistan plans to produce 8.9 mln tons of cement annually. According to forecasts, by 2020, per capita cement consumption in Uzbekistan will be at least 328 kg of cement per year.

Potash

"Uzkhimprom" JSC plans in 2018-2030 to increase the production of mineral fertilizers in 2 times - up to 2.4 mln tons per year.

Plans to increase capacity are fixed in the «road map» for modernizing production facilities, deepening the processing of basic products, making rational use of assets and introducing modern management methods into the activities of «Uzkhimprom» JSC. The «Road Map» was approved by a resolution of the President of Uzbekistan Shavkat Mirziyoyev.

It is planned that the total output of chemical industry in Uzbekistan will increase 4.5 times by 2031, and exports will grow 4 times. At the same time, according to plans, the share of output of organic chemistry in the total production will grow from 7 to 54%. For these purposes, 29 investment projects for modernization, expansion and creation of new processing industries at an estimated value of US$4.8 bln, mainly involving direct foreign investments is planned to be implement.

It is noted in the "road map" that "systemic problems that limit further development and diversification of the chemical industry, attraction capital improvement of existing and construction new chemical production facilities, and expansion of export supplies remain" in the industry.

One of the key problems of chemical industry in Uzbekistan is the facilities obsolescence. Thus, enterprises with production of complex mineral fertilizers are outdated by 60-70% that results in over-expenditure of energy resources and an increase in chemical products cost. In addition, due to the weak development of deep processing in Uzbekistan, the chemical products are imported annually by US$1.5 bln.

By April 15, 2019, the government of Uzbekistan was commissioned to make proposals on reforming the chemical industry system and increasing its investment attractiveness, taking into account the recommendations of international consulting companies.

"Uzkimyosanoat" JSC incorporates chemical enterprises of the Republic. The structure of society includes 13 industrial enterprises, 13 territorial distribution organizations engaged in the sale of mineral fertilizers to agriculture, scientific research and design Institutes.

Natural Gas and Petroleum

264 oil and gas fields have been discovered in the Republic. According to the facts in the report of the Center for Economic Research (CER) of Uzbekistan, on retention of the current trends and volumes of resource consumption, natural gas and coal reserves in Uzbekistan will be sufficient for the next 20-30 years, while oil reserves are almost depleted.

The largest corporations in the power industries of Uzbekistan are CNPC (China National Petroleum Corporation), KNOC (Korea), Gazprom, Lukoil, Uzbekneftegaz.

Natural gas reserves amount to 2239.9 bln m^3 and production makes up 3.5 bln m^3. Uzbekistan ranks 11^{th} in the world in natural gas extraction, and 10^{th} in the world in consumption of natural gas.

Oil reserves amount to 178.1 mln tons, proven oil reserves make up 81 mln tons. Production makes up 0.9 mln tons (806 thousand tons as of 2017).

The main oil fields are located in the Karakalpak Autonomous Republic and in six administrative regions: Kashkadarya, Bukhara, Surkhandarya, Namangan, Andijan and Fergana. The main volume of reserves is concentrated within the Kokdumalak field, the largest in the country. The development of this field (over 50% of the reserves are concentrated in the territory of Turkmenistan) is carried out in accordance with the intergovernmental Agreement between Uzbekistan and Turkmenistan signed on March 1997. In accordance with the terms of the Agreement, part of the extracted oil is supplied free of charge to the Seidinsky oil refinery in Turkmenistan (Table 8).

Table 8 – Crude oil production, mln tons

Year	2010	2011	2012	2013	2014	2015	2016
Total	3,9	3,6	3,2	3,0	2,2	2,2	2,1

Since 2003, Uzbekistan has been importing oil from the Kumkol field in southern Kazakhstan. In addition to Kazakh oil supply, volumes of Turkmen raw materials were supplied to Uzbekistan. Chinese "Petrochina" in 2016 supplied about 111 thousand tons of gas condensate (in 2015 – 125 thousand tons) to Bukhara oil refinery from Turkmenistan.

Two major oil refineries – the Bukhara oil refinery (of a fuel profile with a capacity of 2.5 mln tons per year), Fergana oil refinery (fuel and oil profile with a capacity of 5.5 mln tons per year) and the Alty-Aryk oil refinery (fuel and oil profile with a capacity of 3.2 mln tons per year) are operating in Uzbekistan. According to some reports, due to the decrease in oil production, their utilization does not exceed 50%. In the Surkhandarya region a small Uzbek-Russian JV "Jarkurgannefteprocessing" also operates for heavy oil refining (Table 9).

Table 10 – Production of oil products, mln **tons**

Product	Year			
	2013	**2014**	**2015**	**2016**
Gasoline	1,8	1,07	1,07	1,13
Kerosene	0,25	0,16	0,16	0,18
Diesel fuel	1,12	0,99	1,09	0,98
Heating oil	0,19	0,12	0,07	0,10

52% of oil products consumed in the country are used in transport, 16% – in agriculture, 13% – in power industry, 5% – in industry.

Coal

Uzbekistan possesses proven reserves of coal in the amount of 1900 mln tons, including: brown coal — 1853 mln tons, bituminous coal— 47 mln tons. Inferred resources amount to over 5.7 bln tons of coal. Large reserves of bituminous coal are concentrated in the southern regions — the Surkhandarya and Kashkadarya regions. Currently, coal mining is carried out in three fields: The Angren brown coal deposit, the Shargun and Baisun bituminous coal deposits.

Coal mining on the territory of Uzbekistan is carried out by:

- "Uzbekugol" JSC of the State Joint Stock Company "Uzbekenergo" develops the Angren brown coal deposit:
- by open mining - the Unitary Enterprise "Razrez Angren»;
- by underground mining - Unitary Enterprise "Administration of coal mining underground method".
- "Apartak" JSC develops the Angren brown coal deposit by open cut method by the "Apartak" coal strip mine.
- "Shargunkumir" JSC develops the Shargun and Baisun coal deposits by underground method with partial processing of the extracted coal into coal briquettes at the Shargun briquette factory and the Baisun briquette unit.
- "Erostigaz" JSC develops the Angren brown coal deposit by in-situ gasification.

So, in 2017, up to 3.92 mln tons of coal were produced, in 2019 this figure should be 4.78 mln tons, and by 2021 - 11.67 mln tons. At the same time, in 2016, the Republic produced 3.87 mln tons of this fossil.

In general, it is planned to allocate US$ 690.5 mln for the development and modernization of the coal industry of the Republic in 2017-2021. Within these measures, it is planned to implement six investment projects. Upon that, US$ 87.5 mln will be own investments of coal enterprises. Commercial banks of the country will allocate US$ 155.6 mln, the Fund for reconstruction and development of Uzbekistan – $68.7 mln. In addition, concessional loans of Shanghai Cooperation Organization in the amount of US$ 378.7 mln will be attracted for implementation of these projects.

One of the largest projects targeted for implementation will be replacement of physically and morally outdated equipment at the enterprises of the industry. Its preliminary cost is estimated at US$ 170.2 mln. Within the framework of the project, it is planned to purchase mining technological and auxiliary equipment.

Along with this, it is planned to update the fleet of railway equipment of the "Uzbekugol" company for which US$ 59.6 mln will be spent. On these funds, coal miners will purchase locomotives, traction units, dump cars. It should be noted that due to all these projects, the volume of overburden mining in the Republic in 2018 increased to 22.3 mln m^3, and by 2021 – to 27.8 mln m^3, which is 1.3 times more.

Uranium

According to the IAEA, Uzbekistan is in seventh place in the world by uranium reserves (4% of world uranium reserves) and fifth by its production. Currently about 40 deposits have been explored, the basis of which is 27.

According to the data of Goscomgeology, the explored and estimated uranium reserves amount to 185.8 thousand tons, of which 138.8 thousand tons are uranium of sandstone-type, 47 thousand tons are black-shale type.

The monopoly uranium producer in the Republic is the Navoi Mining and Metallurgical Combine (NGMK). The plant plans to increase uranium production to more 3 thousand tons by 2020. Until the early 1990s, NGMK produced annually up to 3.5 thousand tons of low-enriched uranium.

The Republic does not have its own nuclear industry and all produced low-enriched uranium is exported.

By the decree of the President Shavkat Mirziyoyev dated July 19, 2018 On measures for the development of nuclear energy in the country, the Agency for the development of nuclear energy "Uzatom" was established under the Cabinet of Ministries.

70% of the country's electric energy is generated using gas, 14% - hydro-electric power stations, 13% - coal, 3% - oil. By 2030, according to forecasts, the planned nuclear power plant will account for 15% of the produced energy, gas - 54%, hydroelectric power - 14%, coal - 11%, oil - 3%, renewable sources - 3%.

According to the agreement with the State Corporation "Rosatom", in Uzbekistan by 2028 it is planned to build a nuclear power plant. The complex will be comprised of two power units by a capacity of 1200 megawatts each.

Renewable energy

The Republic is rapidly working on the commissioning of renewable energy sources.

Uzbekistan has a good prospect of using renewable energy sources in remote and ecologically disadvantaged regions. Climatic and geographical conditions of the country make the future use of renewable energy resources (RES) very promising. First of all, it concerns solar energy. The potential of solar energy in Uzbekistan is estimated at 50,973 mln tons of oil equivalent.

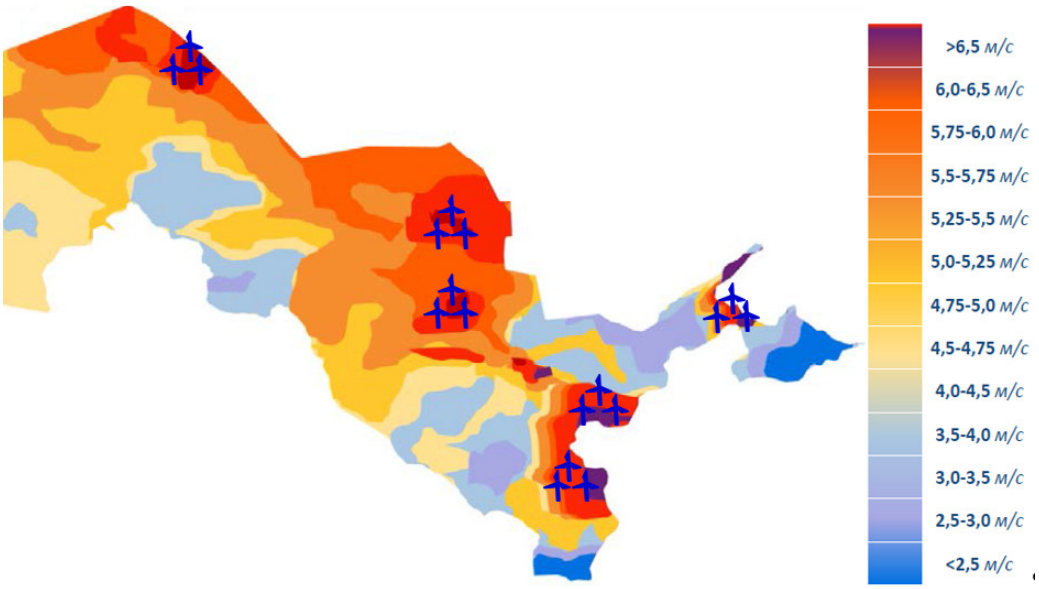
In Uzbekistan, solar time reaches 2000 hours in the North and 3000 hours in the South. During the day, solar radiation fluctuates within 7-10 hours, in the North the annual solar radiation is 4800 MJ /m^2, in the South — 6500 MJ /m^2. (Figure 7)

Figure 7 – Daily amount of total solar radiation (kW*h/m)

One of the renewable energy sources used in the world is wind energy. The potential of wind energy in Uzbekistan is estimated at 2.2 mln tons of oil equivalent. In accordance with the geographical location of Uzbekistan, wind flows are seasonal in nature. On the plains, the average annual wind speed is 2.0-5.0 m/sec (Figure 8).

Specialists of the Academy of Sciences, research institutes, and research centers conduct researches and carry out developments of RES. The center for economic researches in 2011 prepared an analytical report "Alternative energy sources: the possibility of using in Uzbekistan", which assesses the future energy balance of the Republic of Uzbekistan for the period up to 2020, briefly summarizes the rich international experience in the introduction of alternative energy sources to assess the possibilities of its application to the conditions of Uzbekistan.

Figure 8 – The potential of wind energy in Uzbekistan



– Optimal place for the construction of wind power stations

One of the main governmental decisions on the development of renewable energy and energy efficiency upgrading in Uzbekistan is the decree of the President of the Republic of Uzbekistan "On the Program of

Measures for the Further Development of Renewable Energy, Improving Energy Efficiency in the Economy and Social Sector for 2017-2021". This decision noted that in accordance with the Program of measures to reduce energy intensity, the introduction of energy-saving technologies and systems in the sectors of the economy and the social sphere for 2015-2019, approved by the Presidential Decree No. PP-2343 of May 5, 2015. In the Republic in recent years a wide range of measures has been implemented to ensure energy conservation in the sectors of the economy and the social sphere.

In this regard, 4 investment projects for the construction of solar and wind power plants were included to the current program; among them three are solar stations by a capacity of 100 MW each in the Samarkand, Surkhandarya and Navoi regions and one wind station by a capacity of 102 MW in the Navoi region.

The electricity generation forecast by 2030 to 105 bln kWh.

Suggested solutions to this daunting task are the following:

1. Intensify energy efficiency and energy saving (reserve is 30-40%).
2. Widely introduce steam gas technologies.
3. Introduction of wind and solar energy (potential is 10 GW of solar and wind energy).
4. Increase the share of coal and shale in electricity generation.
5. Examine the possibility of building nuclear power plants until 2035.
6. Comprehensive study of water and energy problems, taking into account transboundary rivers.

Since 2000, Uzbekistan's GDP has grown almost 2.5 times, and the population from 1991 to 2018 has increased by 65%. Under these conditions, the generation of electricity per capita has almost halved - by 75%. The capacity of the current TPPs is not enough, so a new stable and cheap energy source is needed.

The commissioning of two units of 1.2 GW each by 2028 will give Uzbekistan 20% of all the necessary energy; this will allow to diversify the economy and release part of the resources due to, for example, additional hydrocarbon exports.

SkyPover (Canada) will build solar power plants at a total capacity of 1000 MW for U$ 1.3 bln. This is the first industrial project in the history of Uzbekistan for the production of solar energy. It will bring about US$ 2.9 bln in the country's GDP and create thousands of work positions.

Annual production, trade, review of current status and outlook

Annual production

Information on reserves and production of main types of minerals in Uzbekistan (Table 11).

Table 11 – Reserves and production of main types of minerals in Uzbekistan

№	Mineral resource	Unit of measurement	Stocks	Mining (2017)	Production, years
1	Gold	tons	5990,5	89,9	> 50
2	Silver	tons	21559,9	232,3	> 50
3	Uranium	thousand tons	96,7	3,6	17
4	Copper	thousand tons	16336,2	137,1	> 100
5	Tungsten	thousand tons	123,6	-	
6	Oil	million tons	178,1	0,9	
7	Natural gas	billion m^3	2239,9	55,4	> 50
8	Coal	million tons	1950,1	3,5	> 50

Currently, in the first instance, geological exploration works are focused on development and reserve replacement of gold, silver, uranium, tungsten, lead-zinc, etc.

Non-metallic raw material is the main object of geological exploration and development of their deposits by business entities. In this regard geological exploration for promising sites with a view to identify large deposits is provided in the long-term perspective.

Considering the ever-increasing demand of the population and industries of the Republic for water resources, a heavy increase of yearly growth in groundwater reserves is contemplated. In this regard, the special priority will be given to substantiation of water supply for population in the remote and inaccessible areas using drinking quality underground waters.

Trade

Exports of hydrocarbons

"Uzbekneftegaz" JSC holds 11th place in the world in natural gas production. Oil production in Uzbekistan in 2017 amounted to 806 thousand tons; natural gas production amounted to 6.4 bln m^3.

The largest corporations in the energy sector of Uzbekistan are CNPC (China National Petroleum Corporation), KNOC (Korea), Gazprom, LUKOIL, Uzbekneftegaz. Uzbekistan ranks 10th in the world in natural gas consumption.

In addition to Kazakh oil delivery, the volumes of Turkmen raw materials have being arrived in Uzbekistan. In 2016, the Chinese Petrochina supplied about 111 thousand tons of gas condensate (in 2015 - 125 thousand tons) from Turkmenistan to the Bukhara refinery.

52% of the petroleum products consumed in the country are used in the transport sector, 16% in agriculture, 13% in the power industry, and 5% in industry.

Imports of Russian oil to Uzbekistan in 2017 amounted to 68.2 thousand tons.

Gas processing is carried out at the Mubarek gas processing plant (commissioned in 1971). Currently, the plant's capacity is about 30 bln $m^3$of natural gas and the production amounts to more than 570 thousand tons of gas condensate per year.

The China-Central Asia gas pipeline starts at the border between Turkmenistan and Uzbekistan, and transits through Uzbekistan and Kazakhstan and ends at the Khorgos Chinese border checkpoint. The length of the pipeline is 1833 km. Construction began at the end of June 2008; In October 2010, the second pipe string was commissioned. The construction of the third (last) string of the gas pipeline was completed in 2013.

Export value

The main export items of Uzbekistan are services, gold, energy and oil products, textile products, ferrous and non-ferrous metals, food products, chemical products.

From 1991 to 2018 there was a significant change in the export structure of Uzbekistan: the main product of the Republic is service sector (its share in exports amounts to 21.3%), while the share of cotton fiber in exports decreased from 59.7% to 1.6%; the share of food increased (from 3.9% to 7.7%), chemical products (from 2.3% to 6.3%), ferrous and non-ferrous metals (from 4.6% to 8.2%).

In the structure of imports, the main share is accounted for machines and equipment - 42.5%, chemical products and products from it - 13.1%.

Foreign trade turnover for 2018 amounted to about US$ 33.8 bln:

- Exports – US$ 14.257 bln;
- Imports – US$ 19.557 bln.

Among the CIS countries, the main foreign trade partners are Russia, Kazakhstan, Kyrgyzstan, Ukraine, Belarus, Tajikistan and Turkmenistan, which account for 36.8% of external turnover, among other countries – China, Turkey, the Republic of Korea, Germany, Japan, Afghanistan, Latvia, USA, Iran, France, Italy, Lithuania, India, which account for 63.2% of the total external turnover.

The main export markets for Uzbek gas remain Russia and China. Also, small deliveries are carried out in neighboring countries. In the Russian Federation, "blue fuel" goes through the Bukhara - Ural and Central Asia - Center gas pipelines.

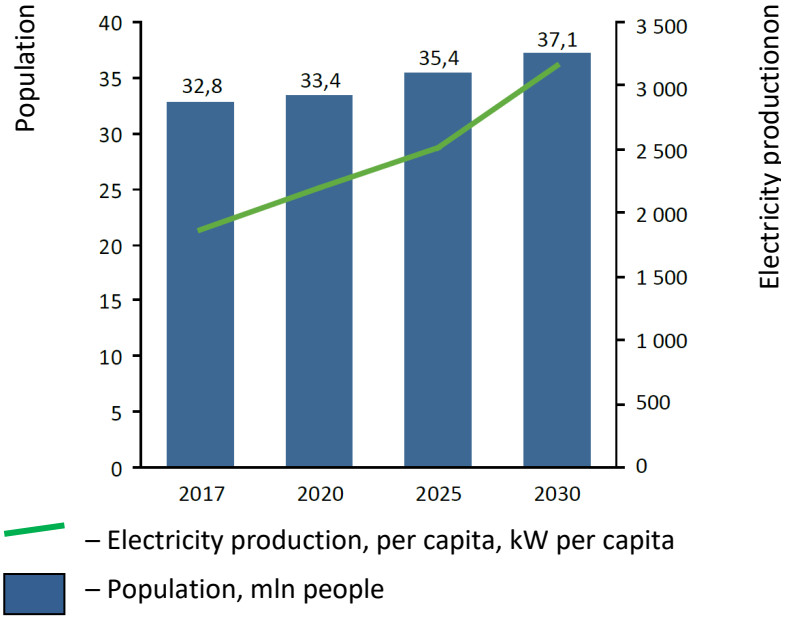
Last year, Gazprom and Uzbekneftegaz signed a contract for US$ 2.5 bln. According to the document, starting from 2018, Uzbekistan annually, within five years will supply 4 bln $m^3$of gas.

In addition, Uzbekistan intends to increase in 2018-2020 the annual volume of gas supplies to China to 10 bln m^3. This is provided by the mid-term agreement, signed during last year's visit of Shavkat Mirziyoyev to The Heavenly Empire. Fuel is supplied to China along three lines of the Central Asia - China gas pipeline.

Outlook

it is expected that the growth of industrial production and raising the standard of living in the country will increase the demand for energy resources (Figure 9).

Figure 9 – Forecast of increase in demand for electrical energy in Uzbekistan until 2030



Since 2000, GDP of Uzbekistan has grown almost 2.5 times, and the population from 1991 to 2018 has increased by 65%. Under these conditions, the electricity generation per capita has almost halved – by 75%. The capacity of the current thermal power-stations (TPS) is not enough, so a new stable and cheap energy source is needed.

At the same time, the analysis shows that in 2017, energy consumption amounted to 69 bln kW/h. About 85% is produced by thermal power plants and 15% by hydroelectric power plants.

Electricity consumption is projected to be increased to 105 bln kW/h by 2030.

High management efficiency of all types of energy, including reducing costs and increasing productivity, increasing the depth of processing, improving the overall energy efficiency of economy of the Republic of Uzbekistan. The main targets till 2035 are as follows (Table 12).

Table 12 – The main targets till 2035

Key figure	Unit	2017	2035
Drilling Rig Performance	m/month	800	1200
Natural gas extraction	billion m^3/year	64	80
Gas condensate extraction	million tons per year	2,06	3,5

A working meeting of Chairman of the Board of «Gazprom» PJSC and Deputy Prime Minister of Uzbekistan, Chairman of the Board of «Uzbekneftegaz» JSC, was held in St. Petersburg, and press-service of the Russian company reports: "Parties discussed the course of bilateral cooperation between companies. In particular, they discussed co-developing of the Shakhpakhty field [Shakhpakhty is gas condensate field discovered in 1962 in the south-eastern part of the Ustyurt plateau in Uzbekistan]. The cooperation issues in Uzbek gas purchase by Gazprom have been also discussed at the meeting". It will be remembered that in 2017, Gazprom and Uzbekneftegaz concluded an agreement on strategic cooperation. In May 2018, Gazprom and Uzbekneftegaz signed an Addendum No. 2 to the Agreement.

Foreign direct investments in the sector

The average annual volume of mastered investments in the Republic remains at the level of US$ 2-2.5 bln (less than 4% of GDP), which is lower than the average figure for countries with transition economies (3.4 bln), and also lower than indicators of some CIS countries (Kazakhstan 15-20 bln – 7-8% of GDP, Azerbaijan 5-8 bln - 15-20%, Belarus 3-6 bln - 8-10%).

The volume of foreign direct investments in the economy of Uzbekistan in 2019 may double in comparison with the current year and amounts to US$ 4.1 bln (in 2018 it is at the level of US$ 2.4 bln).

According to the resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated May 31, 2017 "On approval of selection criteria and lists of promising areas and deposits of strategic types of solid minerals, for geological study and industrial development of which the foreign investments are attracted", 29 deposits and 111 promising areas of solid minerals are offered to foreign investors. In particular, investors are offered 12 fields and 31 promising areas for precious metals, 18 areas for non-ferrous metals, 14 fields and 51 areas for rare and rare earth metals.

Geological study of 12 prospective areas and development of 6 deposits with such companies as B2 Gold (Canada), Rosgeoperspektiva (Russia), Shindong Resources (South Korea), TUMAD (Turkey), NordGold (Great Britain) agreements were reached and cooperation agreements were concluded in 2018.

Currently, out of 435 known subsoil blocks that are promising to identify deposits of precious, non-ferrous and rare metals and uranium, 380 blocks (87%) are uncovered by medium-term and long-term programs for the development and reproduction of the mineral resource base of the Republic, and 120 (71%) solid minerals deposits are not involved in mining.

In accordance with the Resolution of the President of the Republic of Uzbekistan dated July 19, 2018, No. RP-3874, in 2018 implementation of 3 investment projects is provided. In threes implemented investment projects, the direct foreign investment has been utilized US$ 4 mln, in particular:

- Together with the Japanese corporation JOGMEC, the project “Conducting a geological study of the promising area of uranium in the Navoi region” is being implemented. The project in 2018 disbursed investments in the amount of US$ 2.5 mln, for the project as a whole – US$ 5.4 mln. Drilling work has now been completed and a geological report is being prepared for transmission to the Japanese side.
- Together with the Korean company Shindong Resources, the project “Development of the Sautbay tungsten deposit (I stage)” is being implemented with an implementation period of 2013–2022. According to the project, investments in the amount of US$ 1 mln were assimilated in 2018, and in

the whole project – more than US$ 4 mln of foreign direct investment. A feasibility study of a project with a cost of about US$70 mln has been developed, and work is underway to issue a license for the use of a subsoil block.

In 2019, it is planned to increase the direct foreign investments in solid minerals by 10 times.

In the oil and gas sector, as part of the Investment program in 2016, with the participation of foreign investments and loans, only 14 projects with a total cost of foreign investments amounted to US$ 16.3 bln were implemented. At the same time, the main direction of the projects of "Uzbekneftegaz" JSC on investment projects is as follows:

- carrying out geological exploration;
- hydrocarbon production and processing;
- natural gas transportation;
- production of polymer products, gas cylinders;
- construction of a new gas processing complex, CNG filling stations, certified centers for installation of gas cylinders for compressed gas on vehicles, etc.

In all sectors, including those directly related to mineral resources, the attraction of direct foreign investments has been determined for the long term, for example: the Khimprom of Uzbekistan until 2030 will attract 29 promising investment projects to modernize, expand and create new processing plants to implement US$ 4.4 bln direct foreign investments.

In Uzbekistan, the attraction of direct foreign investment and innovative technologies is given national importance (Table 13).

Table 13 – Investments (general in fuel-and-energy complex)

Key figure	To 2025	To 2030	To 2035
Investments (total in fuel-and-energy complex), billion US dollars	23-28	37-46	70-86

A private equity fund has been established in Uzbekistan with a capital of US$ 1 bln. For the effective work of the fund, a special management company will be set up in the form of a joint stock company with a 100 percent state share with an authorized capital of US$ 5 mln, formed at the expense of the Fund for Reconstruction and Development of Uzbekistan.

Completion of state assets privatization process, attracting of major international players to exploration, production, as well as processing and transportation sectors. Disaggregation of assets in oil and gas industry and electric power industry.

The largest corporations in the energy sector of Uzbekistan are CNPC (China National Petroleum Corporation), KNOC (Korea), Gazprom, Lukoil, Uzbekneftegaz.

For example, on May 2018, Gazprom and Uzbekneftegaz signed a production sharing agreement for the further development of the Shakhpakhty field. The document provides for the continuation of gas production until 2024. In 2017, Gazprom's purchase of natural gas in Uzbekistan amounted to 5.5 bln m^3.

Attraction of foreign investments for solid minerals is envisaged under enforcement of the Resolution No. RP-3000 "On measures for accelerating the attraction of foreign investments in geological exploration and development of strategic solid minerals" as part of execution of the Resolution of the President of the Republic of Uzbekistan.

Goscomgeology jointly with private companies is carrying out works on the implementation of exploration projects that will ensure of investments inflow in geological exploration and will make it possible to discover mineral deposits. Today, cooperation with a number of mining and investment companies, such as: B2 Gold Corp. (Canada), JOGMEC Japanese National Corporation, Rosgeoperspektiva Group of Companies (Russia),

Shindong Resources (Korea), MTA (Turkey), Orano Mining (France), IFG Capital (Luxembourg), etc. has been established.

Currently, together with the Japanese Corporation JOGMEC the "Geological study of promising uranium areas in the Navoi region" project is being implemented; in cooperation with the Korean company "Shindong Resources" the "Development of the Southbay tungsten deposit of (phase I)" project is being implemented; together with the Russian company "Rosgeoperspektiva" the "Geological study at the Kazakhtay and Kazakhtay 1 areas in the Navoi region promising for copper and gold deposits discovery" project is being implemented.

The availability of explored gold reserves at the current rate of production amounts to more than 50 years, uranium - more than 20 years, copper - more than 100 years.

An increase in copper production is stipulated within the introduction of the Yoshlik 1 deposisit to development.

Increase productivity of existing MMP with involvement in processing of out of balance ores and mineralized mass.

Creating a cluster of tungsten industry in the Republic of Uzbekistan. IFG Capital Partners will explore the possibility of developing a tungsten deposit in Uzbekistan. IFG Capital Partners will organize industrial development of the field if the research proves to be positive.

In order to attract investments to this industry, it is necessary to reform the Tax Code for mining companies in accordance with international standards.

The long-term programs adopted over the past two years are aimed on accelerating the development, modernization and expansion of production of large mining and smelting industry enterprises. An increase by 2026 in production of outputs in the Navoi MMC by 30 percent, in the Almalyk MMC investments in the amount of US$ 2.9 bln and an increase by 2023 in copper production by 28%, and zinc by 75% is contemplated.

NMMC is one of the largest gold producers in Central Asia. The plant is fully owned by the state. Gold production at NMMC in recent years was about 80%.

The NMMC production complex of at the present time unites four metallurgical plants: in Navoi (MMP-1), Zarafshan (MMP-2), Uchkuduk (MMP-3) and Zarmitan (MMP -4). It is planned to gradually increase the production of gold and uranium, as well as silver at least 5.0 tons per year.

The state pays priority attention to the comprehensive development of the Navoi mining and metallurgical combine. In particular, within the framework of the MMC development program until 2026, about 30 large investment projects at an overall cost of more than US$ 3 bln will be implemented in stages; more than 30,000 work positions will be created.

The Almalyk MMC is the only copper producer in Uzbekistan. The plant is owned by the state at 97.53%, while the management of the state share is handled by the SFI Management Group.

The company produces refined copper, zinc metal, lead and molybdenum concentrates and other products.

AMMC accounts for about 90% of silver production and 20% of gold in the Republic.

Since 2015, the assets of the “Uzbek Plant of Refractory and High-Temperature Metals JSC (UzKTZHM, Chirchik, Tashkent Region) have been fully transferred to the AGMK, therefore, this company has become a monopolist in the production of tungsten.

According to expert estimates, the general demand of Uzbekistan for ferrous metal rolling is only 36.1% due to the processing of scrap and waste of ferrous metals at «Uzmetkombinat» JSC, located in the Bekabad town, the rest part (63.9%) is imported from CIS countries, primarily from Russia, Kazakhstan and Ukraine.

Social and environmental aspects of energy and minerals production

In Uzbekistan, despite the reduction in growth rates, a moderately extended level of population reproduction will remain at the average annual growth rate of 1.3%, meanwhile the population will increase to 37 mln people by the beginning of 2031. In general, for the period of 2013-2030 absolute population growth will be over 7 mln people.

Since 2000, GDP of Uzbekistan has grown almost 2.5 times, and the population from 1991 to 2018 has increased by 65%. Under these conditions, the generation of electricity per capita was decreased almost by twice – on 75%. The capacities of current thermal stations are already insufficient, so it is necessary to use new stable and cheap energy sources.

Putting into operation of two power generation plants of 1.2 GW each by 2028 will give Uzbekistan 20% of all the necessary energy, which will diversify the economy and release some of the resources for example, out of additional export of hydrocarbons.

Maintenance of mining operations for the main types of minerals (gold, uranium, copper, lead-zinc, oil-and gas, etc.) will ensure stable economic growth.

Technological efficiency and innovations

One of the main tasks in this branch is to conduct a unified technical and technological policy in the development of geological exploration, application of the latest achievements of science, technology and advanced production experience to ensure high quality and technical and economic indicators of geological exploration.

Effective implementation of measures for modernization of the mining and geological industry due to the accelerated introduction of modern efficient geology-prospecting equipment, providing with advanced equipment and innovative technologies is also being considered.

The widespread introduction of advanced information and communication technologies into the exploration process with consideration for the expansion of the range of public services provided through electronic data exchange.

Increase of investment attractiveness and adoption of innovative technologies for carrying out exploration works is being contemplated.

Data and knowledge management

In this direction, the main priority is given to the introduction of modern information and communication technologies, including within the framework of Electronic Government system creation, the main task of which should be cardinal improvement of inter-agency electronic interactions and a sector for provision of services to government agencies, businesses and citizens.

At the same time, for the geological industry - the producer of information about a status of reserves record and estimation, and employment of mineral resources, the key becomes the achievement of unity, integrity and process orientation of information support as the basis for rational nature management and information actuality.

The guidelines of further adoption of information and communication technologies in the activities of Goscomgeology are the following:

Collection, processing, transmission and storage of geological information on the basis of modern technical and technological communications;

Creation of a consolidated information and analytical products on geological objects and processes necessary for recording, assessing of the state, reserves and employment of mineral resources of the Republic based on the development and implementation of information and analytical, as well as geographical information systems of the industry;

Gradual digitization of the State Geological Fund of the Republic;

Development and implementation of information systems in the framework of creation of the “Electronic Government” system, which envisages an enhancement of efficiency, quality of provision and availability of public services for the population and business entities;

Introduction of modern information and communication technologies in management and industrial processes, management of financial flows, as well as enhancement of work efficiency of the production and management personnel;

Liberalization and simplification of the procedure for granting the right of subsoil blocks use by applying the information and communication technologies;

Affording openness of the activity of Goscomgeology, introduction of modern forms of providing information relating to the rights, freedoms and legitimate interests of individuals and legal entities;

Development of the technical and technological, communication infrastructure of the industry.

Conclusions on the status of energy and mineral resource management in the Republic of Uzbekistan

The strategic goal of the state policy in the geological industry is rational use, economic rehabilitation and conservation of the mineral and raw material potential of the Republic and focus on the implementation of a consistent administrative and management reform in Goscomgeology.

The Republic has enough reserves of the main types of minerals: gold, uranium, copper, lead, zinc, potash fertilizer, phosphorite, oil-gas, etc.; as well as for geological exploration and increasing the reserves of the main types of minerals.

The works for harnessing of green - renewable resources are carried out in high gear. For the first time in the history of Uzbekistan, the projects for solar power generation on an industrial scale (with a capacity of 1000 MW) are considered. The construction of 2 NPP units is planned. To do this, the country has sufficient reserves of uranium.

The low degree of geological knowledge (or practical lack of knowledge) of certain types of mineral raw materials, the absence or adverse geographic and economic, mining and technical and other conditions, as well as nonsufficiency of the adequate technological solutions in matters of geological exploration, production, enrichment and processing of mineral raw materials necessitates assigning relevant geological surveys.

Works for development of deposits (which are currently not being developed), with attraction of foreign investments for geological exploration and mining are underway.

Training of national competent persons in the main areas of minerals.

Phased transition to the assessment of deposits by the UNFC to attract potential investors.

Work is underway to train national personnel - "competent persons" for all types of minerals.

Currently, a list of gold deposits is being compiled for the transition or revised estimation under the JORC classification.

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