

Working paper

Industrial Development of Kyrgyzstan: Required Infrastructure and Priority Industrial Sectors

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Industrial Development of Kyrgyzstan: Required Infrastructure and Priority Industrial Sectors

1. Infrastructure needed for industrial development

Energy sector, including both energy demand and energy supply, is strategic for it influences the level of life of entire population and development of the entire economy. Energy is crucially important for industrial development.

State energy policy should stride to provide reliable energy supply to guarantee socio-economic development of the country. At the same time energy supply should respond to sustainable development demands. This includes growing energy consumption from private households due to increasing quality of life and population dynamics but also foreseen industrial development. It is projected that the size of Kyrgyzstan's population will grow 1,18 times by 2030 boosting energy consumption per capita by 1,57 times, from 2600 kWh per capita to 2816 kWh per capita. Plans for further development and deployment of the food processing industry and mining, construction and other industries will require stable and reliable energy supply.

However, the government also plans to increase exploration of coal reserves in Kara-Keche, Besh-Burkhan, Zhergalan, Solukta and Tash-Kumir and to augment exploration of oil reserves from 85 thousand tons in 2015 to 110 thousand tons in 2030.

The balance of trade for energy (mainly raw materials) will be influenced by hydropower energy generation but also by oil and gas imports. It is also planned to increase imports of natural gas from 379,5 million cubic meters in 2015 to 759,2 million cubic meters in 2030. Energy imports in the volume of 1,1-1,5 million tons should be secured with abolition of taxes for oil imports from the EAEU region. Kyrgyzstan plans to increase energy exports, mainly electricity generated by hydropower stations, from 4 billion kWh to 6 billion kWh by 2030.

Hydropower energy generation (mainly large-scale hydro) is already covering 90% of Kyrgyzstan's generation capacity. Further development of hydropower generation, especially small hydropower projects, is among priorities of the Kyrgyz government considering the role that hydropower plays in the national energy mix. The development of the energy sector should be regulated by the Concept of Development of the Heating and Energy Complex in Kyrgyzstan for 2017-2030, which is currently under development. Recently the Concept was updated for the period up to 2040. The Concept identifies the following problems for development of energy sector:

- unequal distribution of power stations across the country,
- dependency on large-scale hydro,
- loss of the regulator role for the river Syr Darya,

- despite construction of new power stations still the insufficient level of power supply,
- decrease of investment into power sector,
- volatility of energy prices on the global market,
- and social tariffs for energy, which are below the production costs.

The concept identifies major areas for development of the sector such as construction of new hydro power stations, an increase of oil and gas imports, exploration of new and existing coal reserves, change of the tariff structure. Additionally, there is a need to support the renewable energy sources as well as the deployment of micro hydro-power stations. The Concept foresees construction of new power stations and reconstruction of existing ones. Energy should be generated with the minimum impacts on environment, energy generation and transmission infrastructure should be protected from natural hazards and man-made risks, including extreme climate events, economic, social, technical and environmental risks.

The concept also suggests that to guarantee sustainable development of the energy sector, it is necessary to implement measures, which would allow reduction of energy losses and implementation of low carbon energy generation technologies, including hydro, solar and wind. Also, reforms are necessary in the tariff system to change the costs of electricity to guarantee economic competitiveness of renewable energy sources. Additional recommendations include improving competition conditions in the market for heating systems, decrease monopolies in the sector and further develop decentralized energy generation solutions.

Further recommendations include implementation of the principles of green economy into state tendering procedures to avoid procurement of energy intensive technologies. Also, it is planned to increase measures of control and energy audit to guarantee that products and goods respond to the requirements of energy efficiency and ecological security.

Sustainable development and green economy are of primary importance for Kyrgyzstan given its socio-economic development depends on consumption of natural resources. Materializing potential for green growth requires regulatory reforms to incorporate incentives for investments in and adoption of more environmentally renewable energy technologies and energy efficiency measures. One example of such changes is the plan to implement the unified certificate "Eko", which grants tax rebates for business with environmentally friendly technologies or green methods of production.

The development of green economy requires also harmonization of the national strategic plans and their practical realization in different industrial sectors. Likewise needed is development of human potentials and institutional frameworks.

Recommended actions stemming from international collaboration initiatives such as the Partnership for Action on Green Economy (PAGE), include modeling the transition process towards green economy and further utilization of these results to formulate green economy policies, oriented to foster job creation in green economy sectors. The green jobs are identified as jobs created during the process of transition to green

economy in such sectors as renewable energy sources and energy efficiency measures. Also experience of several countries shows that green economy can stimulate regional development.

The Program of Development of the Kyrgyz Republic for the period 2018-2022 tells that the major feature of environmental protection for the next five years should include implementation of principles and conditions for green economy during all phases of planning, implementation of decisions, realization of projects and monitoring for implementation. It is also necessary to include principles of green growth into the process of reformation of the economic structure of the country and transition to environmentally friendly development. Therefore, recommendations for industrial development of Kyrgyzstan for the period 2018-2023 should include implementation of the energy efficiency measures, rational utilization of the water resources and development of industry without damage to environment and exhaustion of natural resources.

Implementation of energy efficiency measures is among top priorities of the Kyrgyz government. This measure is also crucially important for industrial development as it allows reduction of usage of energy by the industrial sector and other sectors, thus, indirectly it makes additional energy being available for further industrial development.

Currently in Kyrgyzstan a number of initiatives exist to implement principles of green economy, such as energy efficient technologies and renewable energies, into construction practices. One example is the program KyrSEFF, which is in operation from 2013 by the UNISON Group. Over time, the program has supported 968 energy efficiency projects in housing and business activities, contributing to save more than 150.000 MWh and to reduce the equivalent to more than 35.000 tons of CO₂ emissions. KyrSEFF provides credits and grants to increase energy and resource-efficiency in the housing sector and for industrial buildings. The program is also based on best practices from Europe through the Program on financing of sustainable energy (SEFF) of the European Bank of Reconstruction and Development (EBRD). SEFF includes credit lines for commercial enterprises. KyrSEFF credits are available in local currency and in US dollars, from a couple of hundreds up to 2 million US dollars.

According to evidence collected in frames of KyrSEFF, energy efficiency measures should include projects for modernization of the heating system, of street lighting, of implementation of energy accounting, thermal refurbishment and others. Kyrgyzstan has enormous potentials for implementation of energy efficiency measures. According to different estimations, implementation of energy efficiency measures can contribute to 40%-46% reduction of the overall energy demand and of 11% of energy demand in industry. Technical potential for energy efficiency in buildings is around 88% of the yearly energy consumption (KyrSEFF).

In frames of the Program of the Government of Kyrgyzstan for energy saving and policy on energy efficiency for the period 2015-2017 the assessment was conducted about potentials of the small hydro-power stations, as well as solar, biogas and wind energy. The program developed recommendations for creation of institutional and regulatory drivers for deployment of renewable energy sources. However, evaluation and conclusions on the results of the implementation of the Program of the Government of Kyrgyzstan for energy saving and policy on energy efficiency for the period 2015-2017, No. 601, were not conducted. In the draft

concept of the development of the fuel and energy complex for the period up to 2040, it is planned to ensure energy efficiency through reducing the energy consumption of the Kyrgyz economy, introducing market prices for energy use.

Transportation is another type of infrastructure, which is crucially important for industrial development. The extension of the roads is 34.000 km, which includes 18.810 km of roads of general usage and 15.190 km of roads within cities, villages etc. The roads of international meaning have 4.163 km, of state meaning 5.678 km and of local meaning 8.969 km. The socio-economic development increases the importance of transportation system and requirements for its extension. The requirements are also for diversification of currently existing transportation possibilities, as nowadays 95%-97% of cargo and passages transportation is realized via automobile transport. Kyrgyzstan has currently no pay tolls for the roads however this question is currently under development for construction of the road in the city of Uzgen based on the conditions of the public private partnership.

Several short and medium-term infrastructure projects are currently in planning such as:

- Railroad China – Kyrgyzstan,
- Alternative auto road North-South,
- Ring auto road around Issyk-Kul,
- Auto road Suumsamir- Talas-Taras,
- Auto road Djalal-Abad Madanyat

The Government of Kyrgyzstan is also planning for the railroad connecting China, Kyrgyzstan and Uzbekistan, which starts from Torugart, goes through Dostuk and ends in Djalal-Abad. This road should connect the north with the south of the country. In the North of the country the road should connect Torugar, Dostuk and Djalal-Abad. According to the preliminary assessment, the overall investment volume of this project will make 5 billion US dollars. According to the Ministry of Transportation and Roads of Kyrgyzstan, the road will allow transportation of 12 million tons of cargo per year and gain revenues from the cargo transit of 500 million US dollars per year. The construction of this railroad is among strategic priorities of the Government of Kyrgyzstan and is also included into the Program of Development of Kyrgyzstan for 2018-2022 "Unity, Trust, Creation". The road is also in line with the goals of the concept of the regional development, which identifies improvement of the road infrastructure in the "points of growth" as one of the priorities.

Construction of the additional road infrastructure is among strategic projects of the government. New transport infrastructure is needed for industrial development but also because the majority of population of the country resides in the Chui region and the city of Bishkek, and many inhabitants of the Chui region are traveling to Bishkek every day for their jobs. During weekdays several autos head towards Bishkek from the city of Tokmok, in the east and from the city of Kara-Balta, in the west. The transportation problems of Bishkek were one of the drivers for development in 2015 of the concept for formation and development of Bishkek city and region, including small cities located in vicinity of Bishkek. Such concept foresees development of small cities such as Tokmok, Kara-Balta, Kaindy and Kant with the goal to solve

transportation problems of Bishkek. This concept also aims to solve other connected problems such as air pollution, problems with infrastructure and migration.

Another strategically important infrastructure project is the auto road North-South with the overall extension of 433 km. This road will allow creation of an alternative to the available road, which connects Bishkek and Osh. It will also to provide access to natural reserves and land, which is suitable for agriculture in Toguz-Torus, Ak-Talinsk, Jumgalsk, Kochkorsk regions. Construction of this road will be an important driver for investors who are interested in developing food processing industry in these regions. This road will also allow connecting Kyrgyzstan with Kazakhstan and Russia in the north of the country as well as with Tajikistan in the south of the country. According to the opinion of the committee for realization of investment projects at the Ministry for Transportation and Roads, the auto road North-South will also allow creation of the transit possibility between Russia, Kazakhstan, Kyrgyzstan and Tajikistan and will create an alternative for transit through the territory of Uzbekistan. These roads will significantly facilitate transportation of industrial products and of goods needed for industrial projects.

By speaking about green economy and energy demand side, it is also important to mention plans for electrification of transportation or so-called e-mobility. According to the national report on environment from 2011-2014 more than 87% of all air polluting substances can be linked to the transport system. The existing air pollution is also increasing. For instance, in 2011 emissions of polluting substances from transport made 400.3 thousand tons. In 2014 it was already 1.6 times more. In the year 2016 the utilization of petrol and diesel, which contributes to the majority of polluting substances from transport, was 1.7 times higher than in 2010. According to the data from 2014, the major consumption of petrol (94%) and diesel (89%) happened in Bishkek. Bishkek and Osh have the highest level of air pollution, which is caused not only by transport but also by industrial enterprises. The geographical position of Bishkek in the hollow is only making situation worse. The air pollution and emissions from the side of housing sector and construction are not monitored at all. The majority of air polluting substances (95%) from the industrial sector happens in the Issyk-Kul region. The implementation of air pollution risk mitigation measures is characterized by chaotic decision-making process and the process of implementation.

The issues of e-mobility could be addressed in frames of the PAGE program. For the purpose of practical implementation, the following measures could be taken: exemption from tax on electric vehicles, taking measures to develop a network of charging stations and taking measures to simplify the process of land allocation for the construction of charging stations.

Finally, considering existing level of air pollution, especially in large cities such as Bishkek, alternative fuels for public transportation should be introduced. For instance, the majority of road transportations in Kyrgyzstan is realized based on utilization of petrol or diesel. For example, the largest share of autobuses of Bishkek works on diesel, which is highly air polluting. The buses were received in frames of a grant from the government of China.

According to the concept of formation and development of Bishkek agglomeration and satellite cities, following recommendations could be considered for sustainable development of transportation sector:

- Balanced policy for improvement of quality of the public transportation as well as creation of incentives, such as reduction of taxes and import taxes for implementation of electro-autos and autos driving on gas.
- Introduce mechanisms to decrease the usage of old autos as well as autos which don't have catalyzers.
- Creation of favorable conditions for deployment in Kyrgyzstan of enterprises for production of electro-autos.
- Implementation of awareness raising measures and incentives to motivate private households to use electro-autos.
- Implementation of incentives to decrease the usage of low quality petrol.
- Development of the system of public transportation as well as the usage of bicycles.
- Introduction of new approaches in architecture and space planning for organization of public transportation and more dense construction.
- Optimization of the air transportation and creation of the second airport in the Chui region with orientation to transportations within the Central Asian region and within Kyrgyzstan. This airport could also serve as a reserve for the "Manas" airport.
- Connection of the rail road transportation with the planned international transport corridor, which will allow to connect north and south of the country and will provide a safe connection of cargo transportation with the sea ports of China and Europe.
- Exclusion of transit possibilities through the center of Bishkek.
- Diversification and transfer of the large markets from the center of the city to the suburbs and to zones of international transport corridor.

The concept of formation of the Bishkek agglomeration also foresees creation of the new administrative cluster, which should be located outside the center and include the governance center and the state residence.

The development of transport infrastructure can be considered a necessary condition for the efficiency of industry, its successful integration into the economies of the EEU countries and Uzbekistan. The lack of sea routes and the lack of development of the railway sector does not allow for full-fledged economic activity of the state. In this regard, the strengthening of the transport position allows only through road transport. It is true, that the development of transport infrastructure in industrialization strategies must be viewed from the point of view of logistics for the development of industry. On the basis of the strategy, it is necessary to develop sector specific state programs with an action plan for the sectors in which the specific responsibility of the involved ministry or department will be indicated.

2. Priority industrial sectors

2.1. Renewable energy sources

Kyrgyzstan has significant potential to implement **renewable energy sources** (RES). Kyrgyzstan has high potentials for RES. According to estimations of the State Committee of Industry Energy and Subsoil use, potentials of hydro are 5-8 billion kWh per year, wind of 44.6 million kWh per year, solar of 490 million kWh per year, biomass 1.3 milliards tons per year. There are potentials for 100 small hydro power stations, as small hydro is considered the most attractive RES in the country. The potentials of small rivers (172 rivers would be suitable for small hydro electricity generation) in the country with the water usage from 0.5 to 50 cubic meters per second extend 80 billion kWh per year, from which technically it would be possible to generate 5 billion kWh per year. Small hydro power stations could play especially important role for development of rural areas and cities, where they can become decentralized sources of electricity generation and where construction of high voltage transmission electricity lines is economically not viable. The deployment of small hydropower potentials could mean an increase of generation capacities of existing small hydro power stations as well as construction of new small hydro power stations and renovation of existing power stations.

Also, Kyrgyzstan has significant potentials for solar generation with more than 250 sunny days per year and high direct and indirect solar irradiation. Estimations of solar potentials from the State Committee for Industry, Energy and Subsoil show that available potentials for heating purposes show that they would be sufficient to provide 90% of all inhabitants with hot water and to cover 50% of heating demand during the entire year. Potentials for wind electricity generation are also available as the annual average wind speed is 12 meters per second, which would allow generation of 2 billion kWh of electricity per year. Wind potentials are especially favorable in the cities of Balikchi, Alae and Shamaldisae. However, nowadays the share of energy generation (excluding large scale hydro) is less than 1% of the entire electricity mix in the country

Drivers for deployment of RES include concerns of climate change mitigation and energy security policies, and the need to satisfy growing energy demand in Kyrgyzstan. For instance, currently Kyrgyzstan needs to import more than 1 billion kWh, spending for energy imports more than 5 billion Soms. In total, the domestic energy production covers 45% of the country's needs so Kyrgyzstan needs to import the remaining 55%, which mainly comes from the fossil fuels and also includes electricity in winter time depending on variations of hydropower production. Even including energy imports, there is still a lack of energy supply in the country, which has a negative influence on economic and infrastructure development. The consumption of energy is growing. For instance, electricity consumption per capita increased by more than 30% during the period 2010-2015. Residential sector is the largest consumer of energy, followed by transport and industry.

However, currently deployment of RES in Kyrgyzstan is hindered by such facts as the absence of strategic programs for introduction of new electricity generation capacities, namely, the absence of the plan for

construction of new hydro and heating power stations as well as the absence of qualified staff. Another barrier is the absence of short-term and middle term tariff policies, which would stimulate development of RES. The currently existing law about RES establishes the special tariff for the period of eight years, which is however still not sufficient to increase economic profitability of RES. Besides of this the entire tariff formation process is not transparent and is quite complicated. Such issues as the tax exceptions, which are provided only for newly constructed RES power plants, are considered as unfair by several players at the energy market.

Climate change is also playing a role as the hydro sector is highly dependent on weather conditions, which affect level of water in the rivers and water reservoirs.

Table 1. Required procedures for deployment of RES and responsible authorities. Source: (Baibakpaev et al., 2016).

Procedure	Authority	Required time
Acquisition of land	Local governance representatives as well as the National Government and the State Committee for Industry, Energy and Subsoil	3-4 years with unclear results
Land property issues	State land registration service	Up to 2 years
Environmental impact assessment	State agency for environmental protection and forests	3-6 months
Approval of the construction project	State agency for architecture, construction and infrastructure	6-12 months
Licensing and price formation	State agency for regulation of energy and heating sectors	Individual approach

The currently existing financial uncertainty influences negatively the willingness of private investors to invest into renewable energy projects. Taken into reference, that deployment of RES at scale would require not only public financing but also private financing, involvement of private capital into renewable energy projects is essential.

2.2. Mining industry

The mining industry includes coal, oil and natural gas and metal ores and other resources. The number of industrial enterprises in this sector is constantly growing from 150 enterprises in 2012 to 177 enterprises in 2016. Also, the number of employees is increasing, from 7.9 thousand people in 2012 to 10.3 thousand people in 2016. The share of mining sector in the overall volume of industrial production increased from 4.4% in 2012 to 6.1% in 2016. The government of Kyrgyzstan set three major goals for development of mining industry in Kyrgyzstan: increase production efficiency, increase labor efficiency and decrease environmental impacts.

Development of mining industry in Kyrgyzstan is strongly connected with exploration of the **gold** reserves. This industry is dominated by the large-scale enterprises such as Kyrgyzaltyn OJSC (gold deposit Makmal), ZAO Kumtor Gold Company (gold deposit Kumtor) and OJSC Kadamjai antimony plant. In the year 2015 also, new explorations of existing reserves started such the Taldy-Bulak deposit Levoberezhny (Chui region), Altynken Ltd, Bozymchak (Jalal-Abad region, Kazakmys LLC). The following gold deposits are planned to be commissioned soon: Jeruy (Talas region); Ishtamberdi (Jalal-Abad region, Full Gold Mining LLC); Kuru-Tegerek (Jalal-Abad region, Kichi-Chaarat CJSC); Zhamgyr (Jalal-Abad region, LLC Vertex Gold Company); Karakazyk (Jalalabad region, LLC Interbusiness); Nasonovskoye (Chui region); Kumbel (Naryn region).

Mining and metallurgical complex of Kyrgyzstan, in addition to gold mining, includes mining of coal, mercury, tin, processing of antimony, iron, rare metals, non-ferrous ores, raw materials extraction and production of construction materials, selection of underground and mineral waters. In addition, the Kyrgyz Republic has a number of explored deposits of mercury, tin, iron, rare metals, non-ferrous ores, raw materials for the production of construction materials that can potentially be developed.

Coal is an important industry in Kyrgyzstan and the extraction of coal has a significant share in the overall volumes of mining industry. However, it was constantly decreasing from 23% in 2012 to 16% in 2016. According to data from 2016, Kyrgyzstan has 86 working enterprises for coal mining, where 3.358 people are employed. These enterprises jointly extract 1,81 million tons of coal per year. According to the Concept of development of the heating and energy complex up to 2030 it is planned to increase coal mining from 2100 thousand tons in 2017 to 8400 thousand tons in 2030. The concept foresees the growth of the coal industry based on the structural reforms, liberalization of the market and privatization of existing enterprises. It is planned that the coal production will be stabilized in the period 2020-2025 due to financing of reconstruction of existing enterprises and construction of new ones as well as an increased share of private capital. The increase of coal production is planned due to introduction of large-scale enterprises in Besh-Burchan as well as the guarantee of the existing volume of coal production. An increase of the coal export will be facilitated through construction of Chinese – Kyrgyz railway, including its part leading to Kara-Keche. This will facilitate transportation of coal for internal market and its export.

Kyrgyzstan has seven reserves of coal: South-Fergan, Uzken, North-Fergan and Kavaks basins as well as the regions of Alaysk, Alabuk-Chatir-Kul and South-Issyk-Kul. The Kavansk basin, including the Kara-Keche reserve, has the largest volumes of coal reserves which are also suitable for the open exploration. Historically, however, the major explorations of the coal reserves took place in the south of the country in the places of Solukta, Kyzyl-Kia, Abshir, Almalik, Kok-Jangak as well as Tash-Kumir. In the north of the country coal was extracted in small volumes in the places of Jyrgalan, Sogottu, where mining is terminated by now, and Kara-Keche.

The coal mining started at the end of the 19th century from exploration at the reserves of Kok-Yangak, Tash-Kumyr, Sulukta, Kyzyl-Kiya. The extraction of coal was constantly growing until the 1980ies. The pick of coal extraction was in 1976-1980 with the average extraction of 4.2 million tons per year. After 1980 the extraction of coal was declining, also including a steep decline in 1991. The main reasons of decline of coal production were the absence of the unified state policy and financial support of the energy and heating sector, the orientation of the energy sector towards energy imports, the increasing need for more complicated methods of coal extraction, the aging of equipment and high costs of transportation which decreased profitability of coal industry. Starting from 2000ies the coal industry was growing slowly, mainly, due to deployment of extraction activities at the reserves of "Kara-Keche" and "Min-Kuch" to support growing energy demand of Bishkek, as well as because of the increasing demand from the side of cement enterprises in the south of the country and increased exports of Kyrgyz coal to China, Uzbekistan and Tajikistan.

The extraction of **oil and gas** started in 1901 in the area of Maidi-Say. During the Soviet period the extraction of oil increased significantly due to explorations at Mayлуу-Suu 4 and Eastern Isbasket. Kyrgyzstan has oil and gas reserves in the Fergana valley, however, the majority of these reserves are not significant. In 1991 Kyrgyzstan experiences problems with extraction and processing of oil, which were solved when an oil processing company "Kyrgyz Neft" was constructed in 1996 in the city of Djalal-Abad in cooperation with Canadian partners for the overall oil processing of 500 tons of oil per year. The enterprise was transferred to "Kyrgyzneftegas" in 1997.

During the last years the volumes of oil and gas extraction in Kyrgyzstan are decreasing mainly because its extraction becomes more and more difficult and requires new technologies and new methods. The existing reserves are being exploited for the last seventy years already and their volumes are exploited to around 70%, the rest is in the places where oil is difficult to extract. In 2001 in cooperation with Cadima Petroleum a new oil reserve was discovered in the area of Mayлуу-Suu. Currently in the country there are 17 places of oil extracting, from 11 only oil is being extracted, the remaining allow also for extraction of gas.

Oil processing in Kyrgyzstan is performed by five companies, three of which are Chinese-owned companies. The main enterprise is "Kyrgyzneftegas", where the government owns the main share (above 85%) and the remaining is split between 2000 share-holders. The company has licenses for extraction on 11 objects and additional 3 licenses for search of new explorations. The extraction works are being conducted in Leysk region of Batken region as well as in Suzak and Noonken regions of Djalal-Abad region.

The requirements of local communities regarding the social package include:

- providing priority conditions for local inhabitants while creating job-years at the project, combined with requirements on measures to increase the level of professional education and necessary expertise at the local level,
- providing of good working conditions including an increase in salaries and other compensations, such as necessary equipment etc.
- financing from the company for the needs of socio-economic development of the region, including targeted support of socially disadvantaged groups of population, financing of infrastructure objects and other measures to improve living conditions and well-being of local communities

Currently the legislation, which would regulate the size of social package and the compensation and development measures, is absent. This leads to conflicts and further requirements and misunderstandings from both sides. A clear and transparent regulation in this area can contribute to the reduction of social conflicts and to costly delays in the realization of the projects. It will also help companies during the planning stage and decrease uncertainty about the overall volumes of financing.

2.3. Textile

The volumes of textile production were growing steadily in the period from 2005 to 2012 and reaching the pick in 2012 with 156 million US dollars of exports however since then the volumes of production and export were constantly declining until 95.5 million US dollars in 2016. The number of enterprises was also declining from 186 in 2005 to 91 in 2016.

The number of employed in textile industry reached its pick in 2006 with 196 thousand people being employed and then declined to 29 thousand people in 2016. The majority of people working in the sector have middle professional education at the level of vocational schools. The number of employees with special professional education for this sector is declining. The average salary in the branch varies between 173 and 500 US dollars per month. There are also deviations in this information because of the calculation of 27% social payments and insurance, which is not always provided by textile enterprises for its employees.

The main reasons for the decline of production are risk perceptions connected with integration processes and expectations of the increasing competition. Also, the main importers of Kyrgyz production such as Russia and Kazakhstan introduced more strict system of requirements and certification towards the Kyrgyz textile products. The production is exported to Russia and Kazakhstan mainly with the use of logistics in the wholesale markets of Kyrgyzstan as well as with the help of labor migrants. The Kyrgyz production is oriented towards consumers with middle and low level of income. This is also the niche, which is occupied by the Kyrgyz products on the markets of Kazakhstan and Russia.

The volumes of investment into textile production reached their pick in 2013 with 10.431 thousand US dollars but then declined to 691 thousand US dollars in 2016. Currently only 23 existing enterprises benefited from foreign capital participation. The majority of existing in the sector enterprises rely on credits from commercial banks and own capital. The "Textile Trans" is one of the biggest enterprises in this area, which is currently under construction and will be producing 10.000 tons of tissue per year. The investment volumes were 7.5 million US dollars and were fully funded by the Russian-Kyrgyz fund.

The main problems of the textile sector are black payments for salaries due to high social payments and in transparency of payment system in this sector, the lack of available financing due to high percentage rates on credits and short period of repayment, low volumes of private investment in this sector, low level of qualification of personnel and high level of fluctuation of labor, lack of capacities for implementation of international quality standards.

There are big expectations on the realization of the project "Technopolis" which is currently on hold because of the problems with permissions for land usage in Voенno-Antonovka and transformation of the foreseen land to the category of land suitable for industrial activities. There are also alternative plans to create the "Technopolis" based on the Bishkek machinery factory. The sources of financing for this project are also unclear.

Modernization of the textile sector will require training of employees and teaching of new generation of managers. Also, further implementation of logistical centers is needed to move the trade of textile goods from private goods being transported by migrants to more organized system of export. Implementation of new technologies and financial support is needed to help the textile enterprises to modernize themselves in order to be able to improve quality of their production and its competitiveness on the export markets.

Development of the **fur industry** during the periods 2011 – 2016 was positive and the volumes of production were slightly increasing from 9.085 thousand soms in 2011 to 16.188 thousand soms in 2016. The **leather production** was also growing from 197.295 thousand soms in 2011 to 270.458 thousand soms in 2016. The volumes of footwear production increased from 139.863 thousand soms in 2011 to 229.553 thousand soms in 2016. However, in 2018 the volumes of production of **footwear** were decreasing which is connected to the fact that some footwear producing enterprises are currently not functioning because of administrative and other investigations. Kyrgyzstan is exporting leather, in a form of raw materials, mainly to China.

The examples of enterprises include four enterprises such as "Bulgaary", "Opitnoe kojevennoe-kojgalantireinoe obiedinenie", "Alia" and "Renaissance". "Bulgaary" is a joint Kyrgyz-Kazakh-American enterprise, which was created in 1992 and is specializing on production of leather materials for footwear, clothes as well as leather haberdashery. It is also producing leather products such as cloths and footwear. Starting from 1997 it is also producing fur. "Opitnoe kojevennoe-kojgalantireinoe obiedinenie" is producing leather products and is working following the system of orders. More than 20% of products are realized on the local market, the rest goes for export to Kazakhstan. "Alia" is producing coats from leather and fur. It is realizing its production in Kyrgyzstan and Kazakhstan. The company is using modern technologies as well as

chemical materials from such countries as Russia, Turkey, USA, Spain and Turkey. Its main advantage is high quality of production and realization of measures and regulations on protection of environment. "Renaissance" is working since 2014 and is producing footwear. The entire production goes for export to Russia. The enterprise would have employed 120 people, from them 100 people local staff and 20 people international staff, however currently the enterprise is not functioning because of the criminal procedures regarding taxes.

2.4. Food processing

The sector of agriculture is important for economy of Kyrgyzstan, taken into reference that 66% of its population lives in the rural area. However, agriculture provides only 15% of the GDP. It is projected that the growth in the agricultural sector in the periods 2018-2020 will make 3%. This growth will be mainly driven by implementation of measures by state and private sectors to increase productivity of plant growing and life stock. Plans also exist to implement drip irrigation methods and to diversify agricultural production according to the needs of the EAEU countries. In 2016 the system of drip irrigation was already implemented by 482 economic stakeholders on the land of more than 1.200 ha. In 2017 the drip irrigation was implemented already by 623 economic stakeholders on the land of more than 1.815 ha. According to data from January 2018, the agricultural sector had 683.8 thousand active legal and private stakeholders. In comparison to the previous year this number increased by 3.3%. More than 98% existing in agricultural sector economic activities objects are in private property. In 2017 46% of all agricultural products were produced in life stock, 52% in plant growing, 2.1% in services and 0.3% in forestry and fishery.

The overall share of agricultural production, including also forest and fishery sectors, was constantly declining in the overall GDP, from 16.6% in 2012 to 12.8% in 2016. Production of grains, potatoes, vegetables and fruits as well as melons was constantly increasing from 1991 to 2016. At the same time production of cotton, tobacco, grapes and wool was decreasing. The dynamics of the volumes of export show significant changes over the period of time between 2012 and 2017 under influence of such factors as prices for agricultural products, crops yield, and use for agriculture, changes in demand on the markets of the neighboring countries, especially Russia and Kazakhstan, tariffs and other trade barriers for agricultural production. The highest volumes of export of potatoes, carrots and onions were in 2015 because of the low yields in this year in the neighboring countries. Production of grains, fodder crops and potatoes is spread in all regions of Kyrgyzstan. The regions have also specialization on certain types of agricultural production. For instance, Issyk-Kul has specialization on potatoes, apples and currant. Talass has specialization on beans. Osh, Djalal-Abad and Batken have specialization on vegetables, melons and olives. Chui has specialization on sugar beets and olives. The Kyrgyz agricultural production, such as honey, beans, dried fruits etc., is mainly produced for the local market and is also realized at the markets of Russia and Kazakhstan. A small part of production goes for export to other countries, but this happens without any system and largely thanks to the efforts of producers themselves.

More than 90% of all products is produced by owners of small land plots, therefore the sector is characterized by small volumes of produced goods from one enterprise. This does not allow the usage of modern technologies of agricultural production, which would have been easier to implement with owners of large land plots. To address this problem, the government is currently implementing the project "one product – one good" when every village is producing only one kind of agricultural product and utilizes the integrated management of new technologies. One of the major goals of this project is to create working places in the rural area. This project is important because it aims to promote Kyrgyz products on the foreign markets and contribute to the complex development of the regions. Currently the project, which brings together several small producers, has more than 2.000 participants who specialize on products from felts, souvenirs, honey, marmalade and juice from wild berries.

The volumes of food processing industry were constantly increasing in the period between 2005 and 2017. The increase over this period made more than 3,19 times. At the same time the number of people employed by the sector decreased by 28% over the same period. Production of meat and milk as well as sugar, mineral water, non-alcoholic drinks and beer was constantly increasing. Production of bread, tobacco and alcoholic drinks (excluding beer) was declining.

The government is planning implementation of measures during the next couple of years to support enterprises in food processing industry. Another priority of the government actions is to realize program for development of large trade and logistical centers for agricultural and food processing products. The third direction of actions is to create conditions for increased cooperation between different agricultural sectors, such as life stock and plants growing as well as food processing industries. Further plans are to review the financing mechanisms in order to facilitate financing of the agricultural and food processing projects. This will increase a decrease of the volumes of documents needed, to decrease time necessary for approval processes, to decrease interest rates and to increase the payback period for credits, to introduce insurance mechanism in the agricultural sector. Further regulatory measures include introduction of the certification system for ecologically sustainable agricultural and food processing products, including introduction of special symbols for homey, nuts, dried fruits, vegetables and fruits. Other measures to increase exports of agricultural and food processing products can include activation of professional associations, support to local producers for participation at the international fairs and exhibitions and increase of the quality and variety of technical services for agricultural and food processing industries.

The Kyrgyz Republic has a number of **milk production** enterprises, which produce high quality milk products for the domestic market and export. Currently more than 61% of produced butter is exported, more than 50% of produced cheese and 28% of produced milk. According to the national committee of statistics the main products for export are butter, which makes 34% of the exported food processing products, cheese (23%), milk and cream (16%), yogurt and other fermented milk products (12%) as well as dry milk (12%). Russia and Kazakhstan are the main importers of the Kyrgyz food processing products where the Kyrgyz products are occupying the niche of the low and middle price products.

Currently there are two **sugar** producing factories in Kyrgyzstan. These are "Kainda Kant" and "Koshoy" in Chui region. The volumes of sugar production increased from 16.992 tons in 2011 to 67.721 tons in 2016. The entire produced sugar is consumed at the local market.

The **vegetables** food processing industry has 27 industrial enterprises and more than 300 mini-enterprises, which have jointly the volumes of production of 127 million units per year. The efficient usage of available capacities allows to process more than 40 thousand tons of fruits and berries, 10 thousand tons of grapes, 110 thousand tons of tomato and 10 thousand tons of other vegetables per year. The production of juices was constantly increasing from the year 2009 from 7.628 thousand liters per year to 8.6565 thousand liters per year in 2015. The production of processed fruits and vegetables was increasing from 2.602 thousand tons in 2009 to 4.063 thousand tons in 2015.

The export potential of this sector allows exporting of around 20% of the entire yearly production. Russian and Kazakhstan are the main import markets and are importing around 62% of the entire Kyrgyz export. The major export products are beans, walnuts and dried fruits. The overall volumes of exported processed fruits and vegetable production in the period 2007-2015 made 494,3 million US dollars with beans making the biggest share of it is made by beans (397.928 million US dollars), followed by walnuts (67.734 million US dollars), dried fruits (12.480 million US dollars), vegetable and fruit juices (6.991 million US dollars), conserved tomato, vegetables and mushrooms (6.026 million US dollars) and conserved fruits and walnuts (3.096 million US dollars).

The **alcohol** beverages producing industry is represented by 47 enterprises, which include 5 distilleries, 7 vodka producing factories, 21 factories for production of cognac and wine and 14 factories for production of beer. The volumes of alcohol production were constantly decreasing in the period 2009 to 2015 from 620 thousand dals for ethanol in 2009 to 542 thousand dals in 2015, for vodka (1.363 thousand dals in 2009 to 892 thousand dals in 2015), cognac (64 thousand dals in 2009 to 61 thousand dals in 2015) and wine (164 thousand dals in 2009 to 157 thousand dals in 2015). The production of beer was however growing from 1.516 thousand dals in 2009 to 2.633 thousand dals in 2015.

The **non-alcoholic** beverages producing industry is represented by 48 enterprises. The volumes of production are also growing steadily, from 20.652 thousand liters in 2009 to 36.756 thousand liters in 2015. The last years were not only marked by the growth of non-alcoholic beverages production in Kyrgyzstan but also by diversification of the products. Some companies were also very successful with the marketing campaigns, such as "Shoro", "Artesian" and "Bear Beer". Other companies are working with the wholesalers or are currently creating their own distribution networks.

The production of **vegetable oil** is realized by four enterprises such as "Doma-Ata", "Gulam Ata", "Archa" and "Bayas". The volumes of vegetable oil production were decreasing during the last years. For instance, in 2011 they made 15.087 thousand tons and 11.521 thousand tons in 2016. The **confectionery industry** is represented by 11 large-scale enterprises and several mini enterprises, which produce flour products.

In general, the food processing industry is facing currently with the following problems: too small volumes of trade, too small market and local demand, the absence of laboratories for evaluation of quality of food processing products, the low level of implementation of international standards, the declining quality of materials such as seeds, the low volumes of investment and the high percentage rates combined with short terms of credits.

The food processing industry is making only a small share of industrial production, which is much beyond such countries as Vietnam, Malaysia, Kazakhstan, Moldova, Russia and others. The food-processing sector in Kyrgyzstan is also characterized by low productivity and high requirements of land. Currently this sector receives low level of the state financial support, as well as the low level of direct and indirect investment.

The milk processing enterprises need implementation of the measures of analysis for their production. Also, here the certified laboratories are absent. There are also no documents, which are required for the export of production. The conditions of production don't satisfy international requirements. The quality of the packing materials as well as marketing is quiet low. The system of leasing of the equipment is also not developed in Kyrgyzstan.

The sugar industry is experiencing problems with availability of land for sugar production. The vegetable producing industry is facing high competition from Uzbek and Tajik enterprises. It is also lacking financial resources and the access of vegetable processing enterprises to financing is difficult because of several reasons such as too high percentage rate for credits, which cannot be afforded by the majority of enterprises due to the low level of rentability of production. Also, enterprises are often missing collaterals, which are needed to receive credits. Besides of this the industry is characterized by the frequent low crop yields, low quality of materials and unfair competition with products of low quality. There is also lack of possibility for reorganization of enterprises and modernization of equipment based on new technologies. Also, the low level of efficiency of agricultural production negatively influencing the food processing industry.

Among other problems, which enterprises of food processing industry are currently facing, are physically and morally old equipment of many enterprises. Because of aging technologies, the technological divide between Kyrgyz producers and competitors on international markets is growing. The business and governance processes on enterprises are characterized by low level of efficiency, which leads to losses of resources, high costs and low productivity of labor. In the regions there is a lack of qualified employees, especially experts with the technological knowledge and engineers. The production capacity is limited by frequent power outages and the lack of electricity supply as well as by regulatory and legislative risks connected with land rent, when the possibility to cancel the contract any time influences negatively the willingness for further investment.

The meat industry is facing barriers for further development because of the lack of certification processes as well as processing, transportation and storage of production without satisfying hygienic and sanitary conditions. The flour production is characterized by low quality and low competitive advantages in comparison to production from Kazakhstan.

Among advantages of food processing industry in Kyrgyzstan are low volumes of applied mineral fertilizers and availability of mountain pastures. According to the World Bank, the following products can have competitive advantages such as fresh apricots, walnuts, fresh plums, sweet cherries, dried fruits and dairy products. Russia and China can be potential markets for imports of Kyrgyz production.

2.5. Construction materials

In the year 2016 the share of construction industry, which is mainly expressed by the **rubber and plastic products** necessary for construction processes, in total industrial GDP was 6.9%. The dynamic of industry in the period 2012-2016 shows a slight decrease of the construction industry share in the overall industrial share, from 9.3% in 2012 to 10.1% in 2014 and then to 6.9% in 2016. The major shares of this sector are made by cement and glass production (over 80%) and the growth of industry until 2015 is explained by the growth of demand on cement and glass in the country. The decline in the following up years is explained by financial crisis, which affected some countries of the EAEU region. The year 2017 marked a return to growth fueled at least to some extent by growing investment in construction and the increased availability of hypothec financing.

The enterprises producing construction materials are spread very unevenly across the regions, with Batken region having the highest share of 40.9% in Chui region, to 25.5% in Bishkek, 16.2% in Batken region, 10.1% in Osh region and Osh, 3.8% in Djalal Abad region, 2.8% in Issyk-Kul region and 0.2% in Naryn and 0.1% in Talas. The main reason for this situation is production of construction materials close to consumption centers and the availability of resources for production of construction materials in the region.

Currently the sector has 330 enterprises, those number was slightly growing from 2012 (324 enterprises) and employs 11.2 thousand people. The major feature of the sector of production of construction materials is that all existing enterprises are in private property. Therefore, all questions such as necessary technical equipment, modernization and other production and financial questions are solved by private owners of enterprises.

The production of plastic products increased significantly during the year 2016 (225% in comparison to the previous year for pipes made of plastic and 132% for plastic bottles). The major share of this increase is due to small and medium size enterprises.

In the period 2010-2014 production of **cement** more than twofold, which is mainly explained by the growth in the domestic market due to the growing construction volumes. The major problem of the sector is that it is currently mainly producing for domestic market. The size of this market does not allow cement factories to work in their full potential. "South-Kyrgyz Cement" and "South combinat of construction materials" are currently the only Kyrgyz factories, which are producing partly for export. The exports to Uzbekistan make

100 thousand tons per year. The exports to Tajikistan made 200 tons per year however had to decrease until 30 tons per year after Tajikistan constructed two own cement-producing factories with overall capacity of 2.2 million tons per year. So potentials for export are limited and will decline even more when the neighboring countries continue with construction of their own cement factories.

Recently Kazakhstan constructed 13 new cement factories, which resulted in termination of exports from the Kyrgyz "Kant Cement Factory". The ongoing industrialization in Kazakhstan as well as construction of new infrastructure such as roads, public buildings or new houses, leads to an increased consumption of cement and further plans of Kazakhstan to deploy cement factories with overall capacities of over 4 million tons per year. The current demand of Kazakhstan makes 14 million tons per year and with realization of all infrastructure projects it should reach 16.5 million tons per year. The similar situation can be observed in Uzbekistan where cement industry is one of the priorities for industrial development. The production of cement increased from 3 million tons per year by 2010 to 8 million tons by 2017. According to the Program of measures to secure structural reforms, modernization and diversification of production of Uzbekistan for 2015-2019, it is projected that production of cement will be growing by 3.5% per year and will reach 8.9 million tons per year.

Currently eight enterprises exist in the region. The biggest one is the "Kant Cement Factory", which is located in the Chui region and is producing 1.290 tons of cement per year. In 2009 the factory was modernized by transfer of the turning stove from the usage of gas to the usage of coal. The equipment is by NOVAFLAM and is by the French Company Fives Pillard. By transfer from the usage of gas to the usage of coal new equipment was established on the enterprise, including automation of production processes and implementation of higher security standards for coal resources. The factory also has research laboratories for coal, which are equipment of German technologies. Further on, it is planned to establish two gas generators of the Austrian production Unitherm Cemcon to dry coal during its processing as well as for the modern automated terminal for transportation of production.

Factory "South-Kyrgyz Cement" is the second largest enterprise and is situated in the Batken region. The factory is currently producing 1.000 thousand tons of cement per year. The factory is working since 2010 and is producing cement while using the dry method of production. The technical equipment was produced in China. During modernization in the previous couple of years the European equipment was installed (companies FLSchidth Pfister and Unitherm). The factory has plans for further modernization in order to expand the variety of its products.

The third large factory "Technologii", located in Chui region with production volumes of 320 thousand tons of cements is not working since 2009. The factory in Osh region "South combinat of construction materials" has capacities of 200 thousand tons per year and is planning to increase its capacities by installing new stoves. The "Sii-Dsi-Prim", another factory with capacity of 200 thousand tons per year and located in Osh, started working in 2018.

Besides there is a number of smaller factories such as "Kurmentyement" located in Issyk-Kul region with production of 60 thousand tons per year, "Ak-Say cement" in Osh region with capacity of 40 thousand tons per year or a Kyrgyz-Chinese enterprise "KZS" located in Batken region. These factories produce only limited number of products or have seasonal character of work.

Currently a new agreement was reached with the Chinese investors for construction of new cement factory in Kara-Kul with the overall capacities of 1 million tons per year. It is planned that the factory starts operation in 2019.

Therefore, the market for Kyrgyz cement is limited due to the limited potentials for export to the neighboring countries and small potentials on the local market because of the small volumes of industrial and other types of construction works. This leads to a situation that existing factories are working 60% of their capacity. Taken into reference that new capacities of cement production are under construction, realization of their products are only possible with significant growth of construction activities in the country, which can be possible with the realization of the program "Affordable Housing up to 2020", which foresees construction of more than 130 thousand square meters of housing. So potentials for cement production could be increased on the domestic market with realization of new programs for affordable housing.

The **glass** production in the country is fulfilled by the only one enterprise, which is the factory "Interglas" with the capacity of 33,5 million square meters. The enterprise is the largest enterprise in the entire Central Asia. In the year 2000 the enterprise was purchased by the German company "Heinrich Glaeser", which conducted a large-scale reconstruction and modernization of the enterprise with the use of own means and financing from the European Bank for Reconstruction and Development. The overall investment needed for reconstruction made 35 million Euro. The factory experienced difficulties in the period 2015-2016 due to the impact of financial crisis on demand of glass production in Russia and Kazakhstan, where it was previously exporting its production. The Kyrgyz domestic market is consuming only 4% -10% of the products of the factory. Nowadays the demand on the production of the factory has recovered during the last couple of years with an increasing export to Tajikistan, Kazakhstan, Uzbekistan and Russia. It is also projected that the volumes will remain stable for the period 2018-2021. So potential on this market is also limited unless the domestic demand will increase through massive construction programs.

The production of **bricks and reinforced concrete products** is developed across all regions of Kyrgyzstan. This is explained by availability of resources for bricks as well as by the spread of bricks factories across the country with different production capacities but mainly small and medium enterprises. Bricks are mainly consumed on the internal market as their transportation is difficult due to fragility and labor requirements for transportation. From the overall production volumes only 1% are going for export to Kazakhstan to the regions, which are at the borders of Kyrgyzstan.

Previously reinforced concrete products were exported to different countries of the Central Asian region and until 1990ies the volumes of production reached 1.300 thousand cubic meters per year. So high volumes could be explained by several construction works across the region at that time. Currently the volumes of

production of reinforced concrete products are low because of the low level of demand inside the country. There are currently five main enterprises, which produce reinforced concrete products. These are "Bishkek factory JBI", "Kum-Shagil", "Tash-Temir", "Polibeton" and "Zelesobeton".

2.6. Information and telecommunication technologies

The use of information and telecommunication technologies (ITT) in Kyrgyzstan is growing. According to the National Committee of Statistics, in 2016 almost 12.000 economic subjects were using ITT, which shows an increase in 1.3 times in comparison to the year 2013. The number of points of access to Internet also increased during the last years, from 11.030 in 2009 to 22.044 in 2017.

ITT are more frequently used in the cities (68% of all ITT) than in the rural areas (32%). The highest usage is in Bishkek (more than 40% of all ITT) and the lowest usage is in Talas region (around 4%). ITT are more frequently used by private economic subjects (55% of all ITT) than by the public economic subjects (45%). The usage of ITT by public enterprises is actually quite low. From 5.4 thousand subjects in state property only 2.7% are connected to State networks, from them only 529 subjects have their own webpage, 36% of these webpages are in Kyrgyz language. From all connected to the State network enterprises 32% are in Bishkek (Table 2).

Table 2. Indicators for ITT in 2016. Source: (National Statistical Committee of the Kyrgyz Republic, 2018).

	Total	Urban population	Bishkek	Rural areas
Local area networks	7 682	6 611	3 944	1 071
E-mail	4 784	3 757	2 280	1 027
Points of access to Internet, including ADSL	18 383	10 790	8 726	7 593
Provided lines	5 665	3 987	1 923	1 678
Own web-sites	1 625	1 457	1 096	168
Providing services online	877	809	638	68
Web-sites on Kyrgyz language	394	362	241	32
Connected to State Network	187	131	60	56

In 2016 the ITT sector employed more than 20 thousand people, which is 1.6 more in comparison to 2012. The highest share of employed in ITT is in Bishkek (29%) and the lowest in the Naryn region (0.9%). Employees of the ITT sector are enjoying the salaries which are considered as high in comparison to other sectors. The salaries were also growing significantly during the last years, from 4.734 soms per month in 2005 to 26.204 soms per month in 2016. The number of people who received special education needed to ITT sector is increasing for secondary professional education and is decreasing for primary and high

education. For instance, 2013 the secondary professional education sector had 332 students and in 2017 it had already 1.098 students. In 2013 the primary professional education sector had 1.551 students and in 2017 it had 1.367 students. The high professional education sector had 1.075 students in 2013 and only 761 students in 2017.

The overall extension of fiber-optic communication network in Kyrgyzstan makes 17.507 km, from which the most extended network is in the Chui region and Bishkek (2.179 km) followed by Osh region (1.447 km), Djalal-Abad region (1.447 km), Issyk-Kul region (1.324 km), Naryn region (776 km), Talas region (510 km) and Batken region (443 km).

The ATM terminals are also spread very unequally through the territory of Kyrgyzstan. Currently there are 1.300 ATM terminals on the entire territory of Kyrgyzstan, from them the biggest number is in Bishkek (611), followed by Osh region (183), Djalal-Abad region (145), Issyk-Kul region (117), Chui region (102), Batken region (51), Naryn region (47), Talas region (44).

First time the definition of the need of electronic governance was identified in the Decree of the Government "About implementation of the electronic governance system "Tunduk" for pilot of electronic services and exchange of data in electronic format between different information systems" from 2016. Currently 12 state bodies are participating in "Tunduk". The implementation of "Tunduk" shows the start of discussion about digitalization and the forth industrial revolution in the country. However, further assessment of this project and its scalability to other regions of the country is necessary.

Tunduk

The implementation of the service includes connection to the fiber-optic cables, deployment of service equipment, including software, such as Linux Ubuntu, special programs for cyber security etc., and hardware. Currently the state organs are in the process of preparation of program equipment for transfer, exchange and storage of data in frames of "Tunduk". The testing process is also currently ongoing with a number of state organizations. However, implementation of "Tunduk" is lacking qualified programmers who know Java and ASP.NET. The specialists of enterprises "Infosystem" and "Infokom" are currently trying to solve this problem. Also, some state organs are missing centralized server equipment and automatized management systems, which are necessary for connection to "Tunduk". Also, the state organs have the integrated net VPN for exchange of data, which delays connection to "Tunduk". In 2015 an agreement was concluded with "Kyrgyztelecom" for construction of fiber-optic cable to connect all state organs of Kyrgyzstan (approximately 60 km of cable). In 2016 the works were finished, and all 68 state organs are currently connected, and 34 state organs have by now the server equipment.

The deployment of digital technologies includes several goals. One of them is to create digital infrastructure, which would include cloud technologies, digital platforms, centers for processing of information and others). Deployment of digital technologies will be combined with implementation of measures for cyber security. The deployment of digital technologies will also involve statistical data and implementation of international regulatory norms according to the international best practices and standards. It will also include measures to increase human potentials and capacities needed for the digital technologies industries. Here we bring some examples of currently ongoing projects in ITT sector.

The Program of Digital Transformation of the Kyrgyz Republic Taza-Koom was aimed to contribute to the digitalization of the economy of Kyrgyzstan with implementation of ITT technologies, in particular, in provision of state services. Another goal of the project was to reduce intransparency through automatize of the administrative processes and procedures. Also, significant reforms of the governance sector were foreseen. The programs of the government, like Tasa Koom, became a significant driver for development of digital technologies in Kyrgyzstan. The main areas for development of digital technologies are digitalization of the governance sector, such as administrative procedures, as well as providing access to digital technologies to population. The governance reform, which is based on digitalization of all aspects of decision-making processes including judiciary, legislative and implementation powers, should be based on the principle of the unified informational space and access to state services through online instruments. Implementation of digital technologies should also facilitate deployment of renewable energies and measures of energy efficiency as well as mitigation of natural hazards and management of natural disaster risks. Further steps are implementation of digital economies in the area of education and health protection, financing and agriculture.

The Government of Kyrgyzstan in cooperation with the World Bank initiated the project "**Digital CASA – Kyrgyz Republic**", which should contribute to the goal to create electronic government. The financing of the project is around 50 million US dollars, from which 25 million US dollars are provided on the basis of a grant and other 25 million US dollars are provided on the basis of the credit with 1.5% interest rates per year. The credit is provided for the period of 38 years. The project aims to contribute to the national and regional aspects. In the national aspect the project will contribute to the development of digital infrastructure, development of state electronic services as well as cloud technology for data storage through creation of favorable conditions at the regulatory level and contribution from the educational system. The regional aspect will include an increased transmission capacity of the lines as well as connecting several countries of Central Asia and some countries of the South Asia. The project also foresees creation of the regional digital platform, the so-called Eurasia Cloud. The project also foresees creation of the regional center for know-how transfer and education in the area of digital economy. Currently the project is at the stage of approval.

In April 2018 the Government of Kyrgyz Republic ratified the law "About implementation of the **electronic system for tax procedures**". The law created the basis implementation of electronic accounts and further improvement of the electronic financial services. In May 2018 a working group was created to implement the reform on electronic system of tax procedures.

2.7. Tourism

Tourism in Kyrgyzstan is dynamically developing and also has economic priority. According to the program of the Government of the Kyrgyz Republic for development of tourism up to 2020 from 2016, the country has high potentials for tourism, which are based on availability of different ecosystems (22), different mountainous and lowland landscapes (160) and potentials for mountainous tourism as the 94% of territory of Kyrgyzstan are covered by mountains and 70% are covered by high mountains. Among them are the high mountains like the Peak of Victory (7.439 m), the peak of Lenin (7.134 m) and the peak Khan-Tengri (6.995 m). One of the longest glaciers "Enilchek" is the landmark of the global importance. Also, Kyrgyzstan has 1923 lakes, where the most famous, largest and deepest one among mountainous lakes is Issyk-Kul. There are also more than 40.000 rivers, which are mainly carrying water from the glaciers.

Kyrgyzstan is among 200 priority ecological regions of the planet. The natural reserves and special territories are covering 6% of its territory, including 1 biosphere park, 10 state reserves, 9 national parks and 63 reserves.

Tourism plays an important role for national GDP and the tourism industry was growing significantly during the period from 2012 to 2016, as well as the volumes of investment into this sector (from 8.040 million soms to 17 17.453 million soms). The number of tourists over this period remained stable. Mainly tourists are coming from Kazakhstan (65%), but also from Russia (17%), Uzbekistan and Ukraine (5-6%). The majority of tourists go to the Issyk-Kul lake.

To support development of tourism sector several private services provided united themselves into cooperatives, following initiative from 2000. By now in Kyrgyzstan there are 15 such cooperatives, which also unified themselves into Kyrgyz Tourism Association. They are still working and there are currently several tourism associations such as CBT (<http://cbtkyrgyzstan.kg/>); TUK (<http://tuk.kg/?lang=en>); KATO (<http://kato.kg/en/>)

There are several airlines going to Kyrgyzstan however the development is influenced by the absence of direct connections to several destinations. From 2012 Kyrgyzstan introduced free visa regime with several countries, which was a significant driver for further development of tourism sector. Starting from this year the number of tourists increased by 27%. Nowadays Kyrgyzstan has free visa regime with more than 60 countries.

The government has signed Tourism Sector Development Program up to 2020 (GoK, 2016). This program has action plan, which comprises measures of improving of legislation framework and enabling business environment in tourism sector, improvement of tourism service, tourism infrastructure development, branding campaigns, qualified staff attraction and training, development of clusters, providing security to tourists, preserving the natural environment. Also, with the assistance of donors, Ministry of culture, information and tourism of the Kyrgyz Republic are developing the Marketing Strategy, which includes several branding campaigns. In order to develop tourism and to brand a country as a tourism destination, the government has organized three times in 2014, 2018 and this year World Nomad Games, which has attracted many tourists to

the country and world mass media intensely covered that event all over the world as a unique event in the world. Of course, branding campaigns would assist for the development of sector, however due to budget constraints broader branding campaigns somehow are limited. This sector well connected with rural areas and agricultural sector, the construction of tourism resorts and objects may boost construction sector and construction material production sectors. The tourists coming to the country usually buy local souvenirs, national garments and use national cuisine. Therefore, tourists, who came once to the country, come here again by bringing other friends and relatives. Some of them open the business in Kyrgyzstan.

The following factors are drivers for development of the tourist sector, which are not currently or are not fully developed in Kyrgyzstan: availability of direct air connections, fast acquisition of visa, fast and secure transport from airport or border to the touristic place, easy and well-developed procedure of registration of tourists, availability of public toilets as well as the quality of service in touristic places.

Tourist industry has an important meaning for other industries as it leads to construction of new hotels, pensions etc. therefore contributing to the growth of construction industry. It also contributes to the food processing industry and to the industry producing national souvenirs. The further potentials for development of tourist industry are at the South Shore of Issyk-Kul lake as well as on the East of Issyk-Kul for construction of mountainous and skiing resorts.

3. Key messages

1. Continue plans for deployment of renewable energy sources

The focus of the state policy on RES should be on creation of attractive investment conditions for RES, in general, and for small hydro, in particular. The improvements in the regulatory framework should include guarantees for private investment and regulation of state-private sector relationships. The institutional framework for deployment of RES should be also improved. For instance, there is no state authority, which would carry responsibility for attracting investment into RES and dealing with administrative procedures. Introduction of such authority was a successful practice in several countries. The lack of appropriate financing mechanism is also negatively influencing the willingness of electricity distribution companies to purchase electricity generated by RES.

2. Continue deployment of energy efficiency measures and analyze experience of ongoing initiatives for deployment of energy efficiency measures in rural areas

The initiatives include the Public fund of the UNISON Group, which has rich experience in implementation of the measures of energy efficiency in rural areas. The work of UNISON group is realized in cooperation with the major partners such as the Public Fund "AVEP" association "AMETIS" and the public fund "SEEVA". In 2015 the public fund "AVEP" in cooperation with the Swiss company conducted research of the labor market and potentials for energy efficient construction in the rural areas of the Chui Region. Based on the results of

this research a project G-Star was realized which targeted training and education of the inhabitants of rural areas about the measures of energy efficiency. The project included training of young people, who were previously unemployed, about implementation of measures of energy efficiency. The training allowed young people to find new jobs in the energy efficiency sector. This project included 35 villages and provided education to more than 1000 people. The training was based on theoretical part and practical work and trained the participants the measure of qualitative construction and energy efficient refurbishment. For the UNISON Group during the five years of their activity more than 500.000 people from 1.000 villages were trained about energy efficient construction and refurbishment. Another example is the initiative of UNEP and UNDP "Poverty and environment", which developed indicators of progress and monitoring of transfer of the Kyrgyz Republic to sustainable development. The results of the project were provided to public employees at the ministries, state services of statistics as well as other stakeholders in the process of creation of the national system of measurement of green growth.

3. Implement regulations for environmental protection in the mining sector and social impact assessment to deal with the issues of public protests

To achieve the dynamic and diversified development of the mining industry, it is necessary to observe the balance of interests of the state, extractive companies and the local population for the benefit of future generations and without damage to the environment. It is also necessary to mention that without proper institutional framework the mining industry tends to the so-called resources curse, when the countries are getting trapped into resource curse due to foreign currency inflows on accounts of the gold mining companies. This leads to volatile growth, low competitiveness as well as declining of the share of manufacturing, sectoral regression and decreasing productivity rates. The main problem of the industry is the relationship between the company developing the deposits and the local community. Conflicts at the local level, when inhabitants are protesting against further infrastructure development, is an acute problem for industrial development in the regions. One of the reasons for this is unclear regulations regarding compensation to local communities for deployment of the projects and the lack of involvement of communities into decision-making processes. Currently some examples exist on compensation measures, such as investment into local infrastructure, including roads or water supply. However, these measures are seldom, and their scale is not significant. The majority of measures target awareness level of inhabitants and provide information, which aims to improve the image of the company realizing the project or information about the need of the project.

4. Continue developing social license and social package as instruments to mitigate social protests from local communities

In addition to obligations to the state, the Law "On Subsoil" regulates the company's achievement of consent for the development of a field development with the local population in the form of a "social license". In the absence of a social license, mining companies experience such negative consequences as delays in work plans, impeding the implementation of further plans for the launch of the project, vandalism, complications with the hiring of a skilled workforce and suspension of the company. Thus, obtaining a social license is important not only to reduce the risk of social conflicts, public criticism and deterioration of the company's reputation, but also to reduce financial losses. In addition, obtaining a social license is an inevitable step for

companies operating within jurisdictions that are a democratic society for which public support is necessary for political purposes. Although a social license can be approved and given by the state (for example, the government or the general public), local communities still play a key role in the implementation of mining projects because of their proximity to the work area and, as a result, increased impact on their livelihoods. Thus, the concept of social license strengthens the role of communities and other stakeholders in the implementation of the mining project.

To obtain a "social license", the mining company enters into an agreement with the local community, which stipulates the provision of a "social package". A social package is an agreement between a subsoil user and the executive body on assistance in the socio-economic development of a region on whose territory the subsoil use object of national importance is located, which is prepared on the basis of the socio-economic development program of the local community. The law requires an agreement between the company, which explores natural resources, and the government of the relevant administrative-territorial unit. However, the obligation to provide social package exists only for subsoil assets of the national importance, which are at the stage of exploration or planning. The social package includes programs of investment into socio-economic development of local communities, which mainly includes education, providing job opportunities and infrastructure.

5. Continue with projects and programs on digitalization

A number of projects and programs, such as "Tunduk" was initiated to digitalize governance services. An assessment about feasibility of these programs is necessary as well as a follow up on the initial stages of implementation and the ways to scale the programs up, to replicate them and to push digitalization from an economic perspective. For example, this can include the utilization of methods of e-commerce, which include online trades and promotion of information about Kyrgyz goods through online shops. Also, the use of the platforms and introduction of cloud computing can be proposed as an area to follow, replication bearing in mind economic applications.

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