KYRGYZSTAN'S ENERGY SECTOR

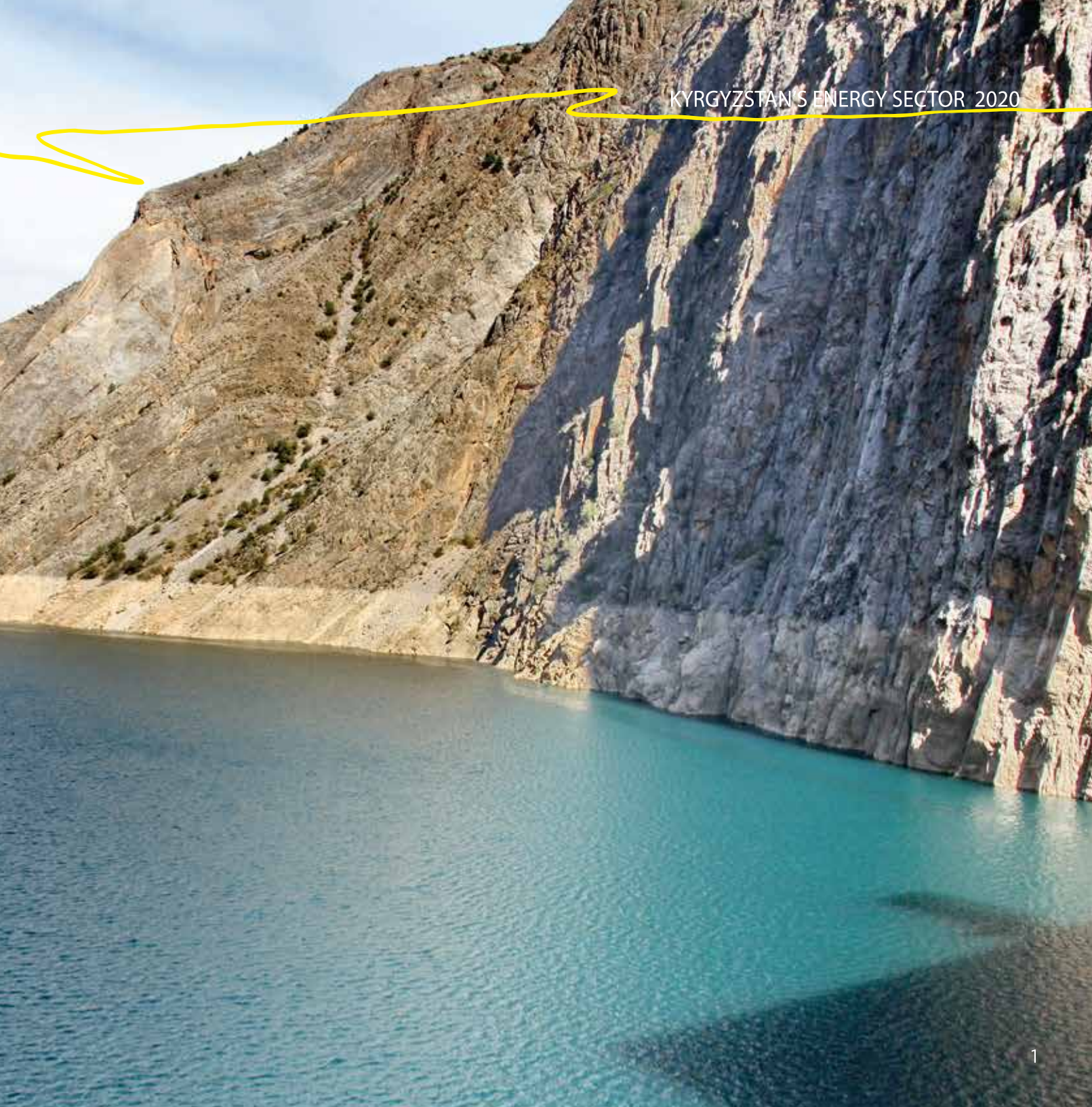
2020

ORDERED BY
THE STATE COMMITTEE FOR INDUSTRY, ENERGY AND
SUBSOIL USE OF THE KYRGYZ REPUBLIC

UNDER THE SUPPORT
OF THE ASIAN DEVELOPMENT BANK

KYRGYZSTAN'S ENERGY SECTOR – LIFE ENERGY

KYRGYZSTAN'S ENERGY SECTOR 2020



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HISTORY
OF ENERGY SECTOR FOUNDING AND DEVELOPMENT

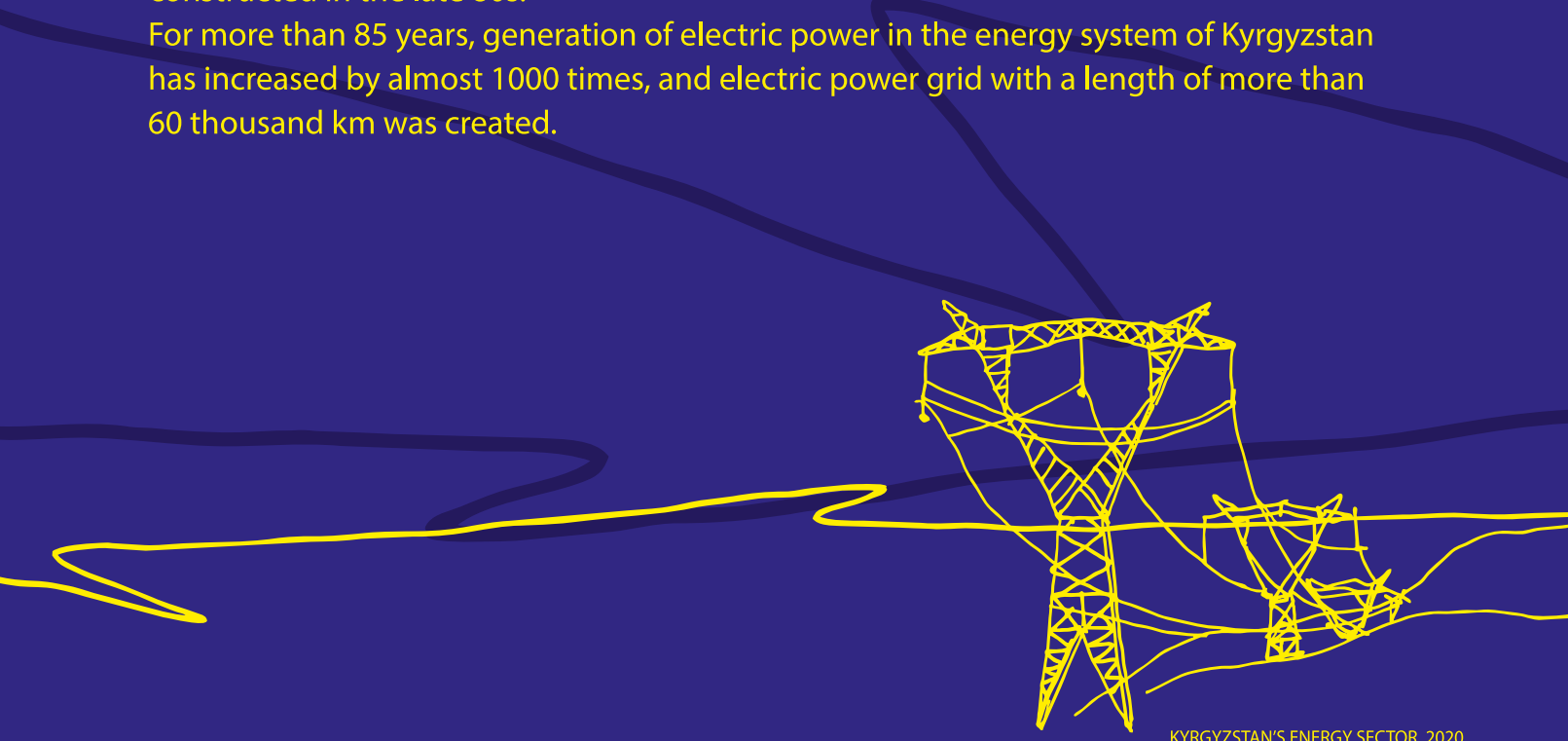
The official countdown of history of the energy system of the Kyrgyz Republic began more than 85 years ago. In 1934, the Kyrgyz Republican Trust for management of construction of hydropower plants and power transmission lines was renamed into Frunze Energy Association (FEA) of the national level. It was closely involved in the development and construction of energy facilities and energy supply to the population of the country. Along with it a single dispatch service was established.

Before that, since 1910, exploration works have been conducted in the Naryn and Chu and other rivers basins for more than 20 years, substations and power transmission lines have been constructed, and the national energy system has been establishing. The first small HPP with a turbine capacity of 240 hp and a generator of 55 kV was put into operation in 1913 in Osh city.

The State Plan for Electrification of the Soviet Russia determined the prospects for electrification of the Turkestan region through construction, first of all, of Uch-Kurgan HPP with a capacity of 45 MW, Djel-Aryk, At-Bashi and Sokh HPPs with a capacity of several tens of kilowatts.

The construction of small and medium HPPs, as well as diesel power plants and electrification of our country have been gaining the pace every year and every five years. During the post-war years, the energy supply in the country has been mainly performed by small HPPs and diesel power plants until commissioning of Bishkek CHP in the north and Uch-Kurgan HPP in the south of the country. Next facilities constructed were Toktogul HPP and later - Kurpsai HPP. Tash-Kumyr and Shamaldy-Sai HPPs were constructed in the late 80s.

For more than 85 years, generation of electric power in the energy system of Kyrgyzstan has increased by almost 1000 times, and electric power grid with a length of more than 60 thousand km was created.



KYRGYZSTAN'S ENERGY SECTOR TODAY

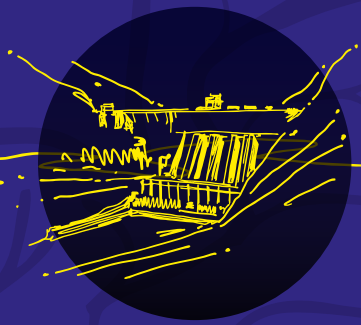
Workers employed in the energy sector –

16 350

people

Dam –

7



Hydropower plant –

7

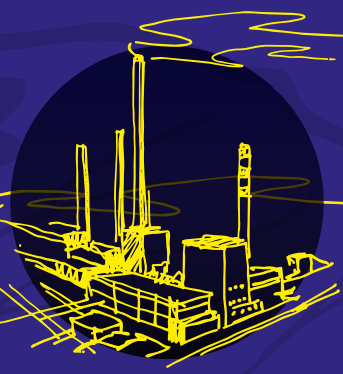
large plants

Small hydropower plant –

16

Power transmission line –

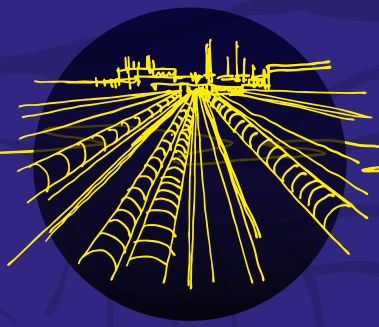
64 700 km



Combined heat and power plant –

2

Bishkek CHP (812 MW)
Osh CHP (50 MW)



Heating supply network –

493.2 km

STRUCTURE OF POLICY AND MANAGEMENT OF ENERGY SECTOR OF THE KYRGYZ REPUBLIC

Government of the Kyrgyz Republic


State Committee for Industry, Energy and Subsoil Use of the Kyrgyz Republic (SCIESU KR)
State Agency for Regulation of Fuel and Energy Complex under the Government of the Kyrgyz Republic (SARFEC)
State Property Management Fund under the Government of the Kyrgyz Republic (SPMF)
State Inspectorate for Environmental and Technical Safety under the Government of the Kyrgyz Republic (SIETS)
"National Energy Holding Company" OJSC (NEHC OJSC)
"Kyrgyz Energy Settlement Center" OJSC (KESC OJSC)
"Electric Power Plants" OJSC
"Chakan HPP" OJSC
"National Electric Grid of Kyrgyzstan" OJSC (NEGK OJSC)
"Severelectro" OJSC
"Vostokelectro" OJSC
"Oshelectro" OJSC
"Jalalabatelectro" OJSC
"Bishkekteploset" OJSC

LEGAL AND FUNCTIONAL STATUS OF ENERGY SECTOR'S SUBJECTS

SCIESU – State Committee of Industry, Energy, and Subsoil Use of the Kyrgyz Republic. The central executive body responsible for the development and implementation of state policy in the field of industry, fuel and energy complex and subsoil use.

SARFEC – State Agency for Regulation of Fuel and Energy Complex under the Government of the Kyrgyz Republic. Authorized state body performing the state regulation of the activities of fuel and energy complex subjects through licensing and setting the tariffs for electricity, heat energy and natural gas.

SPMF – State Property Management Fund under Government of the Kyrgyz Republic. The state body of executive power of the Kyrgyz Republic that represents the interests of the state as the owner of state property, executes the state policy on management and privatization of the state property. The Fund manages the state-owned stake of shares at the "National Energy Holding Company" OJSC.

SIETS – State Inspectorate for Environmental and Technical Safety under the Government of the Kyrgyz Republic. Authorized state body of executive power performing the state control and supervision of the environmental and technical safety.

"NEHC" OJSC – "National Energy Holding Company" OJSC. Managing company that holds the controlling stakes of shares of the following energy companies: 9 subsidiary energy companies with the state-owned stakes of shares of 80.49% of "Electric Power Plants", "National Electric Grid of Kyrgyzstan", "Bishkekteploset", "Severelectro", "Oshelectro", "Vostokelectro", "Jalalabatelectro" OJSCs, and 100% of stakes of shares of "Chakan HPP" and "KESC" OJSCs:

- "Kyrgyz Energy Settlement Center" OJSC - a company providing the services with use of the centralized informational analytical system for collection, processing, validation, and analysis of data on energy cross-flows and losses, compilation of electric power balances, performing of settlements for all users of electric power market, and monitoring of mutual settlements between the participants of electric power market.

- "Electric Power Plants" OJSC – a company with functions on generation of electric and heat energy on the basis of the cascade of Toktogul HPPs, enterprises of HPPs under construction, At-Bashi HPP, and Bishkek and Osh CHPs.

- "Chakan HPP" OJSC – a company with functions on generation, transmission and sale of electric power on the basis of the cascade of Alamedin small HPPs and Bystrovskaya HPP.

- "National Electric Grid of Kyrgyzstan" OJSC – a company with functions on transmission of electric power powered by high voltage power transmission lines with voltage of 110 kV and higher with all their substations and the centralized dispatch service.

- "Severelectro" OJSC - a company with functions on electric power distribution on the basis of distribution grids of Chui, Bishkek, and Talas power lines enterprises.

- "Vostokelectro" OJSC - a company with functions on electric power distribution on the basis of distribution grids of Issyk-Kul and Naryn power lines enterprises.

- "Oshelectro" OJSC - a company with functions on electric power distribution on the basis of distribution grids of Osh power lines enterprises.

- "Jalalabatelectro" OJSC - a company with functions on electric power distribution on the basis of distribution grids of Jalal-Abad power lines enterprises.

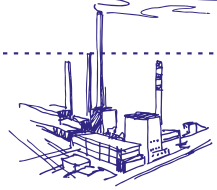
- "Bishkekteploset" OJSC - a company with functions on heat energy distribution on the basis of Bishkek heating network enterprises.

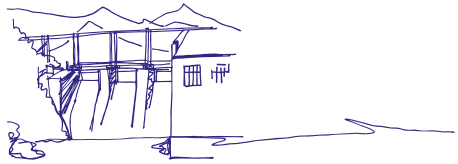
STRUCTURE
OF THE "NATIONAL ENERGY HOLDING COMPANY" OJSC

SETTLEMENT CENTER
"KYRGYZ ENERGY SETTLEMENT CENTER" OJSC

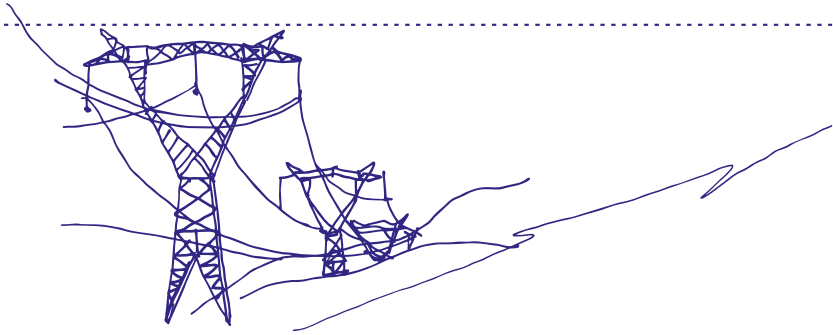
Generating companies

- "Electric Power Plants" OJSC
- "Chakan HPP" OJSC





Transmission company
"NATIONAL ELECTRIC GRID OF KYRGYZSTAN" OJSC



Distribution companies

- "Severelectro" OJSC
- "Vostokelectro" OJSC
- "Oshelectro" OJSC
- "Jalalabatelectro" OJSC
- "Bishkekteploset" OJSC

- **“Electric Power Plants” OJSC –**
  7 HPPs and 2 CHPs with a total installed capacity of 3 892 MW.

- **“Chakan HPP” OJSC –**
  9 small HPPs with a total installed capacity of 38.5 MW.

- **“National Electric Grid of Kyrgyzstan” OJSC –**
  110-500 kV PL and 500/220/110 kV SS.

- **“Severelectro” OJSC –**
  35/10-6/0.4 kV SS, Bishkek city, Chui and Talas regions.

- **“Vostokelectro” OJSC –**
  110-35/10-6/0.4 kV, Issyk Kul region, Naryn region, Toguz-Toro district in Jalal Abad region.

- **“Oshelectro” OJSC –**
  35/10-6/0.4 kV SS, Osh and Batken regions.

- **“Jalalabatelectro” OJSC –**
  35/10-6/0.4 kV SS, Jalal Abad region.

- **“Bishkekteploset” OJSC –**
  19 pumping stations and 466 km of two-pipe heating supply networks in Bishkek city.

MAPPING OF LARGE AND SMALL HPPs AND CHPs OF THE KYRGYZ REPUBLIC

ENERGY SYSTEM – LIFE ENERGY

HYDROPOWER POTENTIAL

The hydropower potential of water resources of the Kyrgyz Republic is **142 bln kWh** of possible annual electric power generation and is on the **3rd place** in terms of reserves in the rating of the countries of the Commonwealth of Independent States. To date, only **10%** out of the total national hydropower potential is developed, which is about 14.5 bln kWh. Prospective energy projects can help to attract investment in other sectors as well. This will create jobs and contribute to the growth of the economy of the Kyrgyz Republic. The priority projects envisage the construction of **18 hydropower plants** and 63 small hydropower plants, of which **6 small hydropower plants** are the most studied, with a total installed capacity of **5 760 MW** with a possibility of the average annual production of about **20 bln kWh.**

GENERAL INDICATORS OF ENERGY POTENTIAL

Hydropower potential

142 bln kWh

In the CIS hydropower rating

the Kyrgyz Republic is on the 3rd place

The percentage of the country's development of hydro resources potential is

10%

THE ENERGY SECTOR'S DEVELOPMENT PROSPECTS

Priority HPP projects

18 HPPs – 5 660 MW

Priority small HPP projects

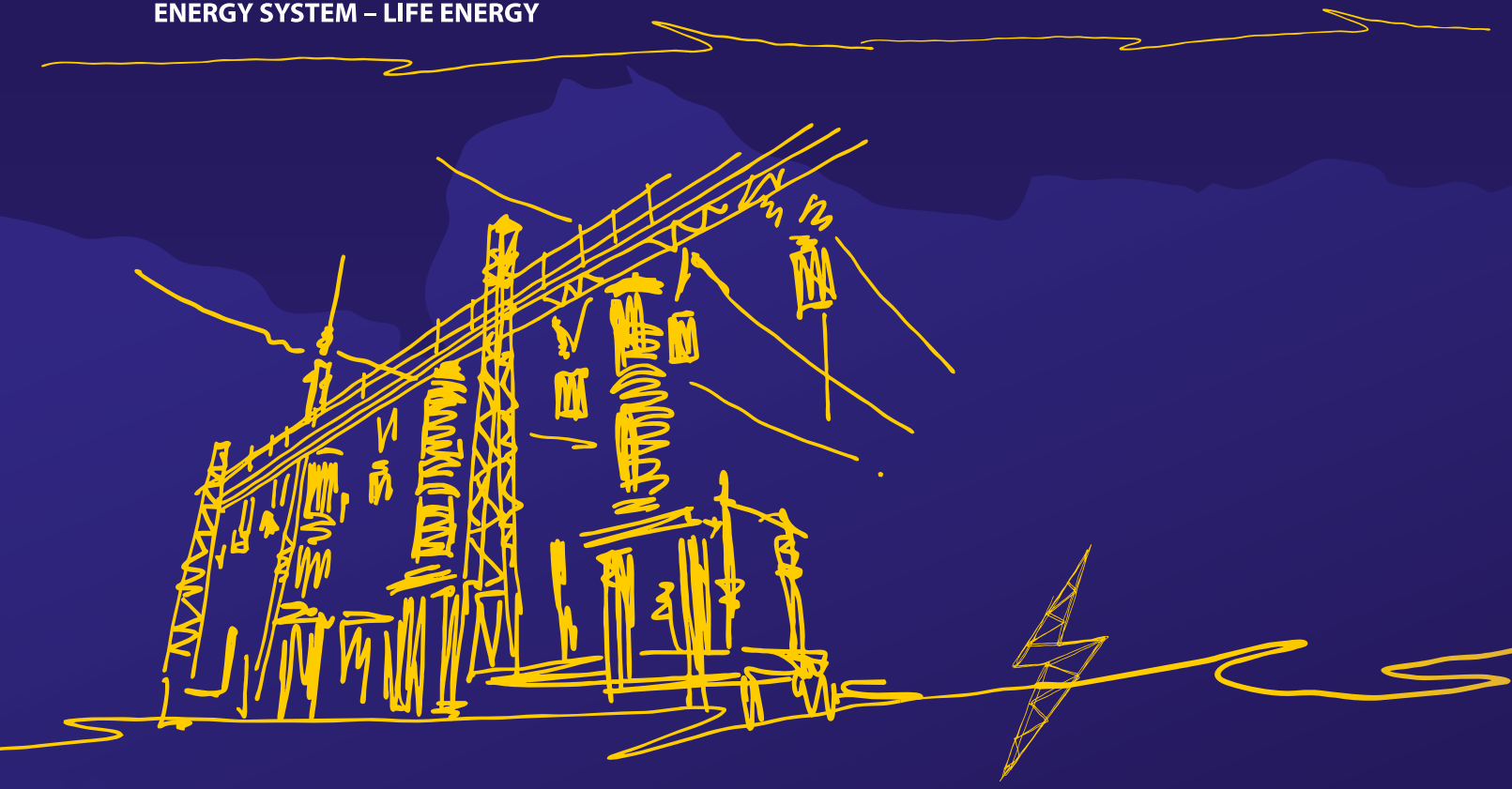
6 SHPPs – 100 MW

Average annual generation

20 bln kWh

LAYOUT OF THE MAIN ELECTRIC GRID OF THE KYRGYZ REPUBLIC'S ENERGY SYSTEM

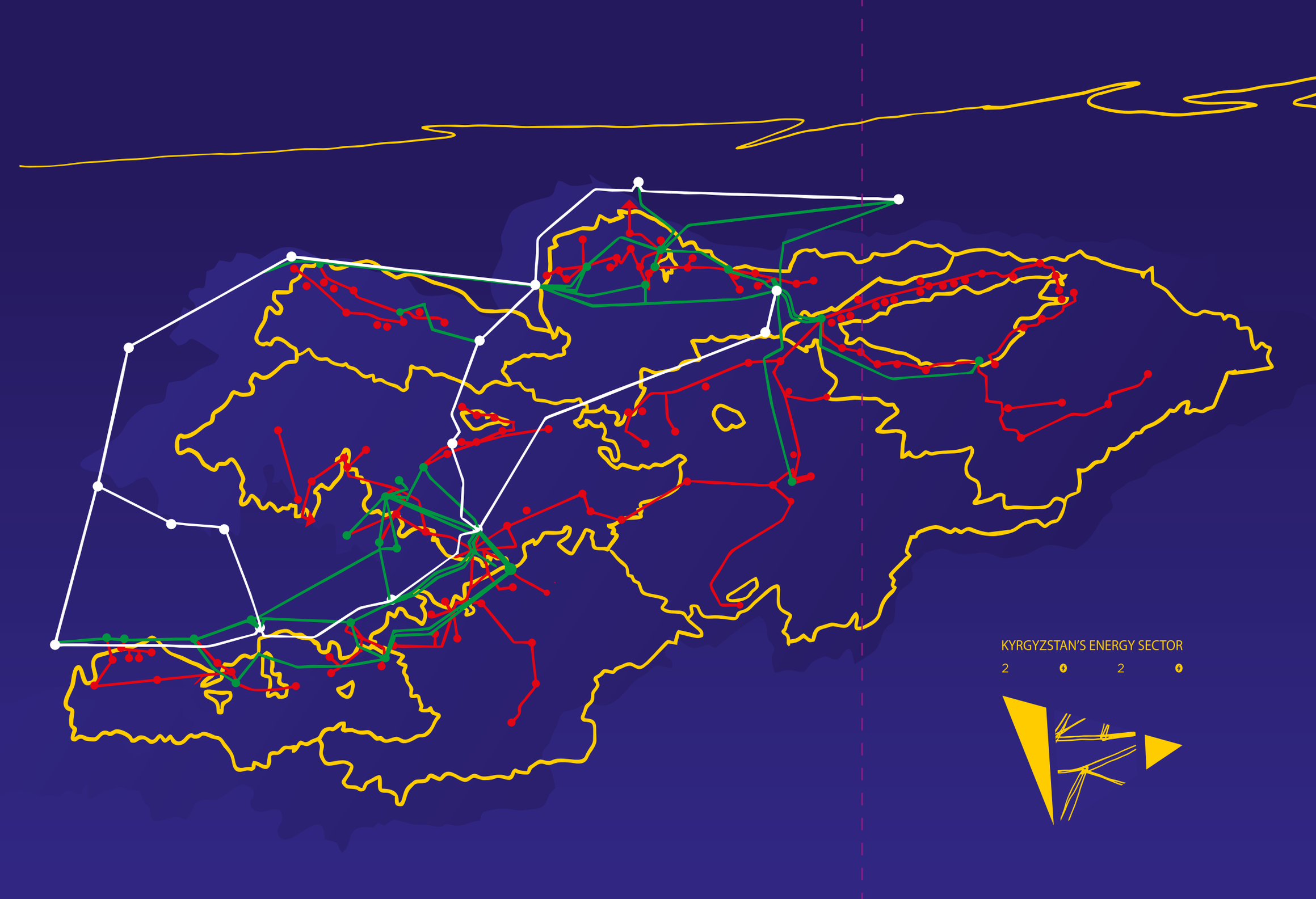
ENERGY SYSTEM – LIFE ENERGY



500 kV SS — 500 kV PL

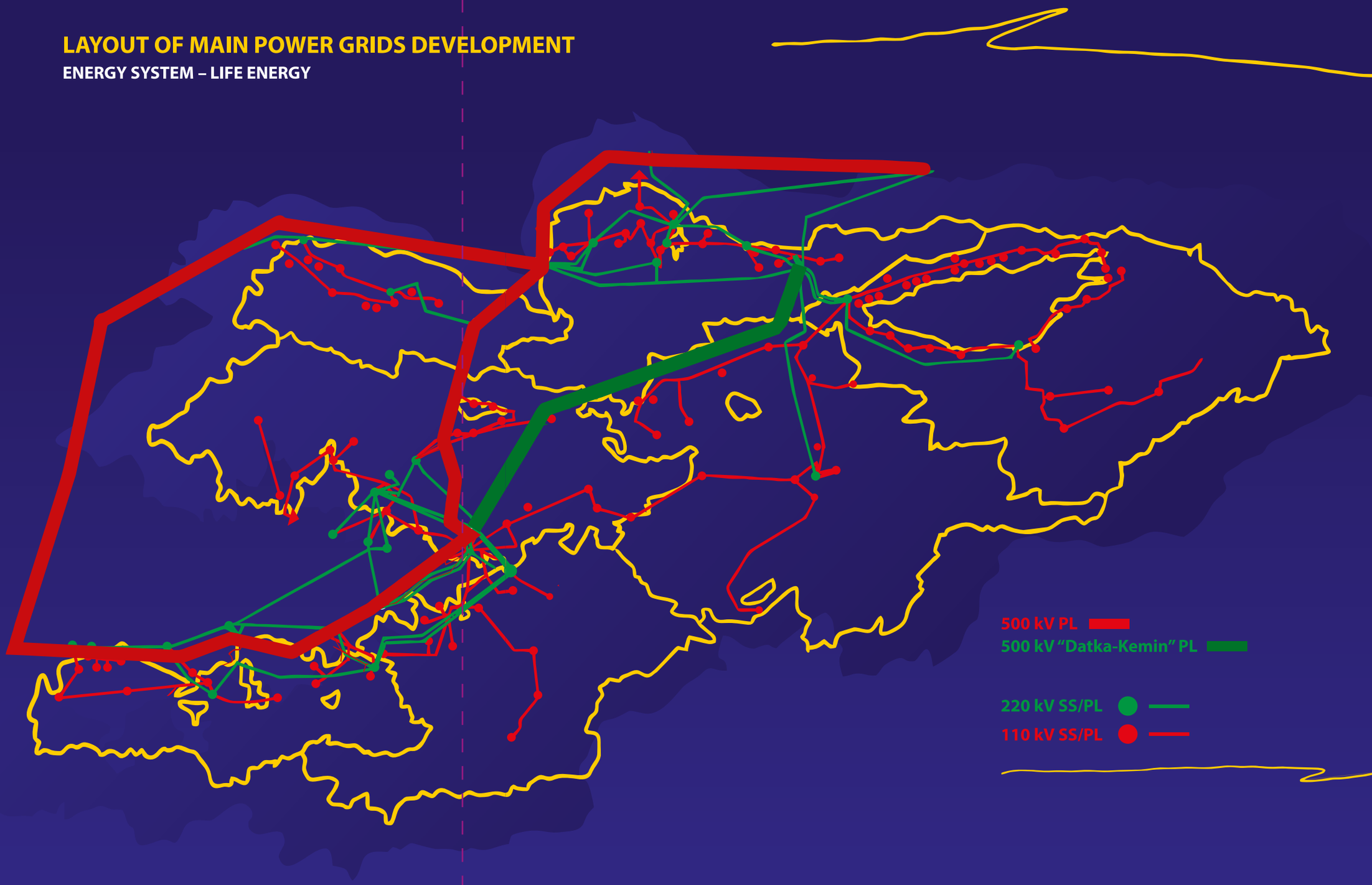
220 kV SS — 220 kV PL

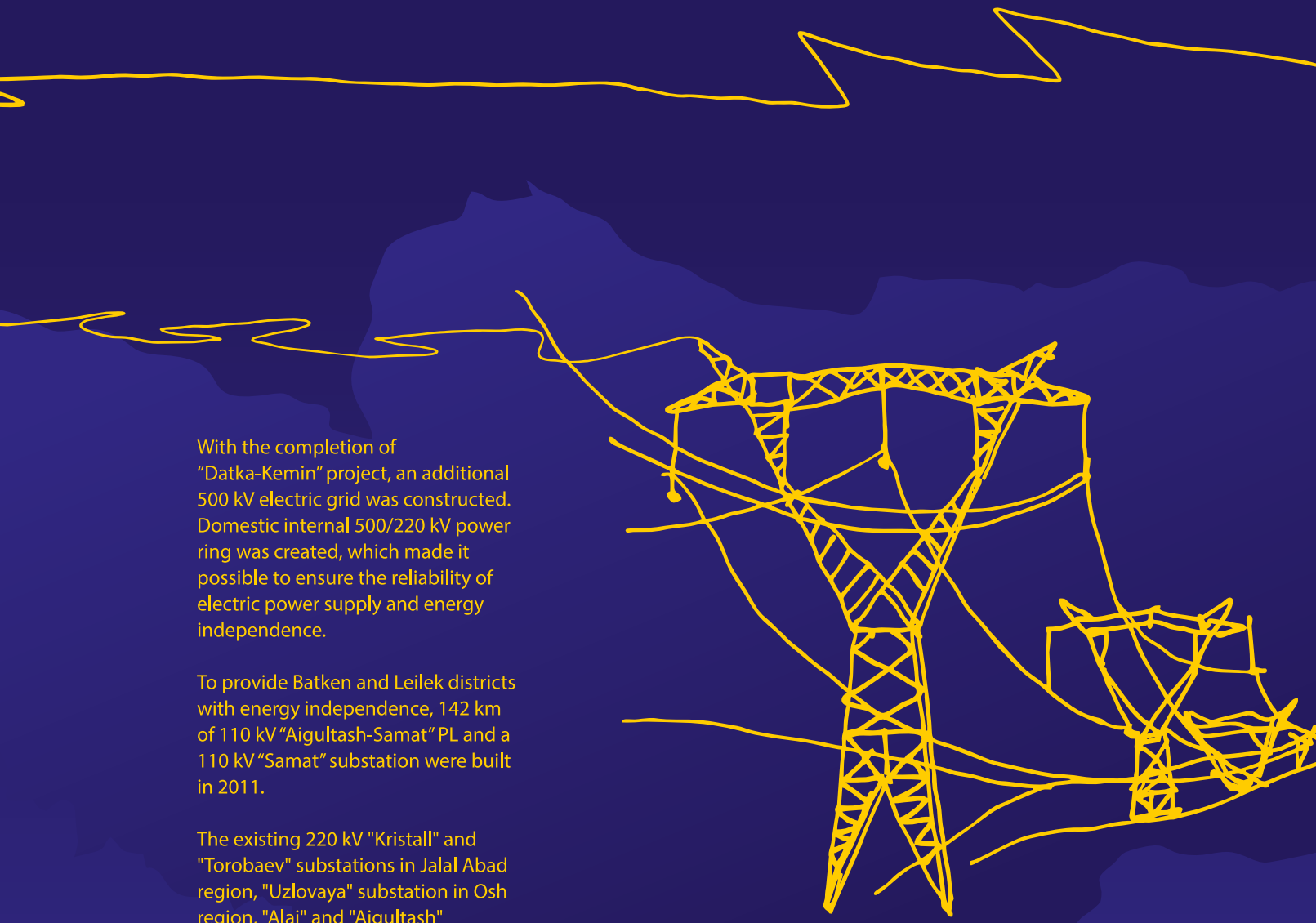
110 kV SS — 110 kV PL


KYRGYZSTAN'S ENERGY SECTOR
2020

LAYOUT OF MAIN POWER GRIDS DEVELOPMENT

ENERGY SYSTEM – LIFE ENERGY





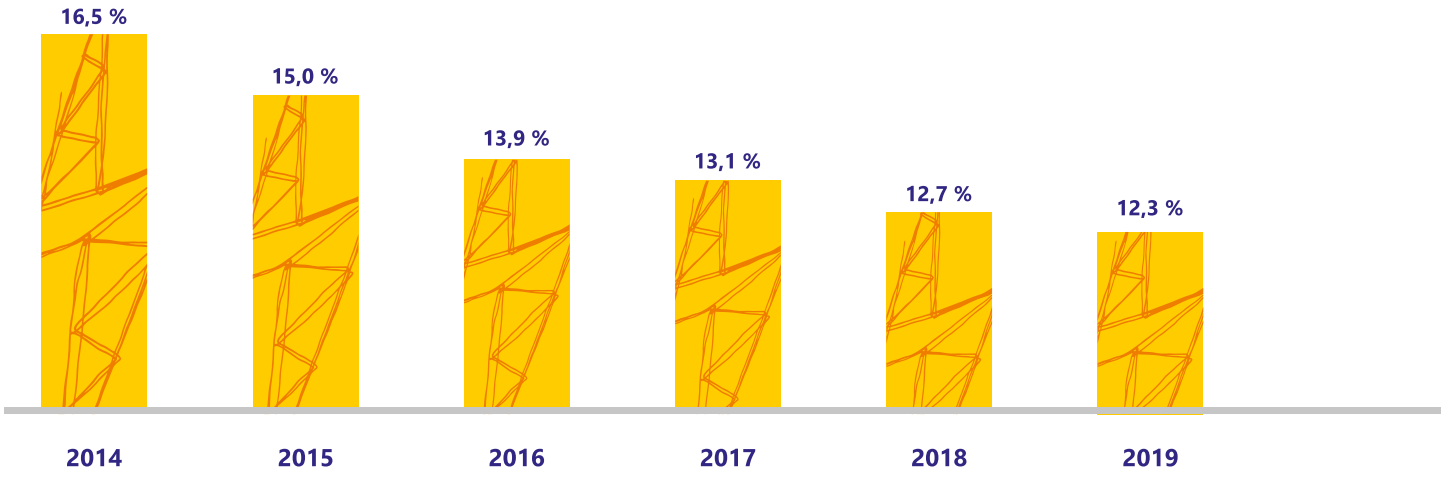
With the completion of "Datka-Kemin" project, an additional 500 kV electric grid was constructed. Domestic internal 500/220 kV power ring was created, which made it possible to ensure the reliability of electric power supply and energy independence.

To provide Batken and Leilek districts with energy independence, 142 km of 110 kV "Aigultash-Samat" PL and a 110 kV "Samat" substation were built in 2011.

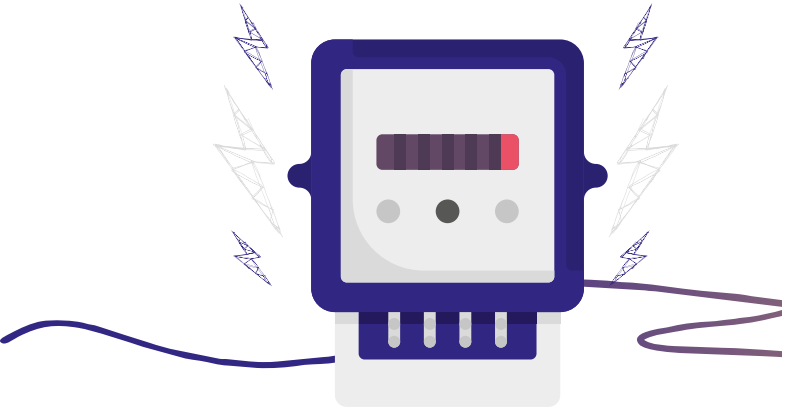
The existing 220 kV "Kristall" and "Torobaev" substations in Jalal Abad region, "Uzlovaya" substation in Osh region, "Alai" and "Aigultash" substations in Batken region as well as relay protection and automation systems at Toktogul HPP and Kurpsai HPP were reconstructed. In total, 248.6 km of 220 kV PL were constructed.

MEASURES TO IMPROVE THE ENERGY SECTOR

ELECTRIC POWER LOSSES IN THE GRIDS OF DISTRIBUTION ENERGY COMPANIES (DEC)



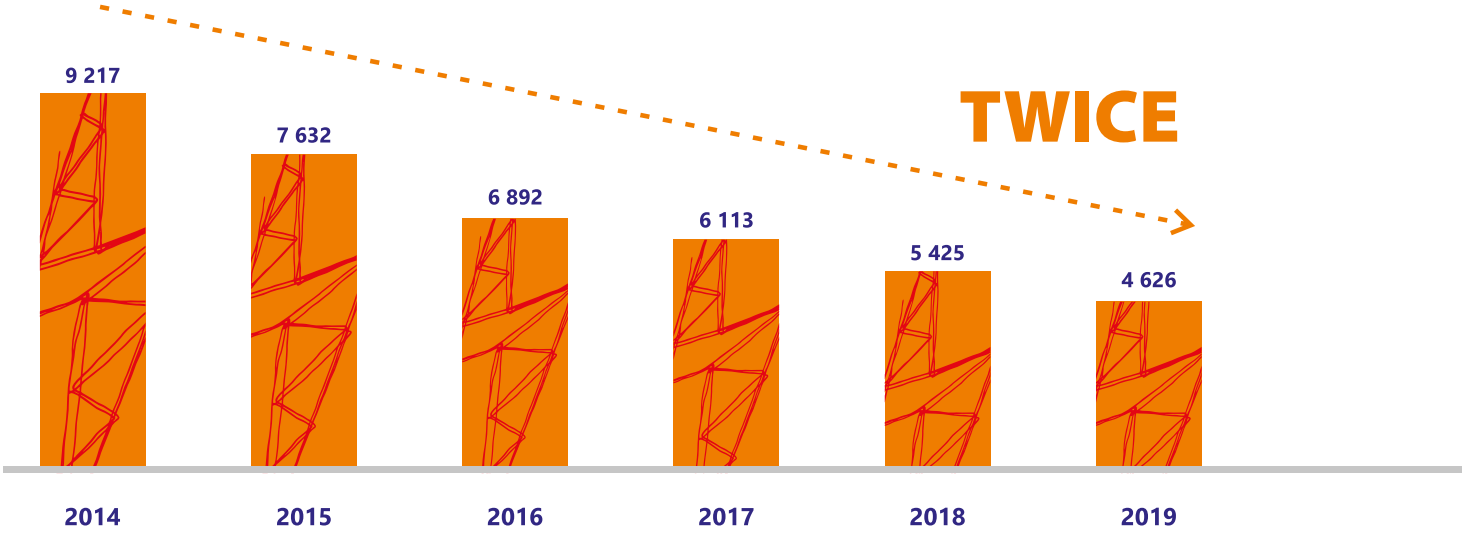
The additional revenue as a result of reduction of losses in DEC`s grids within the period from 2014 to 2019 amounted to **635 mln KGS**



In order to introduce the effective tools for electricity metering, to date, 221.1 thousand "smart" meters - Automated Energy Control and Metering System (ASKUE) were installed in power distribution companies. These smart-meters allow to control power consumption, to proportionately distribute the loads as well as ensure full fee collection and exclude the unauthorized access to smart meters. It is envisaged to install 40 thousand ASKUE meters for large consumers in Chu region and Bishkek city, as well around 70 thousand ASKUE meters for consumers in Kara-Suu district of Osh region, Osh city, Karakol city, Chopon-Ata city, Balykchy city and Naryn city.

REDUCTION OF EMERGENCY BLACKOUTS

NUMBER OF EMERGENCY BLACKOUTS

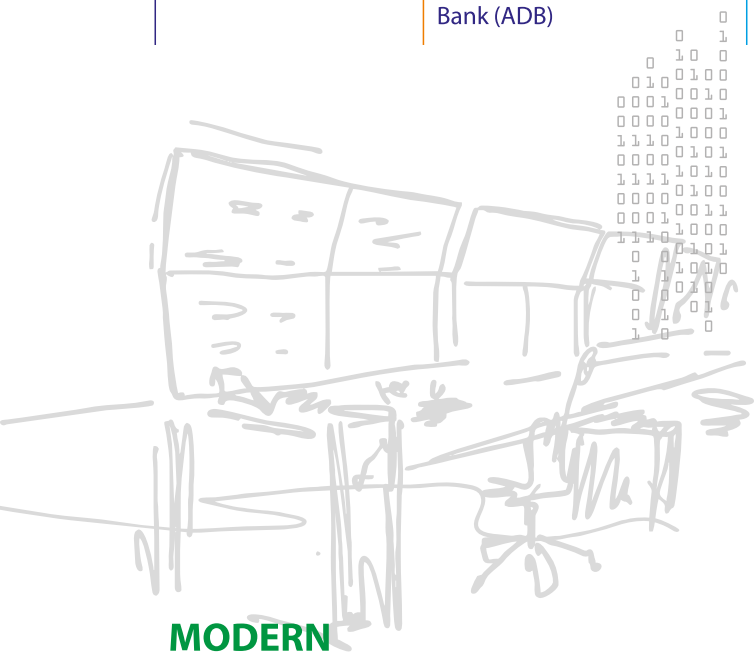


The number of emergency blackouts reduced **twice.**

ESTABLISHMENT OF THE KYRGYZ ENERGY SETTLEMENT CENTER (KESC)

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

Implementation period	Donor	Results	Achievements
2017 – 2019	Asian Development Bank (ADB)	• workflow management and training of the staff of the Kyrgyz Energy Settlement Center • procurement of server equipment and software for MDM system	• modern information technologies into energy generation sector were introduced • corruption risks and ensuring the transparency of energy companies performance were reduced • information data, automatized collection and analysis of data on energy generation were consolidated

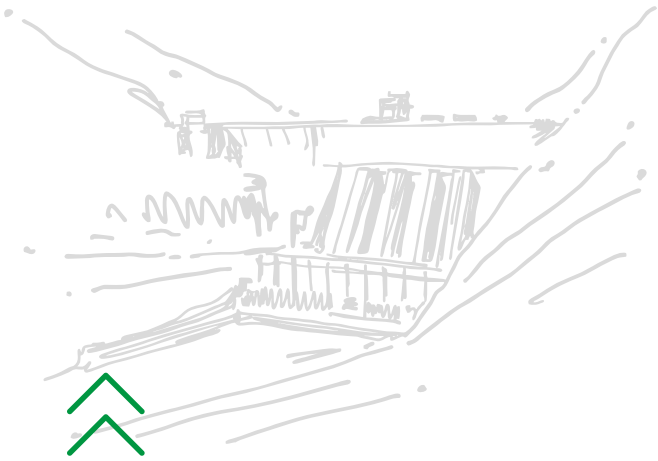


MODERN INFORMATION SYSTEMS

TOKTOGUL HPP REHABILITATION

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

Implementation period	Donor	Results	Achievements
2017 – 2024	Asian Development Bank (ADB), Eurasian Development Bank (EDB)	• replacement of electric-mechanical equipment (power transformers, 500 KV cable lines and other auxiliary equipment); • complete replacement of all four hydropower units of Toktogul HPP; • reconstruction of water gates and hydro-mechanical equipment	• it is planned to ensure the reliable operation and extend the service life of Toktogul HPP by 35-40 years with an increase in capacity by 240 MW

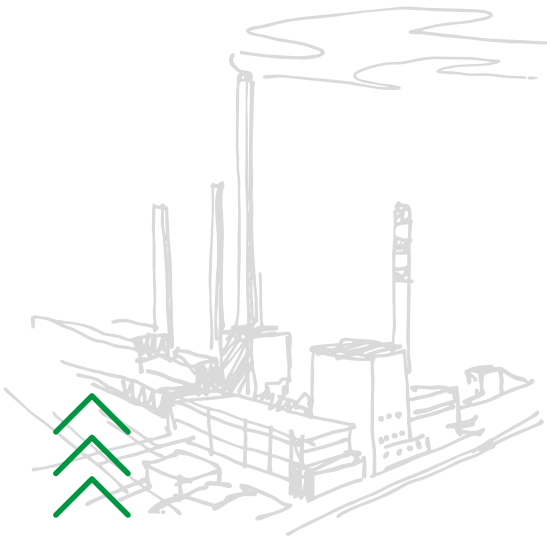


Installed capacity is 1200 MW
Increase in capacity by 240 MW
After modernization, the capacity will be 1440 MW

BISHKEK CHP MODERNIZATION

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

Implementation period	Donor	Results	Achievements
2014 – 2017	Exim Bank of China	• 2 new power units were constructed with a total energy production of 300 MW and heating production of 300 Gcal/h, with auxiliary equipment and necessary infrastructure	• electric installed capacity increased from 512 MW to 812 MW • heat installed capacity increased from 994.2 Gcal/h to 1294.2 Gcal/h • as a result – the national energy security improved



Installed capacity is 512 MW
Increase in capacity by 300 MW
After modernization, the capacity is 812 MW

COMMISSIONING OF THE 1ST HYDROPOWER UNIT OF KAMBARATA-2 HPP

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

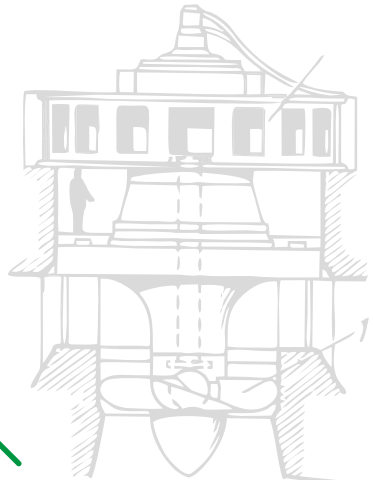
Implementation period	Donor	Results	Achievements
2008 – 2010	Government of the Russian Federation	• the first hydropower unit of Kambarata-2 HPP was constructed and commissioned	• Kambarata-2 HPP was commissioned and started operation with the installed capacity of 120 MW

The installed capacity of the 1st hydropower unit is 120 MW

COMMISSIONING OF THE 2ND HYDROPOWER UNIT OF KAMBARATA-2 HPP

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

Implementation period	Donor	Results	Achievements
2017 – 2024	Eurasian Development Bank (EDB)	• construction and commissioning of the 2nd hydropower unit with a capacity of 120 MW; • construction of 500 kV ODU to release "locked" capacity and connect to 500 kV "Datka-Kemin" PL • installation of the additional equipment for 110 kV ODU and other parts of HPP infrastructure and systems	• the additional increase in capacity of 150 MW is planned, taking into account the release of "locked" capacity and strengthening the potential for cooperation in the Syrdarya river basin between Kyrgyzstan, Kazakhstan and Uzbekistan



Increase in capacity up to 150 MW
Total capacity of 2 hydropower units will be 240 MW

UCH-KURGAN HPP MODERNIZATION

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

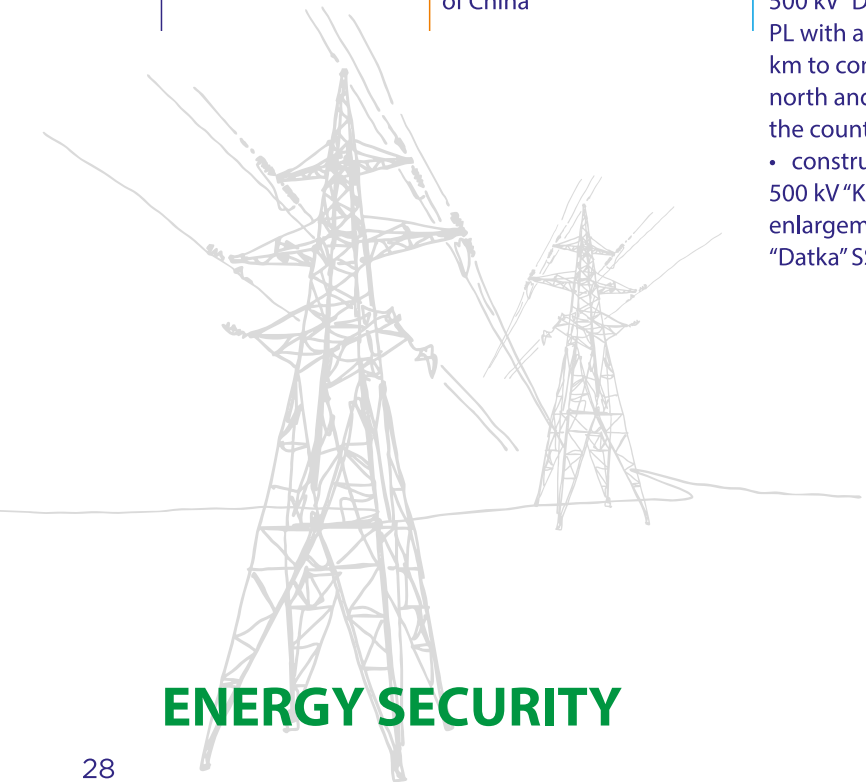
Implementation period	Donor	Results	Achievements
2020 – 2025	Asian Development Bank (ADB), Eurasian Development Bank (EDB)	• modernization of the main and auxiliary equipment at Uch-Kurgan HPP	• it is planned to fully modernize the Uch-Kurgan HPP while maintaining the integrity of the Naryn cascade of hydropower plants and increasing the energy security of the Kyrgyz Republic

Installed capacity is 180 MW
Increase in capacity by 36 MW
After modernization, the capacity will be 216 MW

CONSTRUCTION OF 500 KV "DATKA-KEMIN" POWER TRANSMISSION LINE AND 500 KV "KEMIN" SUBSTATION

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

Implementation period	Donor	Results	Achievements
2011 – 2018	Exim Bank of China	• construction of new 500 kV "Datka-Kemin" PL with a length of 405 km to connect the north and the south of the country • construction of new 500 kV "Kemin" SS and enlargement of 500 kV "Datka" SS	• domestic 500-200 kV power ring was created, which ensures the reliability of power supply to consumers in the northern regions of the country



ENERGY SECURITY

IMPROVEMENT OF POWER SUPPLY IN BISHKEK AND OSH CITIES

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

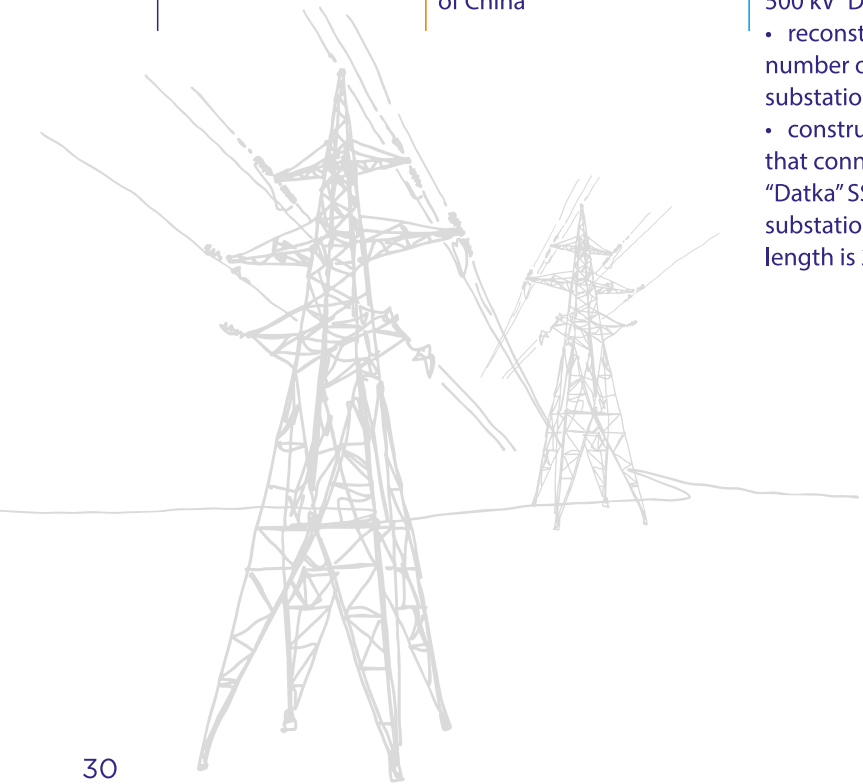
Implementation period	Donor	Results	Achievements
2013 – 2018	Islamic Development Bank (IDB)	• reconstruction of 110 kV "Kyzyl-Asker", "Vostochnaya", and "Kara-Suu" substations; • construction of the new 220 kV power transmission line with a length of 19.8 km	• reliable energy supply to Bishkek and Osh is provided

RELIABLE POWER SUPPLY

MODERNIZATION OF POWER TRANSMISSION LINES IN THE SOUTH OF KYRGYZSTAN

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

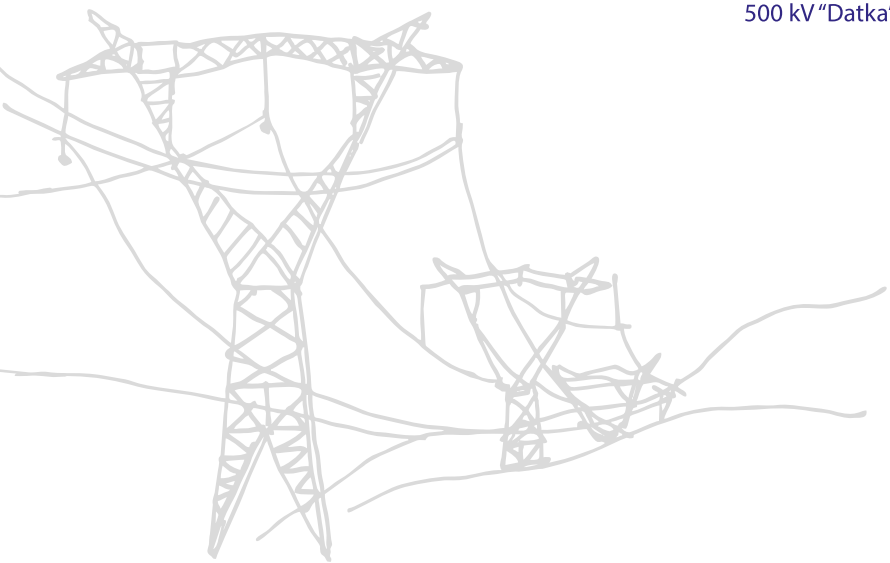
Implementation period	Donor	Results	Achievements
2010 – 2018	Exim Bank of China	• construction of new 500 kV "Datka" SS; • reconstruction of a number of 220 kV substations; • construction of PL that connect 550 KV "Datka" SS and other substations with a total length is 247 km	• the reliable and sustainable energy supply to energy users in the southern regions of the country is ensured



CASA - 1000

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

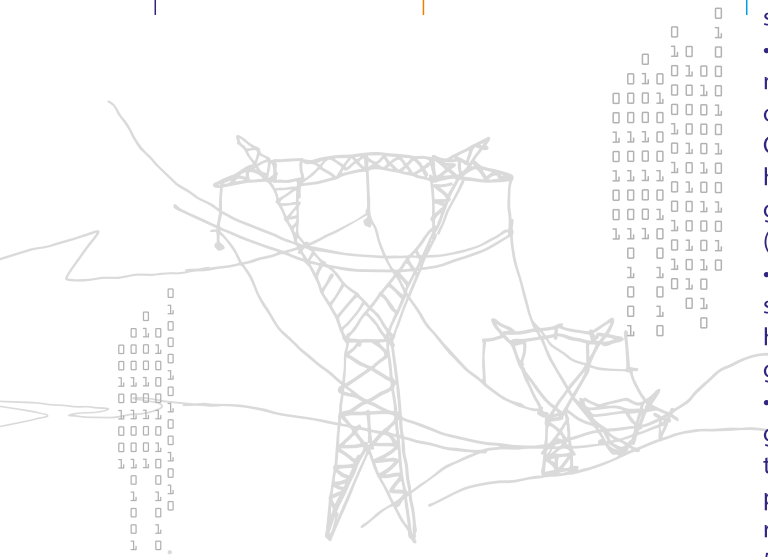
Implementation period	Donor	Results	Achievements
2020 – 2023	World Bank (WB), European Investment Bank (EIB), Islamic Development Bank (IDB)	• construction of the new 500 kV PL that connects 500 kV "Datka" SS and Tajikistan border area - 450 km • construction of the additional 500 kV cell at 500 kV "Datka" SS	• exporting of electric power to Pakistan and Afghanistan in summer period (from May to September) is planned



ENERGY SECTOR DEVELOPMENT

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

Implementation period	Donor	Results	Achievements
2013 – 2018	Asian Development Bank (ADB)	• modernization of 109 high-voltage substations • reconstruction of two main dispatch centers of "NEG of Kyrgyzstan" OJSC and Chui high-voltage electric grid enterprise (ChuiHVEG) • installation of 2800 smart-meters at high-voltage electric grids • routing of new optic grounded cable through 220-110 kV power transmission line ring with a length of 523 km	• transparency of accounting of electric power supply is improved • electric power losses are reduced • emergency blackouts are reduced • modern IT systems for minimization of human intervention are introduced

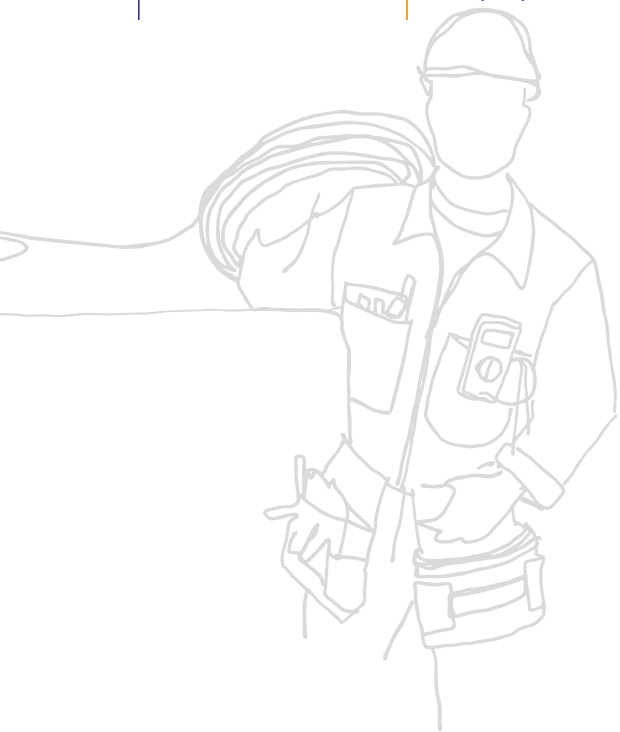


MODERN TECHNOLOGIES

IMPROVEMENT OF ELECTRIC POWER SUPPLY IN ARKA AREA OF LEILEK DISTRICT OF BATKEN REGION

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

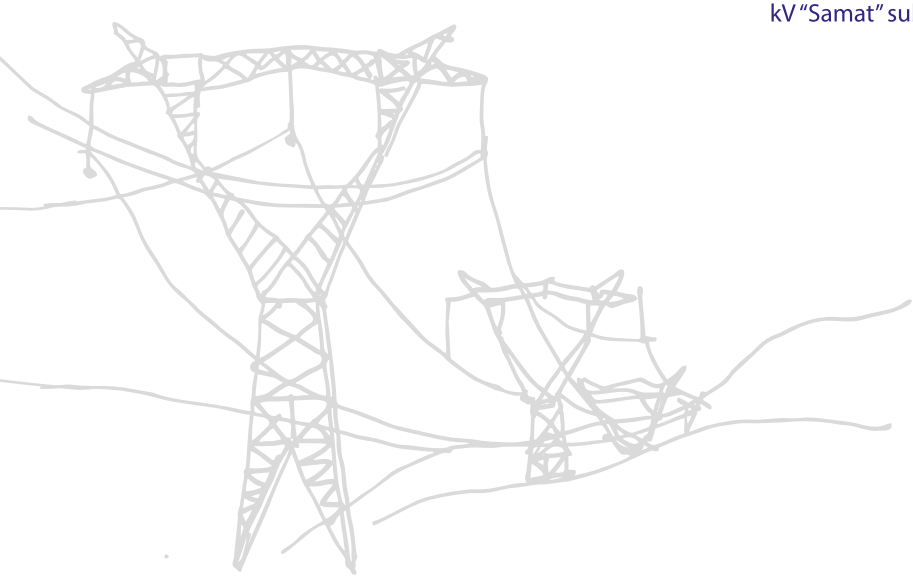
Implementation period	Donor	Results	Achievements
2013 – 2021	Islamic Development Bank (IDB)	• construction of 110 kV high-voltage power transmission line with a length of 51 km • construction of new 110 kV "Razzakov" substation • reconstruction of 110 kV "Arka" substation	• it is planned to ensure the Batken region with a reliable energy supply



CONSTRUCTION OF 110 KV "AIGUL-TASH – SAMAT" PL

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

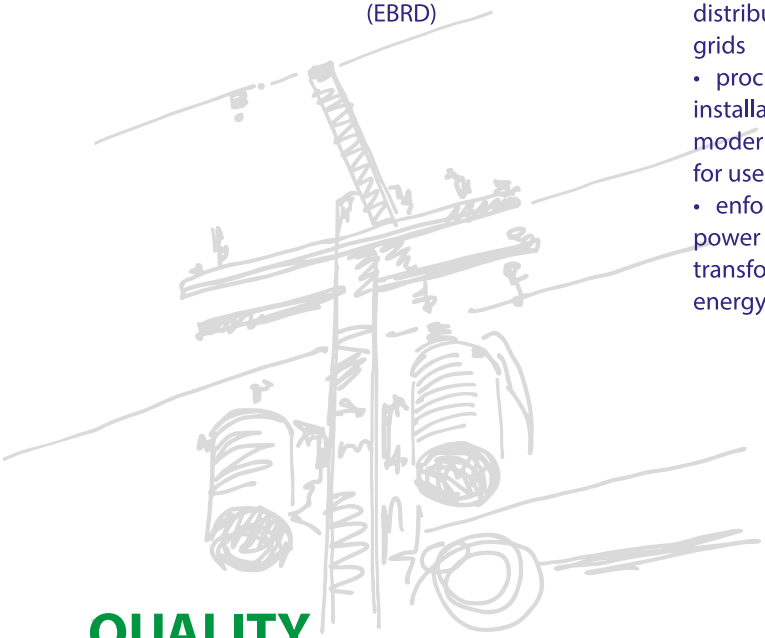
Implementation period	Donor	Results	Achievements
2009 – 2011	Islamic Development Bank (IDB)	• construction of the new 110 kV "Aigul-Tash - Samat" PL with a length of 142.05 km; • reconstruction of 110 kV "Samat" substation	• reliable and uninterrupted energy supply to Batken region's users is ensured



REHABILITATION OF "OSHELECTRO" OJSC AND "VOSTOKELECTRO" OJSC

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

Implementation period	Donor	Results	Achievements
2017 – 2021	European Bank of Reconstruction and Development (EBRD)	• modernization and enforcement of 6- 10/0.4 kV distributing electric grids • procurement and installation of the modern smart-meters for users • enforcement of power lines and transformers in the energy supply system	• reduction of technical losses in energy supply system is planned • increase of the reliability and quality of energy supply to users • elimination of corruption risks and optimization of production processes



QUALITY

HEAT SUPPLY IMPROVEMENT

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

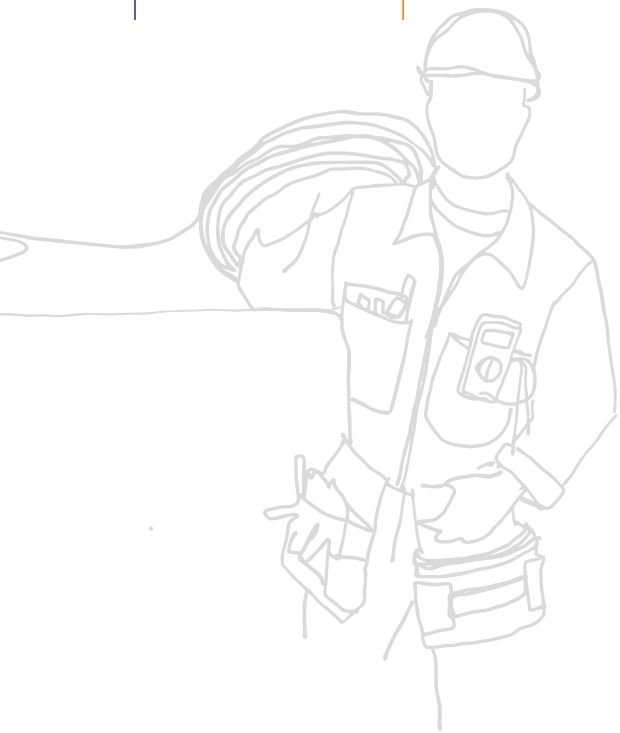
Implementation period	Donor	Results	Achievements
2017 – 2023	World Bank (WB)	• modernization of individual heating unit • installation of heat energy meters in multi-apartment residential buildings • reconstruction of "Vostok" main heating supply network	• expansion of "Bishkekteploset" OJSC service coverage is planned • improvement of heating supply quality to the existing users • improvement of equipment operation quality

ENERGY EFFICIENCY

PROVISION OF EMERGENCY ASSISTANCE

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

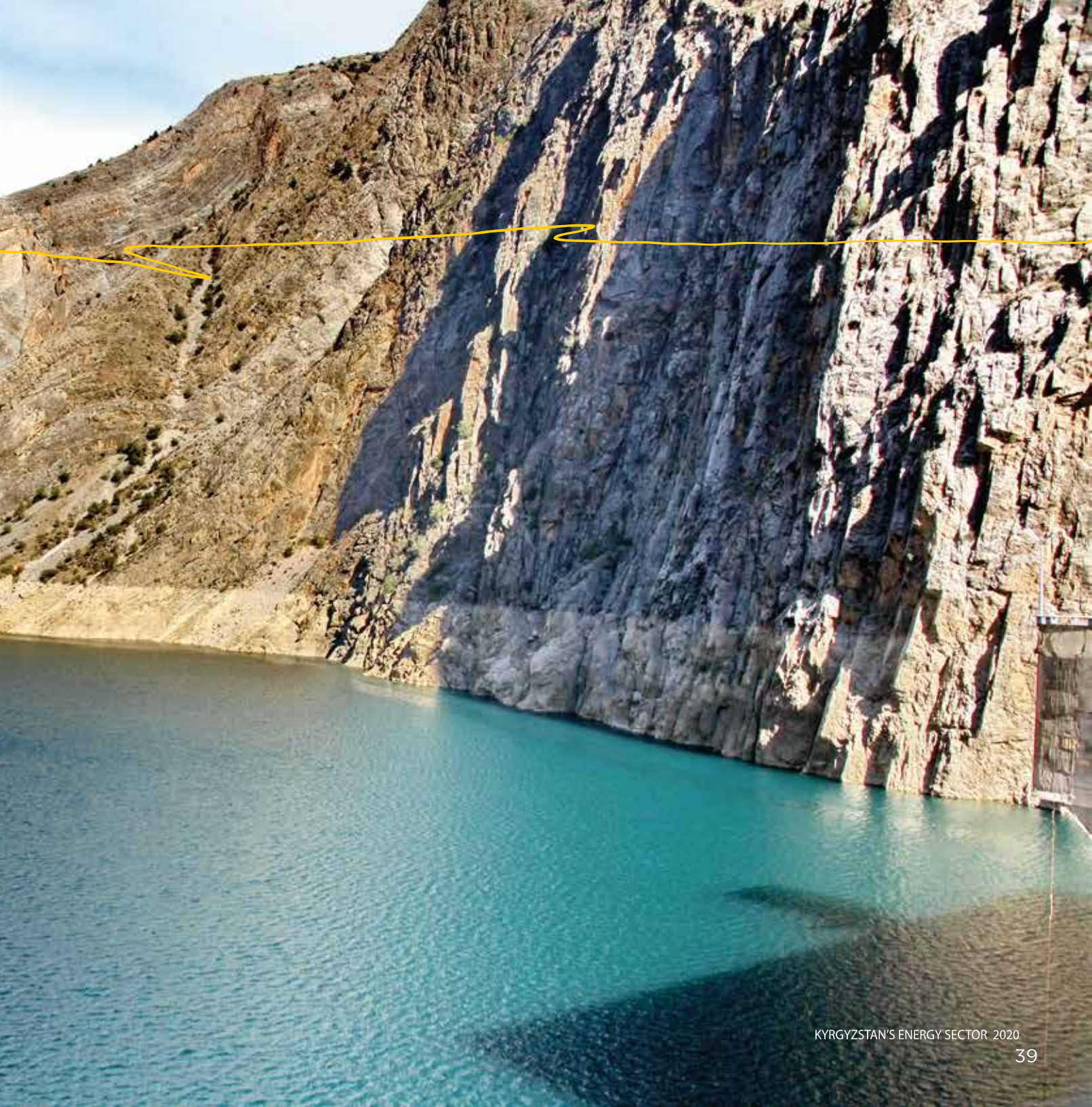
Implementation period	Donor	Results	Achievements
2010 – 2013	World Bank (WB)	• procurement of new power transformers, packaged transforming substations (PTS), and specific equipment	• continuous supply of basic energy services (electric power, heating, and gas) is recovered and ensured

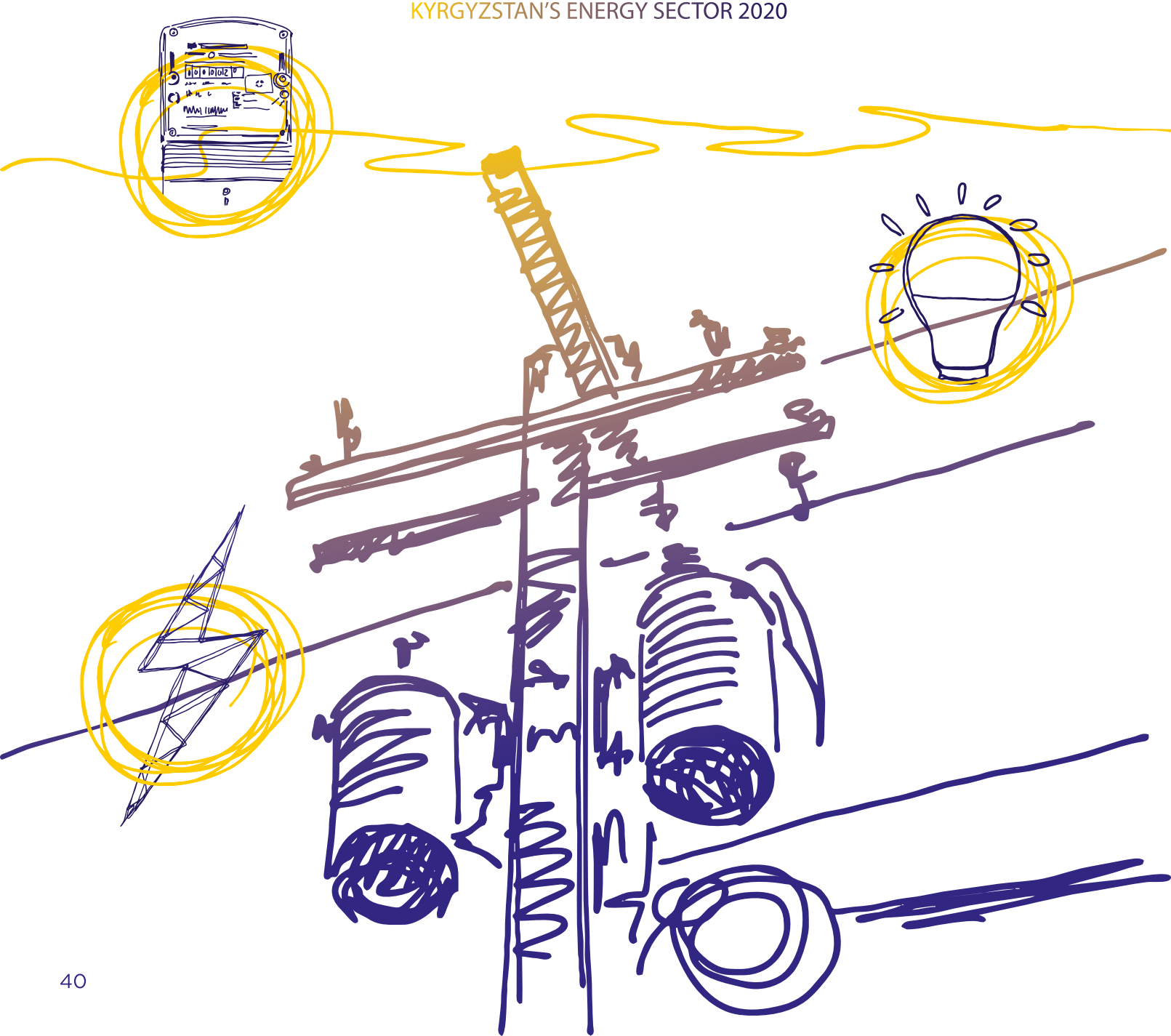


IMPROVING THE ACCOUNTABILITY AND RELIABILITY OF ELECTRIC POWER SUPPLY SYSTEM

WHAT DO THE GOVERNMENT AND ENERGY COMPANIES DO TO IMPROVE THE ENERGY SECTOR

Implementation period	Donor	Results	Achievements
2015 – 2019	World Bank (WB)	• construction of substations: 110/35/6 kV "Bishkek" SS, 35/6-10 kV "Orto-Sai" SS, 35/6-10 kV "Sport" SS • installation of 40000 smart-meters • replacement of 480 km of cables and wires • introduction of GIS (geographical information system) to visualize the company assets	• electric power supply in Bishkek city downtown is improved • energy distribution infrastructure is reinforced • customer service system and the company resources management system is improved





CREDITS

DEFICIT OF FINANCIAL RESOURCES OF ENERGY COMPANIES

(WITH STATE-OWNED STAKE OF SHARES)

STRUCTURE OF COST OF 1 kWh OF ELECTRIC POWER

Generation cost
51 tyiyn

Transmission cost
37 tyiyn

Distribution cost
54 tyiyn

VAT and ST
10 tyiyn

Technical losses
14 tyiyn

Cost 1 kWh – 1,66 KGS

Tariff at consumption up to 700 kWh
0,77 KGS

Tariff at consumption over 700 kWh
2,16 KGS

Average billed tariff
1,35 KGS

Revenue for 2019 – **19.5 bln KGS**
Expenditures for 2019 – **21.7 bln KGS**

DEFICIT OF FUNDS IN 2019 AMOUNTED TO 2.2 bln KGS

CREDITS

TERMS OF COMMISSIONING OF THE FACILITIES

Description	Capacity	Date of commissioning
Toktogul HPP	1200 MW	1975
Kurpsai HPP	800 MW	1981
Tash-Kumyr HPP	450 MW	1985
Shamaldy-Sai HPP	240 MW	1992
Uch-Kurgan HPP	180 MW	1961
At-Bashi HPP	40 MW	1970
Kambarata-2 HPP	120 MW	2010
Chakan HPP (cascadeofAlamedinHPPs, BystrovskayaHPP)	38.5 MW	1928
Bishkek CHP	812 MW	1961-2017
Osh CHP	50 MW	1966

Energy company	Overall deterioration of equipment
"Electric power plants" OJSC	
HPP, CHP	**79.8%**
"NEG Kyrgyzstan" OJSC	
110-220-500 kV SS	**69%**
110-220-500 kV PL	**36%**
"Bishkekteploset" OJSC	
Main networks	**81.8%**
Distribution networks	**70.8%**
"Severelectro" OJSC	
0.4-6-10-35 kV PL/CL	**62%**
35 kV (6-10/0,4 kV TS, PTS) SS	**58%**
"Oshelectro" OJSC	
0.4-6-10-35 kV PL/CL	**71.5%**
35 kV (6-10/0.4 kV TS, PTS) SS	**68.7%**
"Jalalabatelectro" OJSC	
0.4-6-10-35 kV PL/CL	**49.3%**
35 kV (6-10/0.4 kV TS, PTS) SS	**46.5%**
"Vostokelectro" OJSC	
0.4-6-10-35 kV PL/CL	**56.7%**
35 kV (6-10/0.4 kV TS, PTS) SS	**45.6 %**
"Chakan HPP" OJSC	
HPP	**100%**

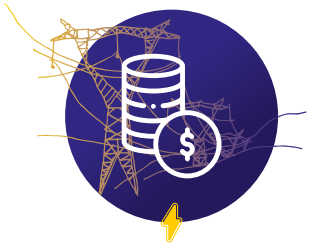
The deficit of funds of energy companies with state-owned stake of shares caused by the socially oriented tariffs, limits the opportunities for full modernization, rehabilitation and reconstruction of the existing facilities and construction of the new modern facilities of energy sector. The sector needs urgent rehabilitation and modernization measures on the existing facilities, and construction of the new ones.

CREDITS EXPENDITURES OF ENERGY COMPANIES

Debt obligations of energy companies

As of 1 January 2020, debt obligations (credits, loans) of the energy companies amounted to **106.1 bln KGS,** including:

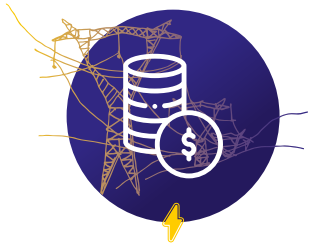
"NEG of Kyrgyzstan" OJSC



53.3 bln KGS

(credit term: 2007 – 2046)

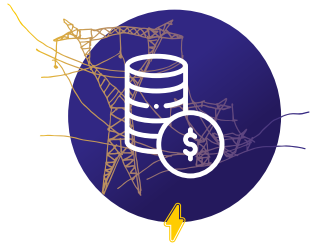
"Electric Power Plants" OJSC



48.5 bln KGS

(credit term: 2004 – 2040)

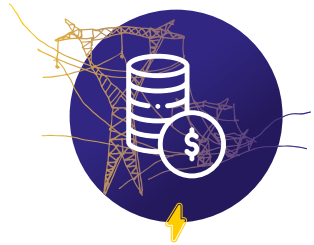
Total for DEC



4.1 bln KGS

(credit term: 2004 – 2045)

"Bishkekteploset" OJSC



0.2 bln KGS

(credit term: 2011 – 2032)

Debt obligations of “NEG of Kyrgyzstan” OJSC

Total **53.3 bln KGS**

- Construction of “Datka” SS, “Kemin” SS and “Datka-Kemin” PL
  Modernization of power transmission lines in the south of Kyrgyzstan –
  41.4 bln KGS (Exim Bank of China)

- Construction and reconstruction of SS and PL, and CASA-1000 –
  8.1 bln KGS (ADB, SDF, IDB, WB, etc.)

- Restructured debt obligations –
  3.8 bln KGS (ADB, SDF, IDB, and etc.)

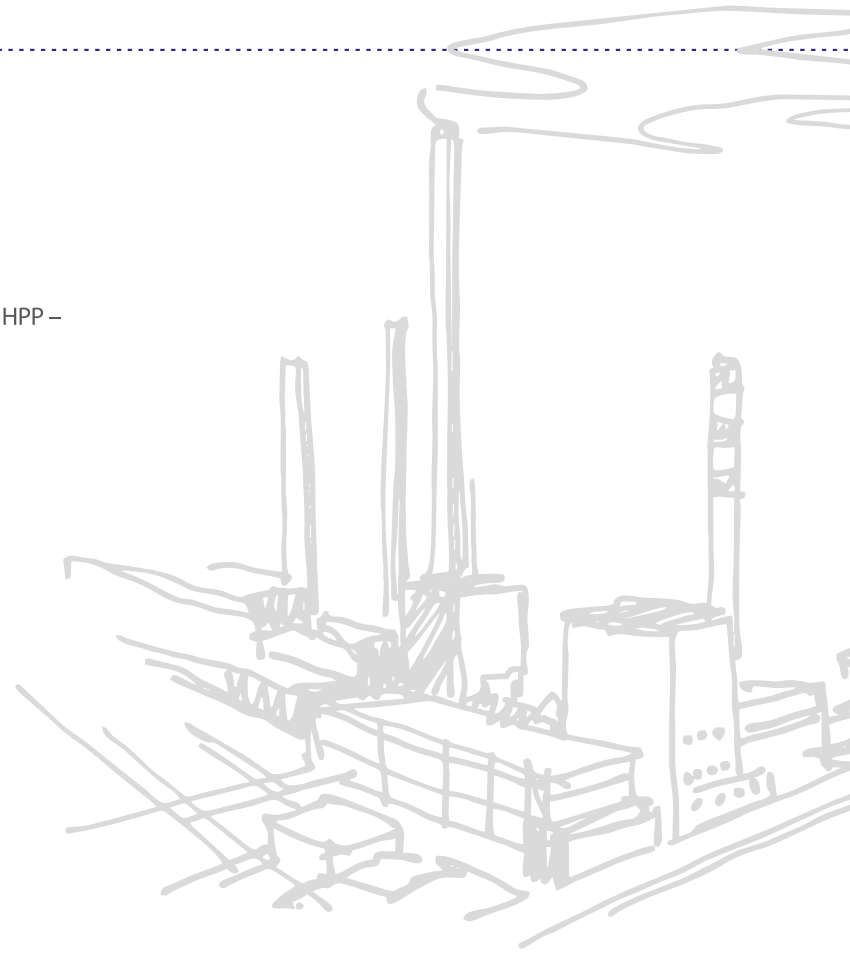
CREDITS EXPENDITURES OF ENERGY COMPANIES

Debt obligations of "Electric Power Plants" OJSC

Total **48.5 bln KGS**

Modernization of Bishkek CHP –
27.1 bln KGS (Exim Bank of China)

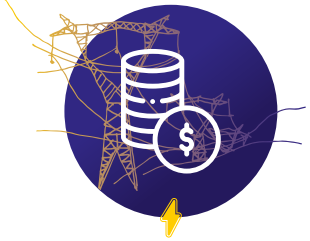
- Commissioning of the 1st hydropower unit at Kambarata-2 HPP – **7.4 bln KGS** (budget credits)
- Assistance to the energy sector – **1.6 bln KGS** (WB)
- Restructured part of the external credits – **3.7 bln KGS** (WB, ADB)
- Toktogul HPP Rehabilitation – **3.2 bln KGS** (ADB and EBRD)
- Budget loans for the purchase of fuel resources and payment for the energy import – **5.5 bln KGS**



Debt obligations of distributing energy companies (DEC) and "Bishkekteploset" OJSC

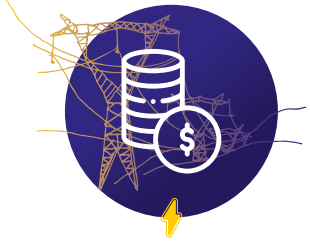
Total for DEC
4.1 bln KGS

"Severelectro" OJSC



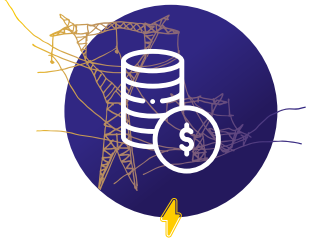
3.034 bln KGS
World Bank (WB), German Development Bank (KfW)

"Vostokelectro" OJSC



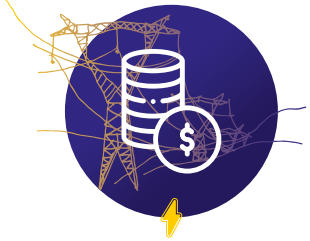
0.179 bln KGS
World Bank (WB)

"Oshelectro" OJSC



0.490 bln KGS
Ministry of Finance of the Kyrgyz Republic

"Jalalabatelectro" OJSC



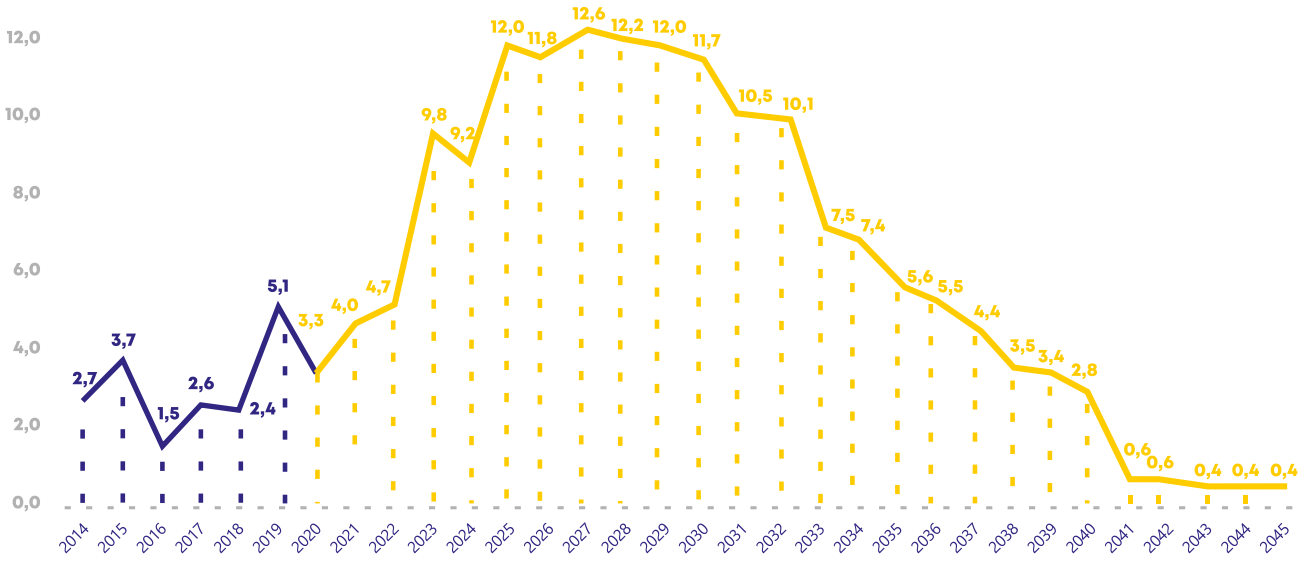
0.402 bln KGS
World Bank (WB)

"Bishkekteploset" OJSC
0.2 bln KGS

World Bank (WB), EBRD

Credit payments will amount to **4,0 bln KGS** in 2021 and **9,8 bln KGS** in 2023. The main payments will be in **2025-2030,** which will start from **11,7 bln KGS** (on average, 12,1 bln KGS), while the amount of the financial receipts from the sale of electricity at the existing tariffs is about **21 bln KGS,** which will not cover the loans and the operating expenses of energy companies.

Credit obligation repayment schedule



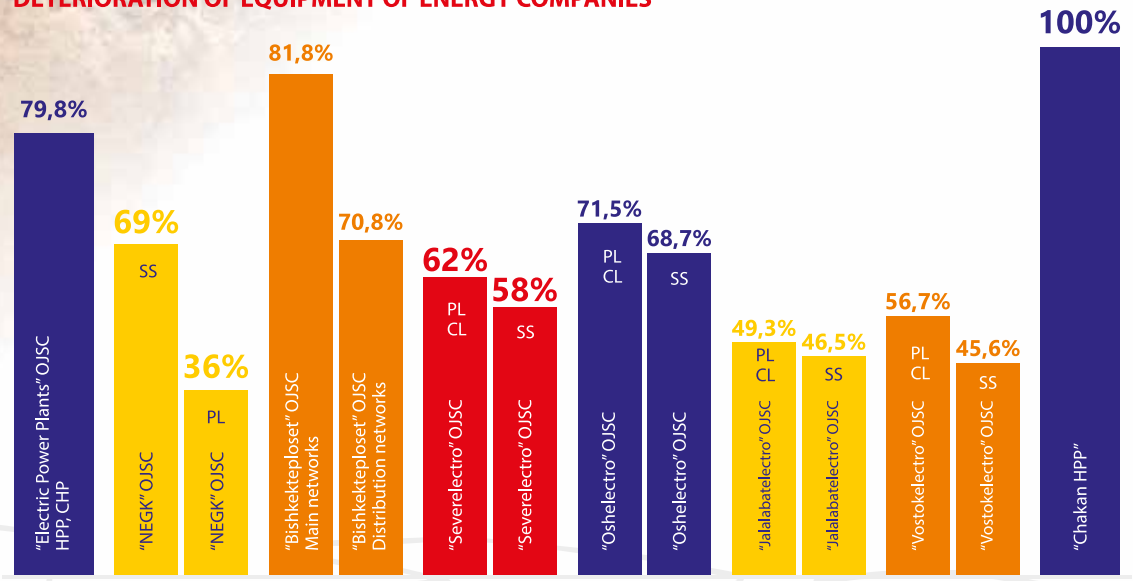
Actual repayment (bln KGS)

Payment of the principal and the interests on the credits (bln KGS)

Exchange rate of 1 US dollar - 75 KGS

PRESENT STATUS OF THE ENERGY SECTOR: deterioration of equipment

DETERIORATION OF EQUIPMENT OF ENERGY COMPANIES



Detailed information on page 43

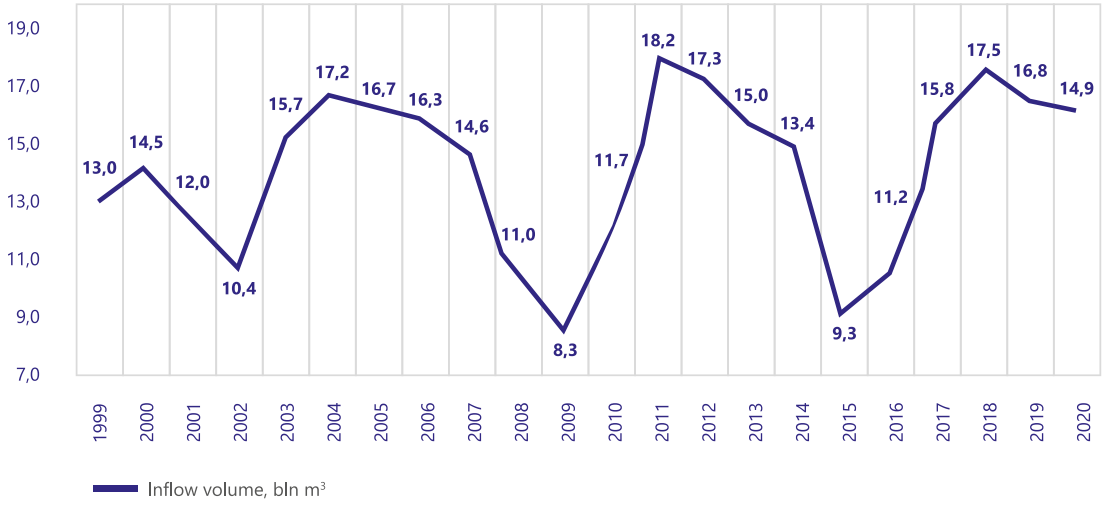
Actual deterioration of the equipment is above the critical level. In international practice, the deterioration of capital assets (CA) at the level of 30% is considered critical, and the deterioration above 30% is unreliable. Today, the energy sector of the Kyrgyz Republic demonstrates the deterioration of CA at above 60%, which is classified as dangerous level.

EXPORT IMPORT OF ELECTRIC POWER

Dynamics of the Toktogul water reservoir storage capacity

There is a regularity in the natural water inflow, which affects the level of electricity generation. Thus, energy generation tends to decline in low-water periods. Water discharge is used for power generation, as well as for irrigation in Uzbekistan and Kazakhstan within the framework of the intergovernmental agreements.

Volume of water in Toktogul water reservoir at the beginning of each year from 1999 to 2020

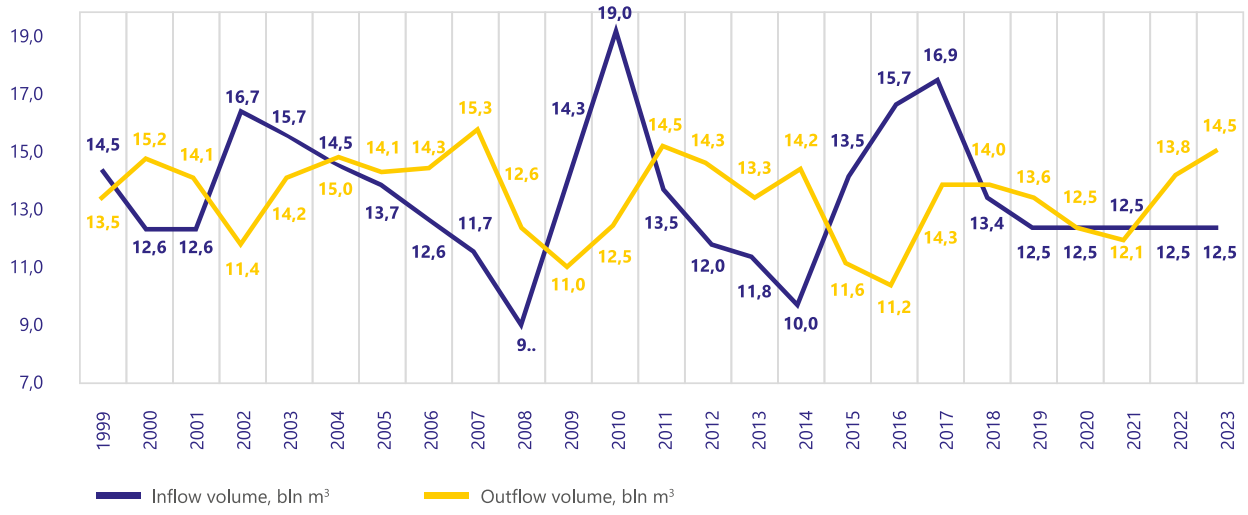


EXPORT IMPORT OF ELECTRIC POWER

Forecast for water inflow and outflow of the Toktogul water reservoir

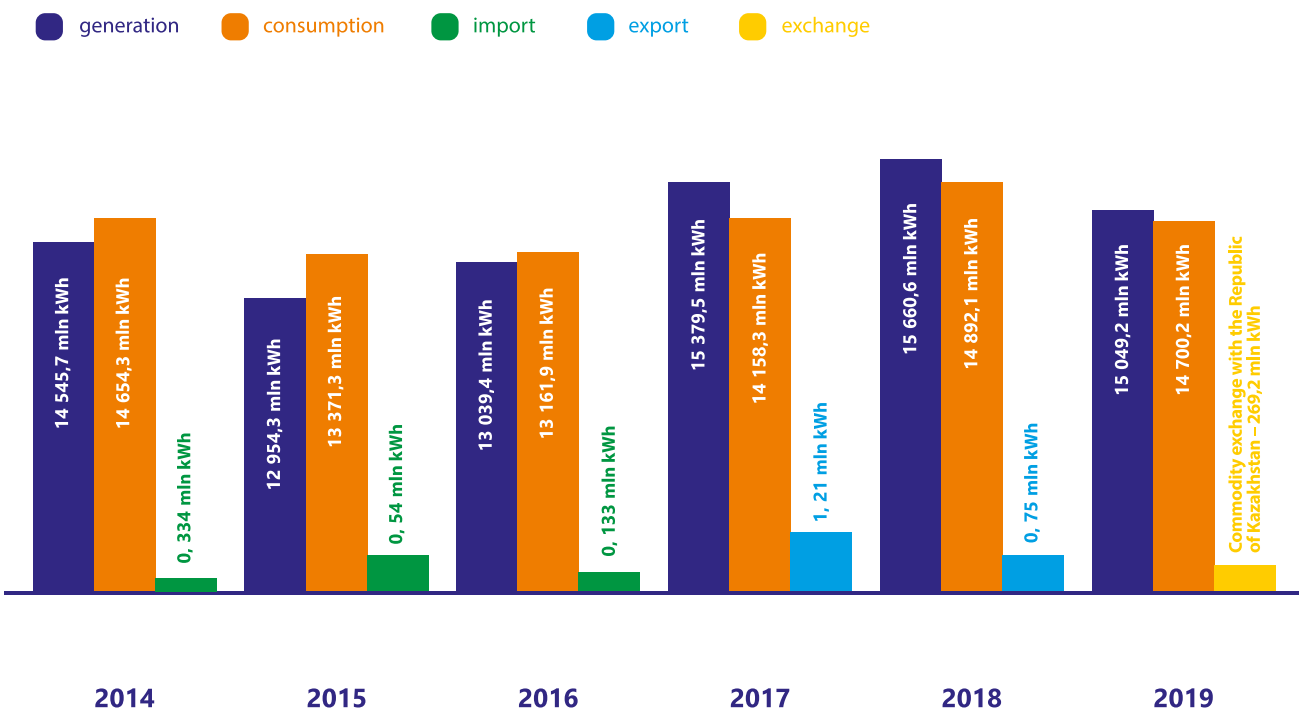
Forecast of the volume of inflow at the level of the average annual rate - 12.5 bln m^3
The accumulation volume in a low-water year is 9.9 bln m^3
The accumulation volume in a high-water year is 19.0 bln m^3

The annual water inflow and outflow of the Toktogul water reservoir



EXPORT IMPORT OF ELECTRIC POWER

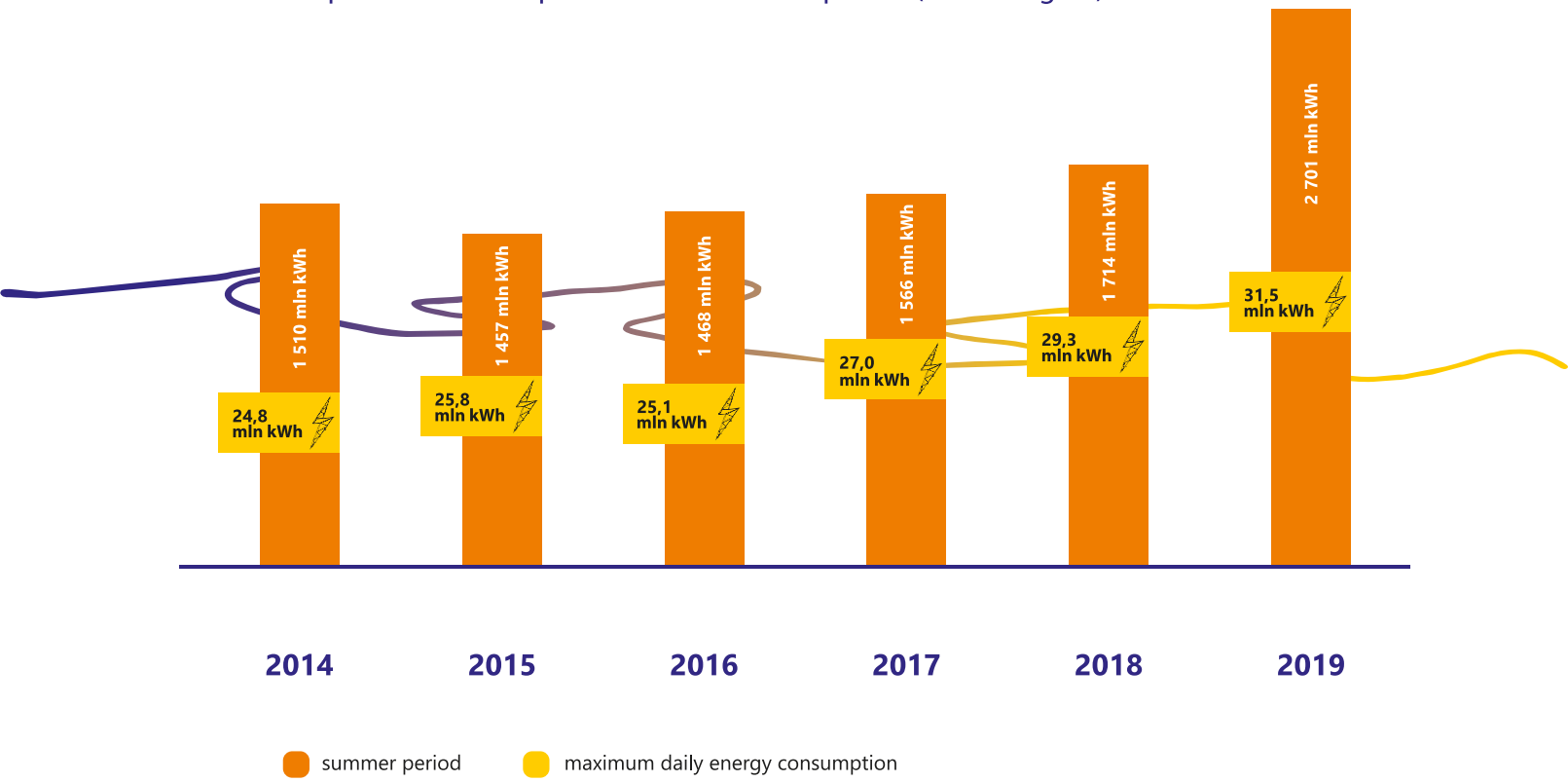
With a low-water inflow, energy import covers the lack of electric power generation for provision of domestic consumption.
Energy exporting is performed in accordance with the intergovernmental agreements with Uzbekistan and Kazakhstan.



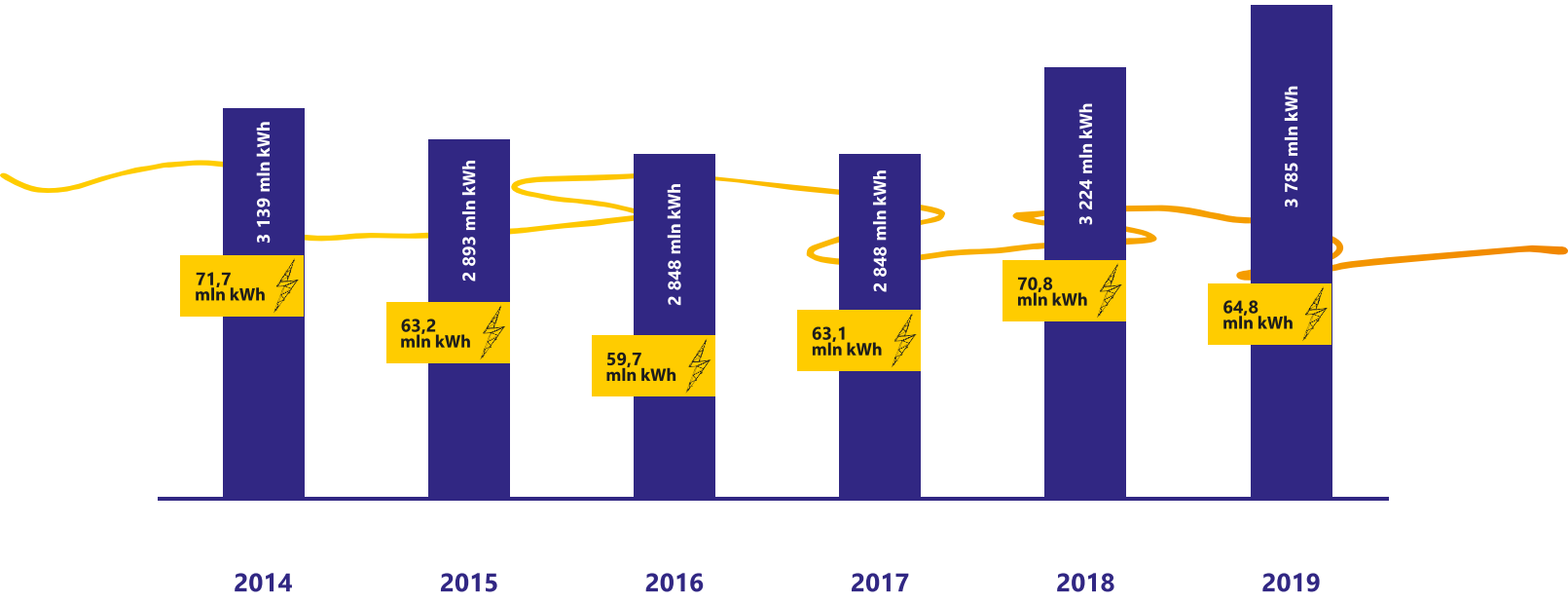
EXPORT IMPORT OF ELECTRIC POWER

Seasonality of electric power consumption

Consumption of electric power in the summer period (June- August)



Consumption of electric power in the winter period (December – February)



851,7 mln kWh
January 2019

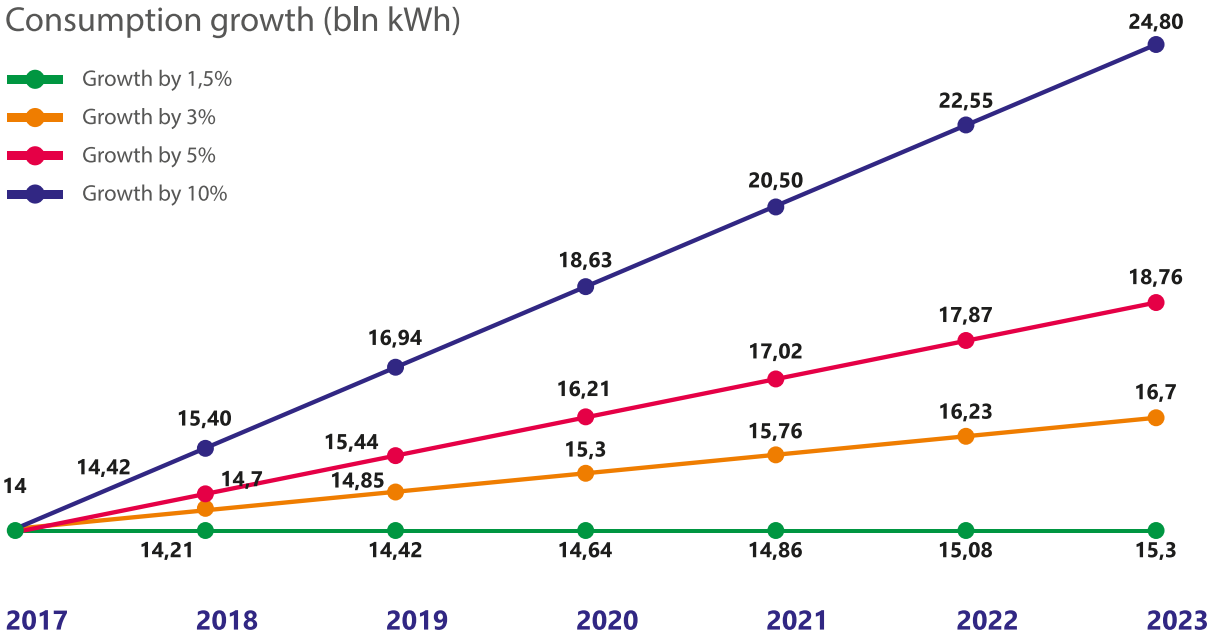
344,3 mln kWh
July 2019

2.5 times

Share of consumption of energy by the population – **63.5%**

The population consumes electric power for heating and cooking in the winter period, therefore, the gap in electric power consumption rates in summer and winter periods reaches 2.5 – 3.5 times.

Annual forecast of energy consumption growth from 1,5% to 10%



With growth by 1.5% - no additional capacities are necessary by 2023

With growth by 3% - additional capacities of 300 MW are necessary by 2023

With growth by 5% - additional capacities of 300 MW are necessary by 2021 and additional capacities of 600 MW are necessary by 2023

With growth by 10% - additional capacities of 300 MW are necessary by 2019 and additional capacities of 1 500 MW are necessary by 2023

TARIFF

Cost of 1 kWh of electric power

Generation cost

51 tyiyn

Transmission cost

37 tyiyn

Distribution cost

54 tyiyn

VAT and ST

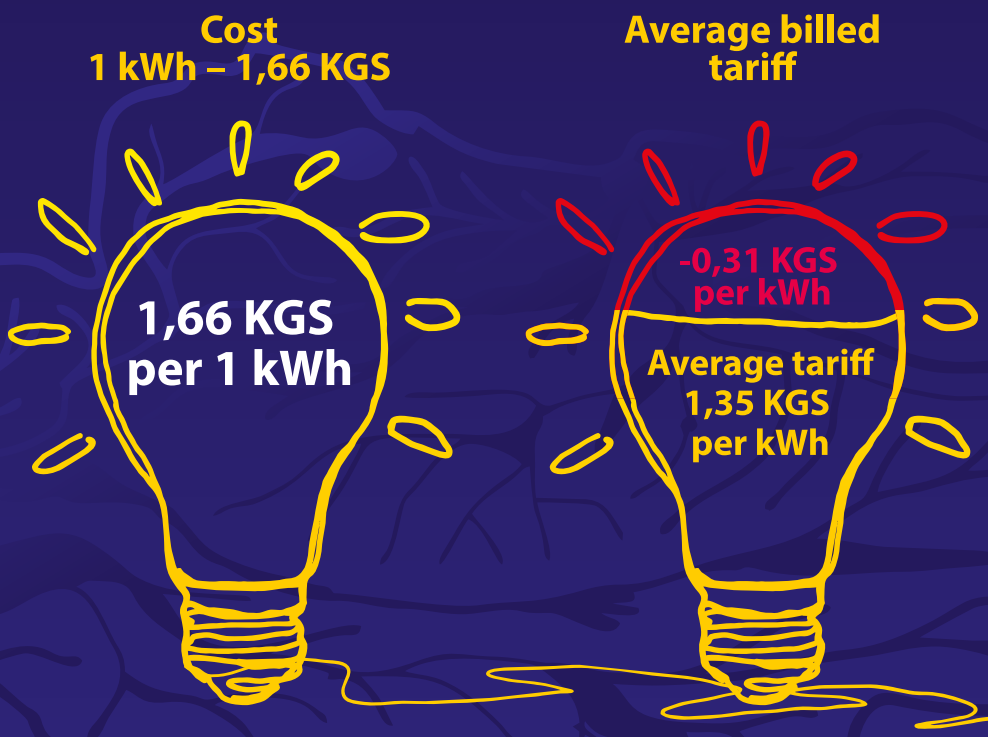
10 tyiyn

Technical losses

14 tyiyn

Actual inflation

4%



DEFICIT OF FUNDS IN 2019 AMOUNTED TO

2.2 bln KGS

TARIFF

Comparison of the tariff for electric power and the average salary in the CIS countries in 2019

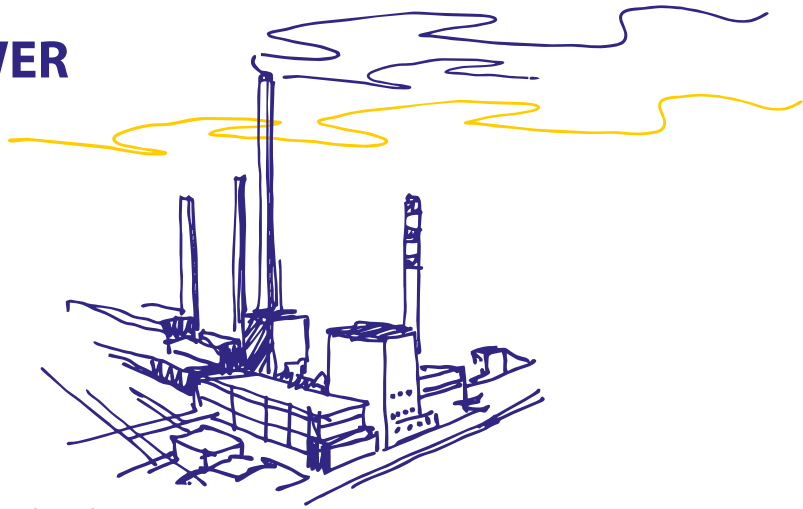
Tariff for 1 kWh in 2019

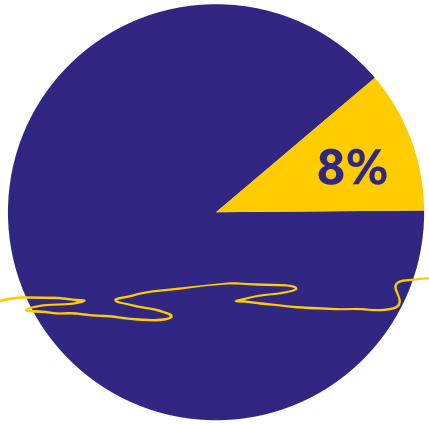
Armenia	34.98 – 44.98 AMD	0.07 – 0.09 USD
Azerbaijan	0.07 -0.11 AZN	0.04 – 0.06 USD
Georgia	0.15 – 0.27 GEL	0.05 – 0.09 USD
Belorussia	0.12 – 0.21 BYN	0.06 – 0.1 USD
Kazakhstan	15.21 – 26.06 KZT	0.06 – 0.08 USD
Russia	5.38 RUB	0.1 USD
Tajikistan	0.168 TJS	0.02 USD
Ukraine	0.9 UAH	0.03 USD
Uzbekistan	204.3 UZS	0.02 USD
Kyrgyzstan	0.77 KGS (up to 700 kWh) 2.16 KGS (more than 700 kWh)	0.01 USD

Average salary in 2019

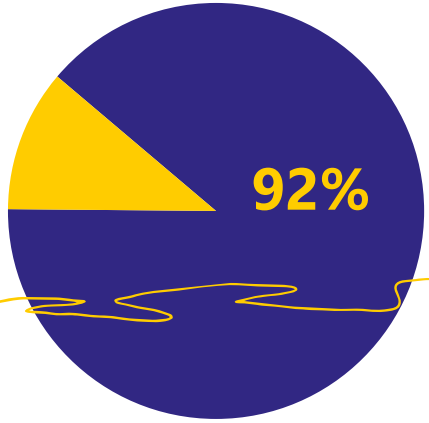
Armenia	182 673 AMD	377 USD
Azerbaijan	542 AZN	318 USD
Georgia	1 204 GEL	390 USD
Belorussia	1 239 BYN	589 USD
Kazakhstan	196 603 KZT	470 USD
Russia	41 845 RUB	676 USD
Tajikistan	1 142 TJS	111 USD
Ukraine	10 497 UAH	447 USD
Uzbekistan	2.2 mln UZS	217 USD
Kyrgyzstan	17 232 KGS	247 USD

VOLUME OF ELECTRIC POWER GENERATION FOR 2019



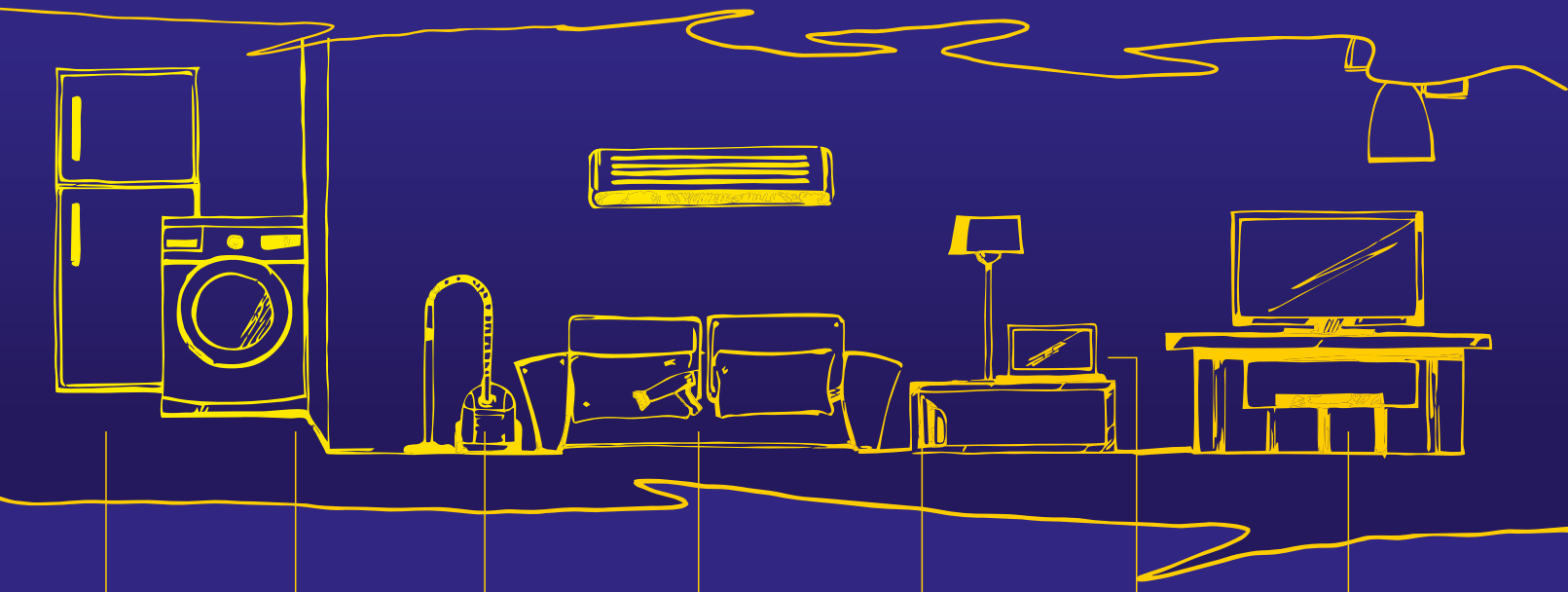


CHP
8%
1.37 bln kWh
generation cost is 3,36 KGS per 1kWh



HPP
92%
14.29 bln kWh
generation cost is 0.14 KGS per 1 kWh

GUARANTEED MONTHLY CONSUMPTION RATE (UP TO 700 KWH)



Fridge
100 W
24 h
30 days

Washing machine
1 050 W
5 hours
8 days

Vacuum cleaner
1 200 W
5 hours
8 days

Hair dryer
1 050 W
3 hours
8 days

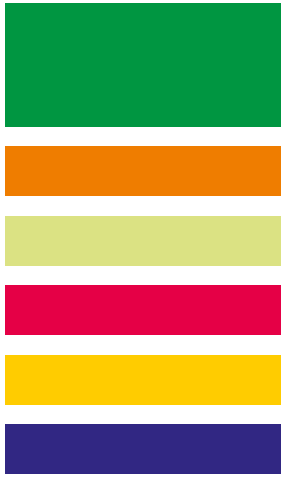
Iron
1 050 W
4 hours and 30 min
8 days

Laptop
560 W
5 hours
30 days

TV set
135 W
10 hours
30 days

82% OF POPULATION DOES NOT EXCEED THE 700 kWh LIMIT

Comparison of electric power expenditures with other expenditures



1st place – FOOD PRODUCTS/CELEBRATIONS AND FEASTS

2nd place – NON-FOOD GOODS

3rd place – HEALTH CARE/EDUCATION

4th place – UTILITY SERVICES

5th place – TRANSPORT/FUEL AND LUBRICATION MATERIALS

6th place – MOBILE COMMUNICATION AND INTERNET

A study of household expenditures and their prioritizing by the highest costs has shown that food and celebrations/feasts are the most expensive items. Savings are the least expensive ones. Electricity and central heating costs are on the first place among the most expensive utilities. It may be assumed that the answers of the respondents were related to the expenses in the autumn-winter period, when electric power is used as a heating method (heaters etc.) and central heating bills in this period are the highest among the majority of the population.
Interviewed - 1367 persons*.

** Data from the study "Public Awareness and Perception of Energy Sector" (April-May, 2019) conducted by the ISR Consulting Company by the order of the SCIESU under the support provided by the ADB within the framework of the Public Information Program on the energy sector.*

ENERGY SAVING

The Kyrgyz Republic has a high potential of the renewable energy sources (RES) that is estimated as 840.2 mln tons of reference fuel per year.

The main types of the RES in the country are solar energy, small water stream energy, wind energy, geothermal water energy, and biomass energy.

Kyrgyzstan is an energy deficient country and covers only 51% of its needs at the expenses of own resources, mainly by electric power generated by HPPs, and the remaining part is covered by energy resources imported from the neighboring countries.

Kyrgyzstan has a huge energy saving potential that is estimated in the volume of 35-40% out of the total energy consumption.

Legal regulation framework for the RES development:
The Law of the Kyrgyz Republic "On the Renewable Energy Sources"
The Law of the Kyrgyz Republic "On Electric Power Sector"
The Law of the Kyrgyz Republic "On Energy Saving"
National Energy Program of the Kyrgyz Republic and Fuel-Energy Complex Development Strategy till 2025.

Summary

The official countdown of history of the energy system of the Kyrgyz Republic began more than 85 years ago. Since then, the construction of small and medium hydropower plants as well as diesel power plants and electrification of our country have been gaining the pace every year.

Before the commissioning of the combined heat and power plants and large hydropower plants, the country's electricity supply was performed by small hydro and diesel power plants.

The operating 7 large hydropower plants, 2 combined heat and power plants and 9 small hydropower plants, owned by energy companies with a state-owned stake of shares, were commissioned from 1928 to 2010.

As of today, the general deterioration of the equipment of energy companies with a state-owned stake of shares is about 60%. However, due to significant increase in the volume of energy consumption, there is a need to take urgent measures to recover and modernize the existing and build the new energy facilities.

The hydropower potential of water resources of the Kyrgyz Republic is 142 bln kWh of electric power and takes the 3rd place in the ranking of the CIS countries.

To date, only 10% out of the total national hydropower potential is developed, which is about 14.5 bln kWh. The prospective energy projects can help to attract the investment in other sectors also. This will create jobs and enhance the growth of the economy of the Kyrgyz Republic.

Socially-oriented electricity tariffs in Kyrgyzstan are among the lowest ones in the world and do not allow to provide the sufficient investment for the development of the energy sector and for capital programs to reform the energy sector. In this regard, energy companies are forced to attract the borrowed funds to implement the investment projects for recovery and modernization of the existing facilities and construction of the new ones. Among them are such large projects as: "Toktogul HPP Rehabilitation", "Bishkek CHP Modernization", "Commissioning of the 2nd unit of Kambarata-2 HPP", "CASA-1000", "Construction of 500 kV "Datka-Kemin" power transmission line and "Kemin" substation" and others.

A large share of the borrowed funds in the structure of the capital of energy companies with state-owned stake of shares increases the financial resources for debt servicing in the expenditure part of the budget of energy companies, which is reflected in the growth of the cost of production (electricity and heat).

Thus, the average billed tariff does not cover the cost, and energy companies with state-owned stake of shares have to make every effort to reduce this difference by optimizing the expenditures.

However, frequent forced cost cuts and underfunding of repair works and capital investments can lead to negative result in terms of indicators such as an increase in the number of accidents and blackouts.

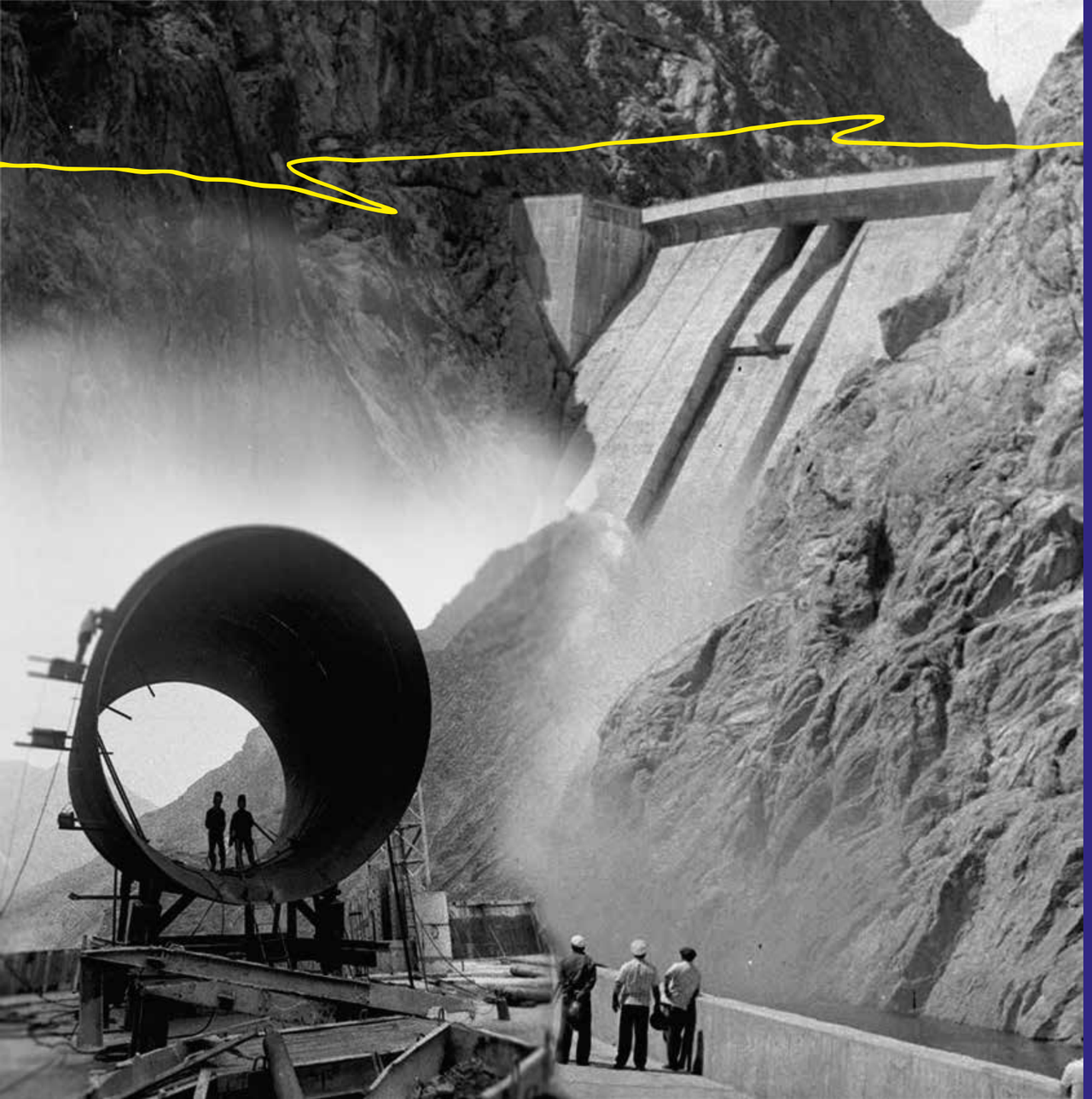
Today's realities dictate the conditions under which it is necessary to urgently take effective measures for rehabilitation and modernization of the energy sector in order to avoid its shutdown and possible resuscitation in the future.

Abbreviations:

ADB - Asian Development Bank
WB - World Bank
EDB - Eurasian Development Bank
EBRD - European Bank for Reconstruction and Development
IDB - Islamic Development Bank
SFD - Saudi Development Fund

OJSC - Open Joint Stock Company
ChuiHVEG - Chui enterprise of high-voltage electric grid
ASKUE - automated system of control and accounting of electric power

HPP - hydropower plant
CHP - combined heat and power plant
SS - substation
TS - transformer substation
PTS - packaged transformer substation
ODU - open distribution unit
PL - power transmission line
CL - cable line
kV – kilovolt
kW - kilowatt
kWh - kilowatts per hour
MW – mega watt



KYRGYZSTAN'S ENERGY SECTOR

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