



Perspective Investment Projects in the Field of Energy

Bishkek, 2022



Kyrgyz Republic

Territory : 199 951 km²

Population: 7 mln

State language : kyrgyz

Official language : russian



GDP \$8 billion USD



Currency
SOM (KGS)

(1 USD = 84,5 KGS)



3070 MW
HPP

HYDROELECTRIC
POWER STATION



862 MW
TPP

THERMAL POWER

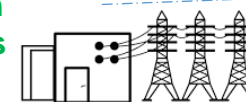
TOTAL
3932 MBT

The volume of average annual output:

- electricity 14 billion kWh.
- thermal energy - 2 000 000 Gcal

Энергетика

Customer base of
1.5 million
customers



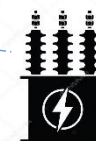
SS 110-500 KW
197 units
12 498 MVA



Transmission lines
110-500 kV
7 500 km

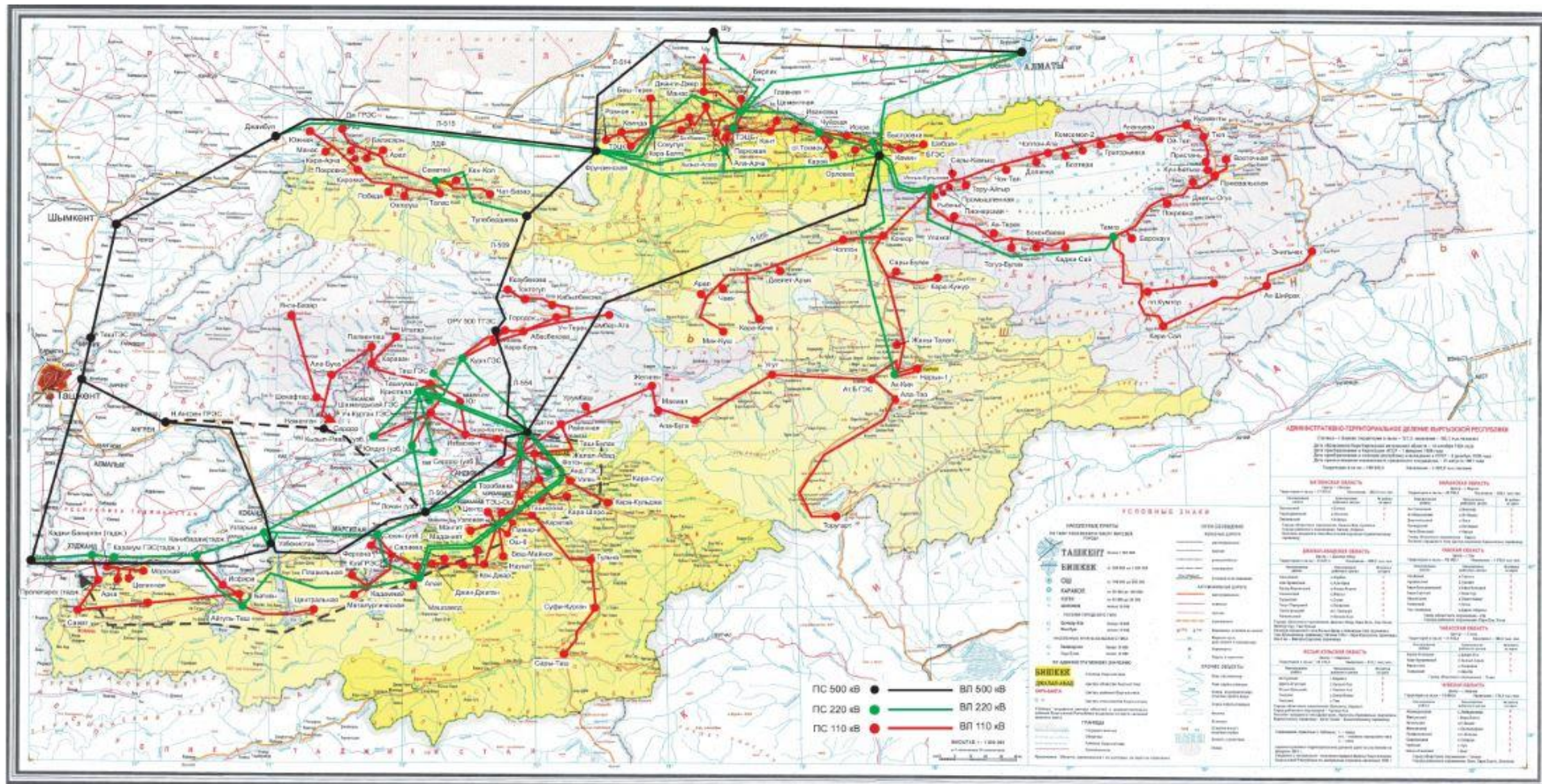


High voltage lines
0,4-35 kV
59 700 km

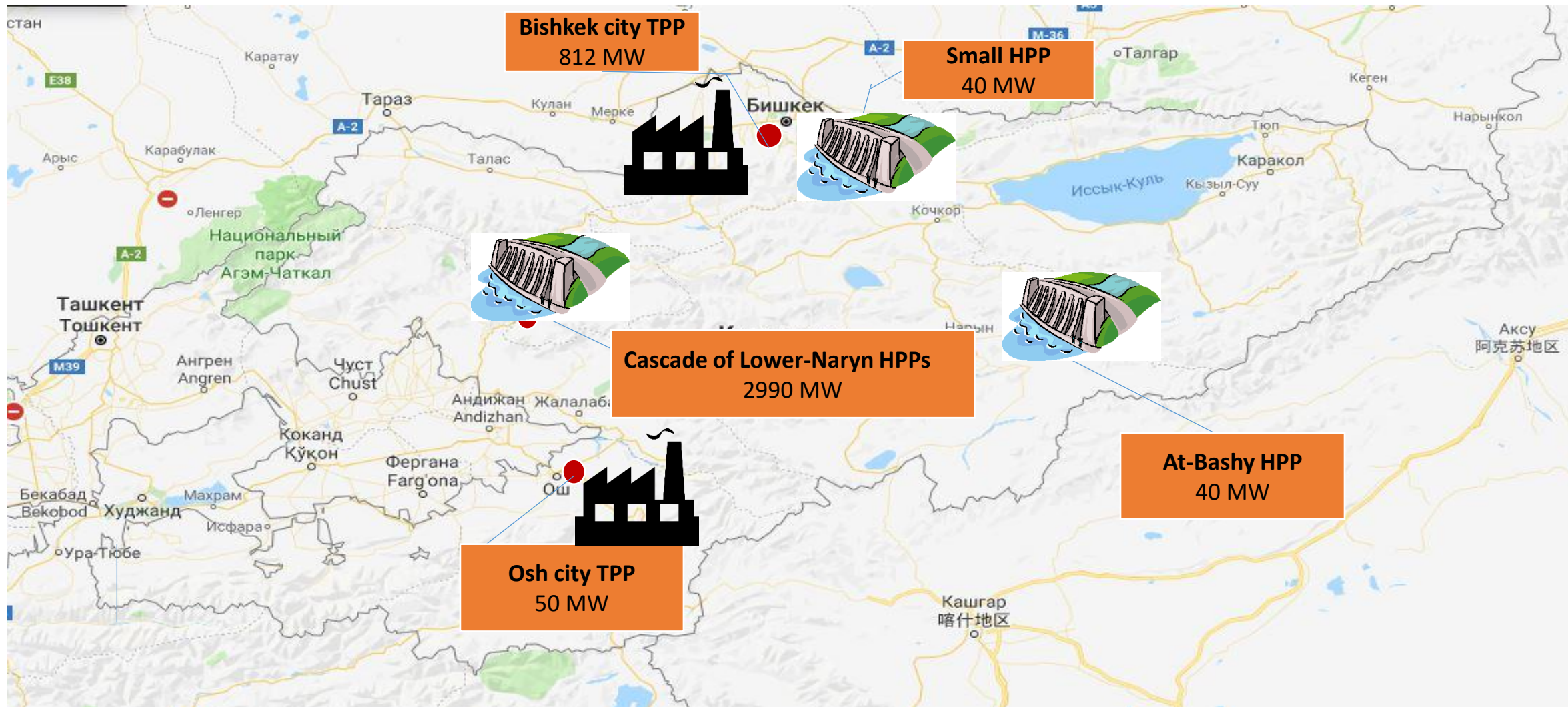


SS and TS
23 915 units

The Diagram of the Main Electrical Network of the Kyrgyz Republic's Energy System.



Main Generating Capacities



LARGE HPPs
3030 MW

SMALL HPPs
40 MW

TPPs
862 MW

TOTAL
3932 MW



Main Generating Capacities

Name	Capacity	Commission date
Toktogul HPP	1200 MW	1975
Kurpsai HPP	800 MW	1982
Tash-Kumyr HPP	450 MW	1987
Shamaldy-Sai HPP	240 MW	1992
Uch-Kurgan HPP	180 MW	1961
At-Bashy HPP	40 MW	1970
Kambar-Ata HPP-2	120 MW	2010
Total large HPPs	3030 MW	
Bystrovka HPP	8,7 MW	1954
Lebedinovka HPP	7,6 MW	1943
Cascade of Alamedin HPPs	23,7 MW	1957
Total small HPPs	40 MW	
Bishkek TPP	812 MW	1961
Osh TPP	50 MW	1966
Total TPPs	862 MW	
The Total Capacity of the PPs	3 932 MW	



National Electricity Network

Length HVL 110-500 kV	7500 km
Number of Substations 110-500 kV	197 pcs
Installed Capacity of Transformers	12 498 MVA





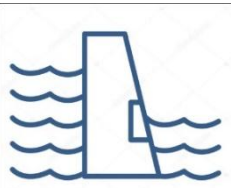
Hydropower potential



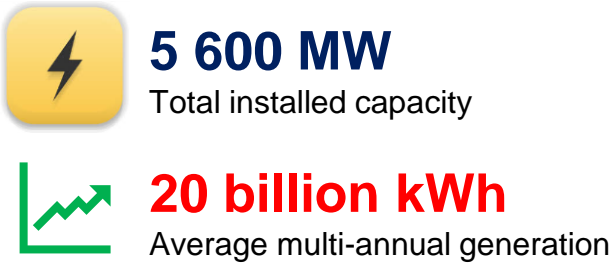
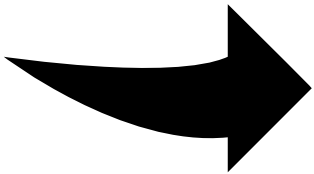
IT IS POSSIBLE TO CONSTRUCT ON THE NARYN RIVER:










7 cascades



27 hydro power plants



Perspective Projects

	HPP POWER	CONSTRUCTION PERIOD	Electric energy generation mln. kWh	 PROJECT AMOUNT	 STATUS
Construction of Upper-Naryn Cascade of HPPs	237,7 MW	5 years	942,4	727,7 mln.\$	FS and Project Developed
 Construction of Kambar-Ata-1 HPP	1860 MW	8 years	5 640	2 868,5 billion \$	FS Developed
 Construction of Suusamyr-Kokomeren Cascade of HPPs	1305 MW	8 years	3 317	3,3 billion \$	Preliminary FS Developed
 Construction of Kazarman Cascade of HPPs	1160 MW	8 years	4 661,6	2 billion \$	FS Development is required
Construction of Sary-Jaz Cascade of HPPs	1100 MW	8 years	4 764	2,5-3 billion \$	FS Development is required
Kara-Keche TPP	600 MW	3 years	3 900	0,778 billion \$	Preliminary FS Developed
 Construction of Small HPPs	95 MW	3 years	450	100 mln \$	FS Development is required

Upper-Naryn cascade of HPPs

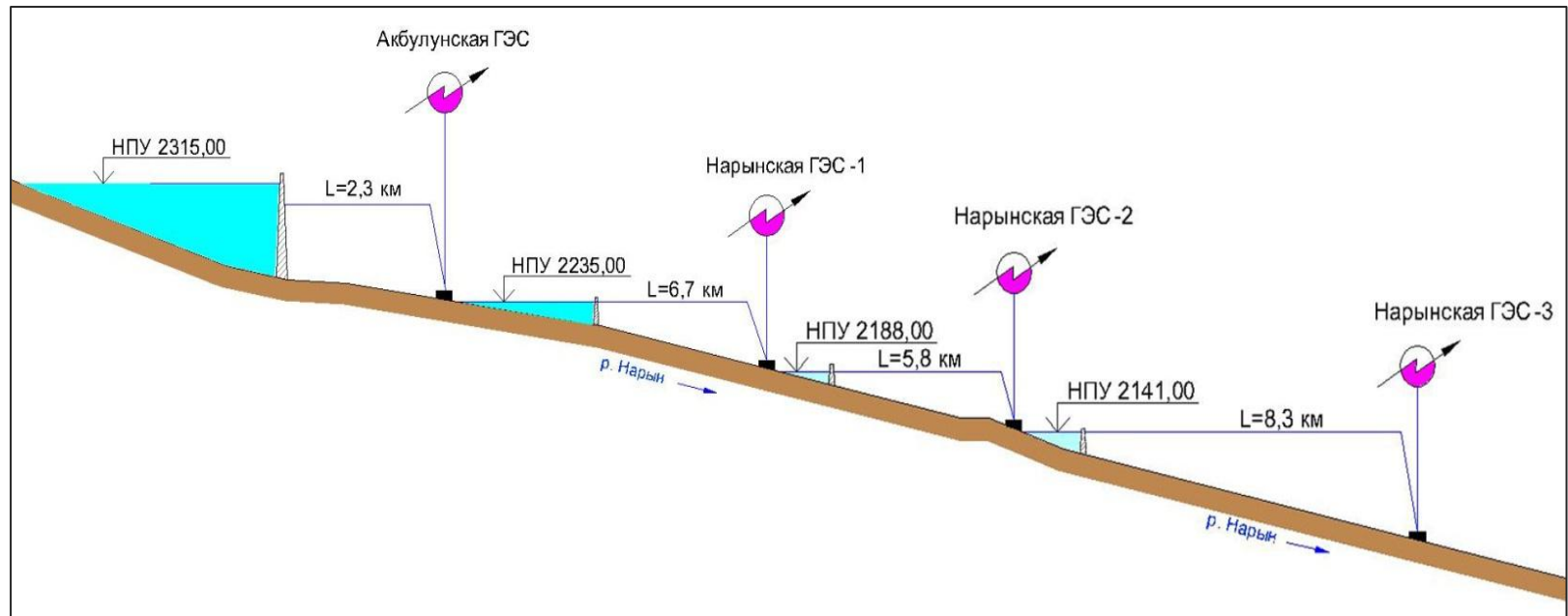
HPP name	Installed capacity, MW	Average multi-annual generation, mln. kWh	Dam height, m	Construction period, months
Akbulun HPP	87,4	345,5	75	72
Naryn HPP-1	47,7	187,5	20,5	36
Naryn HPP-2	47,6	188,8	19	36
Naryn HPP-3	55,0	220,5	9	48
Total	237,7	942,4		86

Location:

The cascade is designed in the upper reaches of the Naryn river, with absolute elevations of 2100-2300 m. All stations are designed according to the dam-diversion scheme with small reservoirs, which reduces the area of flooded lands.

Construction infrastructure:

- ✓ There exists a production infrastructure
- ✓ Close proximity of the highway of the national importance
- ✓ There is an existing 35 kV overhead power line on the right bank of the river
- ✓ The main type of transport in the area of construction is automobile. The nearest railway station "Balykchy" is located at a distance of 183 km
- ✓ The necessary land plots for the construction of hydropower plants are provided
- ✓ The feasibility study of the project and a part of project documentation is developed



The chosen cascade scheme allows the full use of the fall of more than 30-km stretch of the river - the lower pool of the overlying plants is the reservoirs of the underlying ones

Completed works

- Allocated 2459.04 hectares of land
- The first stage of the shift camp for 450 people, readiness - 100%
- Facility “Pioneer base”, readiness - 80%
- Facility “Shift camp”, readiness - 95%
- The facility of the main construction “Surface Spillway Naryn HPP-1”
1st stage, readiness 100%
- The facility of the main structure "Diversion canal Naryn HPP-1"
readiness - 10%
- Concrete mixing plant – 35 m³/h, performed commissioning, at the moment
plant produces concrete (produced 1,000.0 m³ of concrete)



Completed works

- Facility “Temporary bridge Naryn river”- readiness 30%.
- Facility “Onsite road”, readiness 100%
- Temporary power supply - have been put into operation: substation 35/10 kV, more than 10 km of 35 kV and 10 kV overhead lines, 8 transformers of various capacities
- Production of inert materials - deployed two crushing and screening facilities, produced 20 thousand cubic meters of inert materials

Project survey work – development of project documentation for the construction of the main hydro unit cascade, working documents (Akbulun HPP and Naryn HPP-1). Topographical survey completed, main construction plan refined.



Kambar-Ata-1 HPP

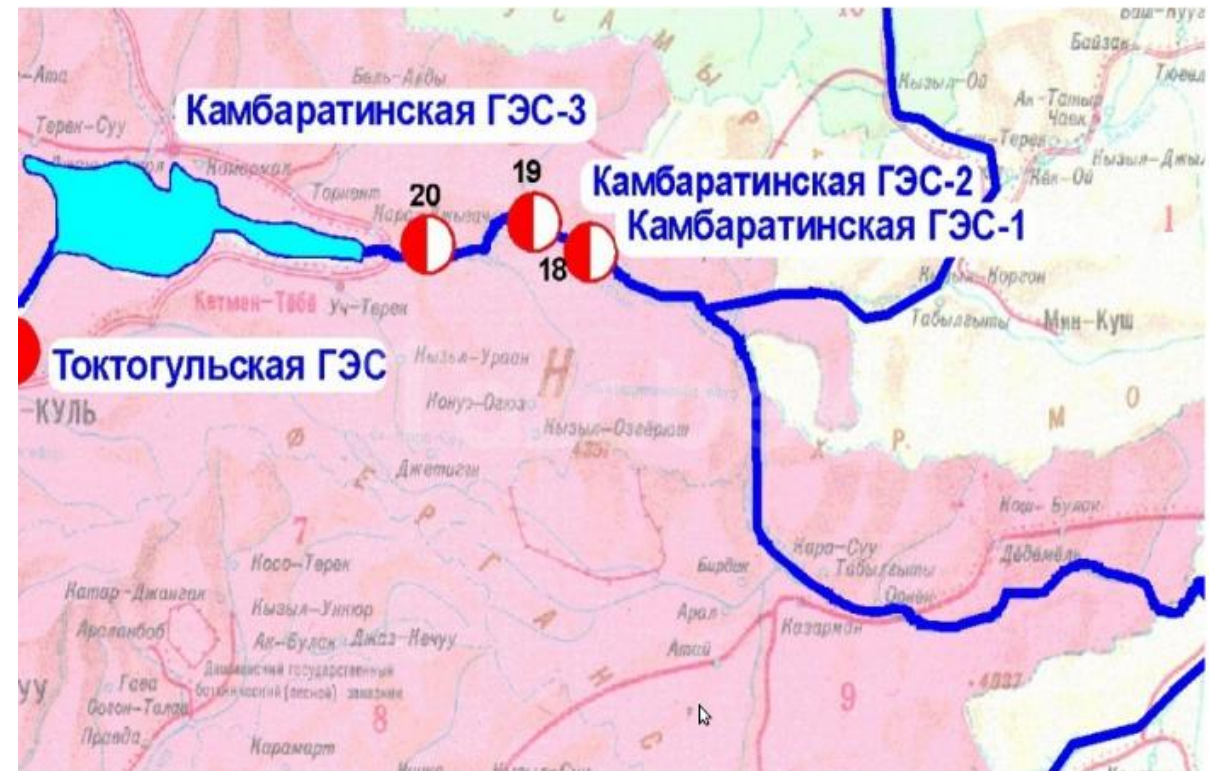
Name	Normal headwater level, NHL, m	Installed capacity, MW	Electric energy generation, mln. kWh	Reservoir volume mln.cbm	HPP type
Kambar-Ata-1 HPP	1 198	1860	5 640	2 730	Near dam type

Location:

The dam of Kambar-Ata HPP-1 is located on the Naryn river in the V-shaped canyon, 14 km above the Kambarata HPP-2

Construction infrastructure:

- ✓ There is a production infrastructure that was used during the construction of Kambar-Ata HPP-2
- ✓ There are the sufficient reserves of quarries of building materials for construction of the dam of Kambar-Ata HPP-1
- ✓ The close proximity of the republican road and a 500 kV power line connecting the North and South of the country
- ✓ Feasibility study developed (by SNC Lavalin International Inc.)

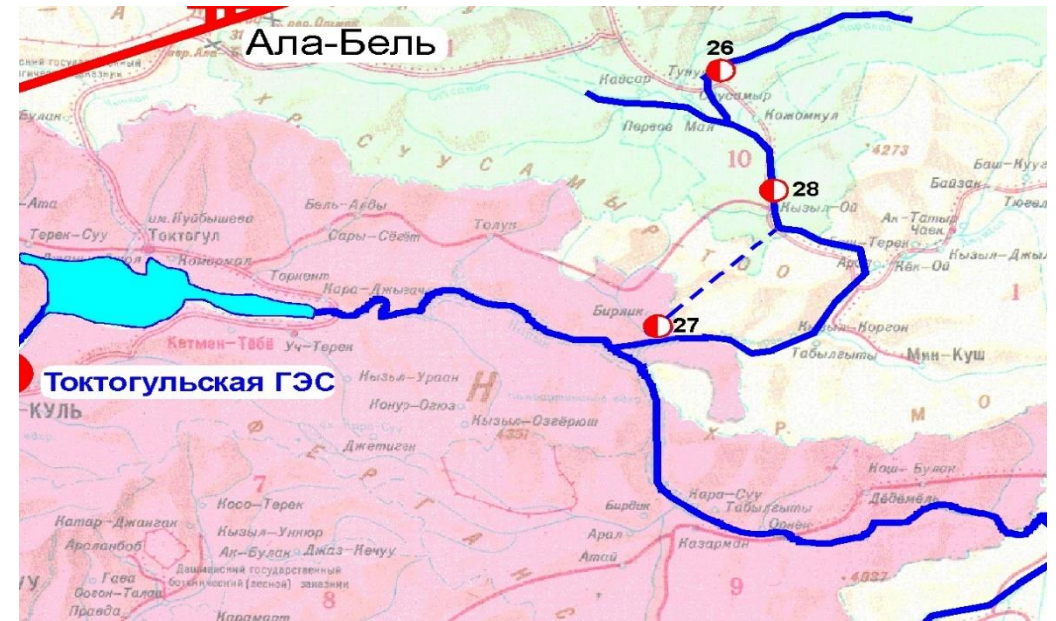


Suusamyr-Kokomeran Cascade of HPPs

HPP name	Reservoir volume mln.cbm	Installed capacity, MW	Electric energy generation, mln. kWh
Karakol	400	33	95,0
Kokomeran 1	680	360	848
Kokomeran 2	19,5	912	2374
Total		1305	3317

Location:

Suusamyr-Kokomeran cascade of HPPs (hereinafter SKC) is located on the river Kokomeran, which is a tributary of the Naryn. The catchment area of 10400 sq. km, length – 199 km. The average altitude of the basin - 2737 m. the highest monthly average temperature is plus 39 degrees Celsius in the area of Chaek, the lowest temperature is minus 37 degrees Celsius. Geographically it is located in Jaiyl district of Chui oblast and Toktogul district of Jalal-Abad oblast.



Kazarman Cascade of HPPs

HPP name	Normal headwater level, NHL, m	Installed capacity, MW	Electric energy generation, mln. kWh	Reservoir volume mln.cbm	HPP type
Alabuga HPP	1 570	600	2 358,3	2 835,5	near dam
Karabulung HPP-1	1 370	149	536	110	near dam
Karabulung HPP-2	1 370	163	852	110	diverting dam
Toguztoroo HPP	1 327	248	915,3	168,5	near dam
Total for the Cascade		1 160	4 661,6		

Location:

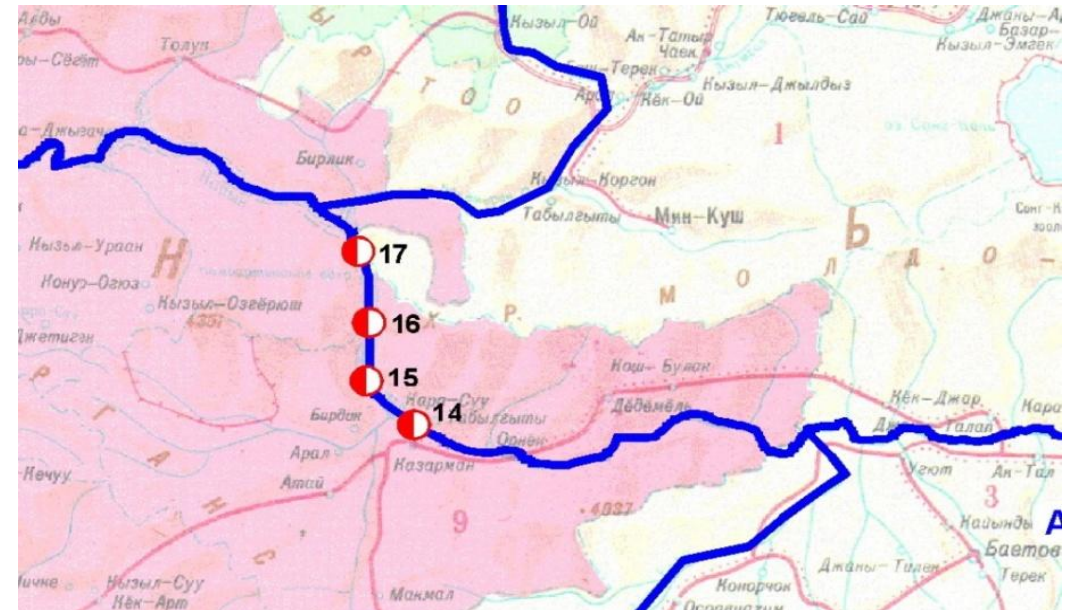
The Kazarman cascade is located on the Naryn river section between its inflows – the Alabuga and the Kokomeren rivers.

Construction Infrastructure:

The existing road of the republican significance with a length of 155 km provides an exit from the Naryn zone to the cities of Osh and Jalal-Abad.

In addition, construction of an alternative North-South road has begun in this area.

Precipitation - 303 mm per year; The relief is mountainous; Seismic activity - 9 points.



Sary-Jaz Cascade of HPPs

Name	Reservoir volume mln.cbm	Installed capacity, MW	Electric energy generation, mln. kWh
Kuiluk	650	170	450
Engilchek	18	60	204
Kaingdy-Engilchek	40	20	80
Akshyirak	500	350	1230
Kokshaal	20	250	1390
Kuyukap	20	250	1410
Total:		1100	4764

Location:

The river Sary-Jaz originates from the glacier Semenov and flows in the East of lake Issyk-Kul in the direction from the North to the South. The climate in the tract of Sary-Jaz is harsh, sharply continental with cold winters and short summers. The average temperature of the coldest month of the year - January is $-19-20^{\circ}$, the warmest - July is $+10^{\circ}$.

Geographically it's located in the Aksuu district of Issyk-Kul oblast



Kara-Keche TPP

The Kara Keche field is located in the Naryn region and belongs to the Kavak coal basin:

- located 220 km from Balykchy r/w station;
- rated capacity - 4.1 million tons per year

Basin reserves are 1.85 billion tons

Coal characteristics:

- brown coal with calorific value - 4700 kcal/kg
- working humidity - up to 19%
- ash content - up to 14%
- sulfur content - 1%.

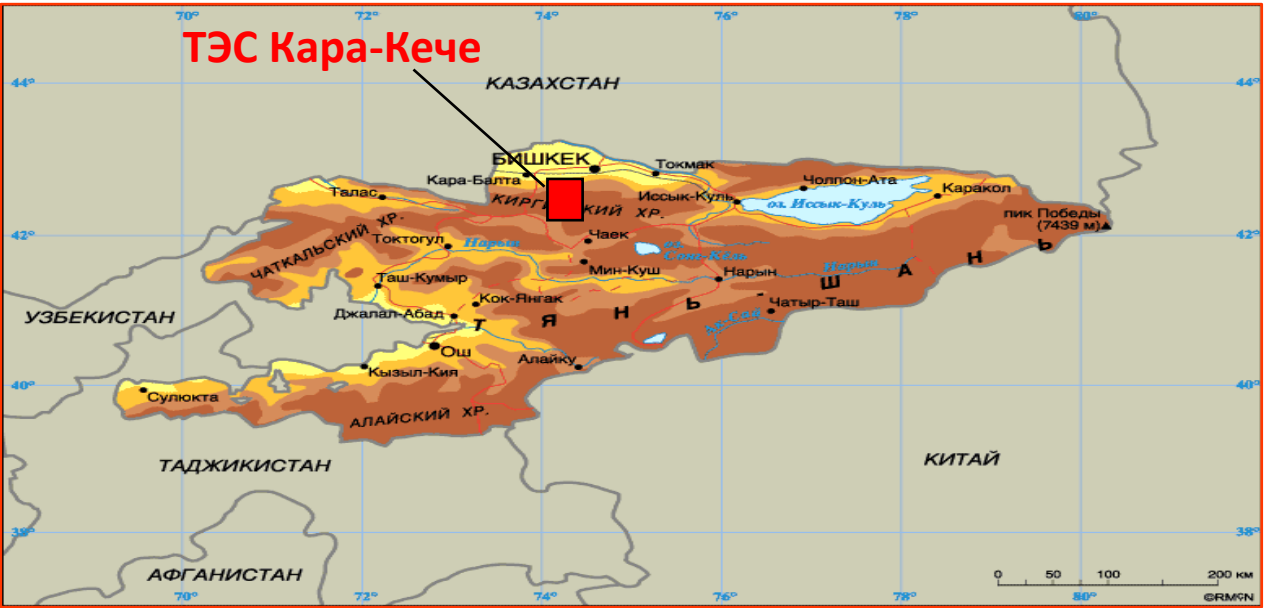
The construction of the TPP is planned near the coal-mining enterprises developing the Kavak brown coal basin.

Construction infrastructure :

The main type of transport in the area of construction is automobile. The distance to the nearest r/w station "Balykchy" on a gravel-paved road - 230 km.

Precipitation – 440 mm per year; **Relief** - mountainous;
Seismic activity – 9 points.

HPP characteristics	Data
Project capacity	600 MW (2x300 MW)
Electric energy generation	3 900 mln. kWh
Fuel	brown coal (consumption 397.4 tons/h)
Source of technical water supply	The Djungal river/ The Kokomeren river
Water consumption	summer time 45 m3/s winter time 42 m3/s
Stack height	330 m

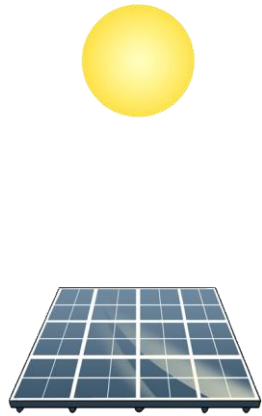


THE ROLE OF RENEWABLE ENERGY SOURCES IN THE COUNTRY'S ENERGY SECTOR

The issue of saving energy resources is the most important priority for the Kyrgyz Republic. We also need to actively develop hydropower and other types of non-fuel energy as the most economical and environmentally friendly, expand the construction of energy facilities in the regions using local resources, including, of course, renewable and alternative energy sources



RENEWABLE ENERGY POTENTIAL

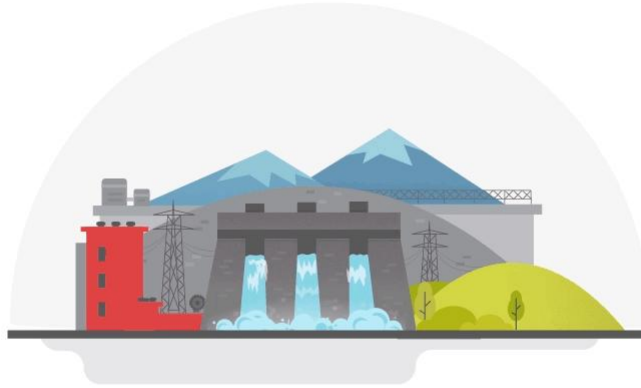


2100-2900 h.

Average annual duration of sunshine

Annual radiation to the surface

1700 kWh/m²



258 MW

The potential of small hydroelectric power plants

1,5 billion kWh



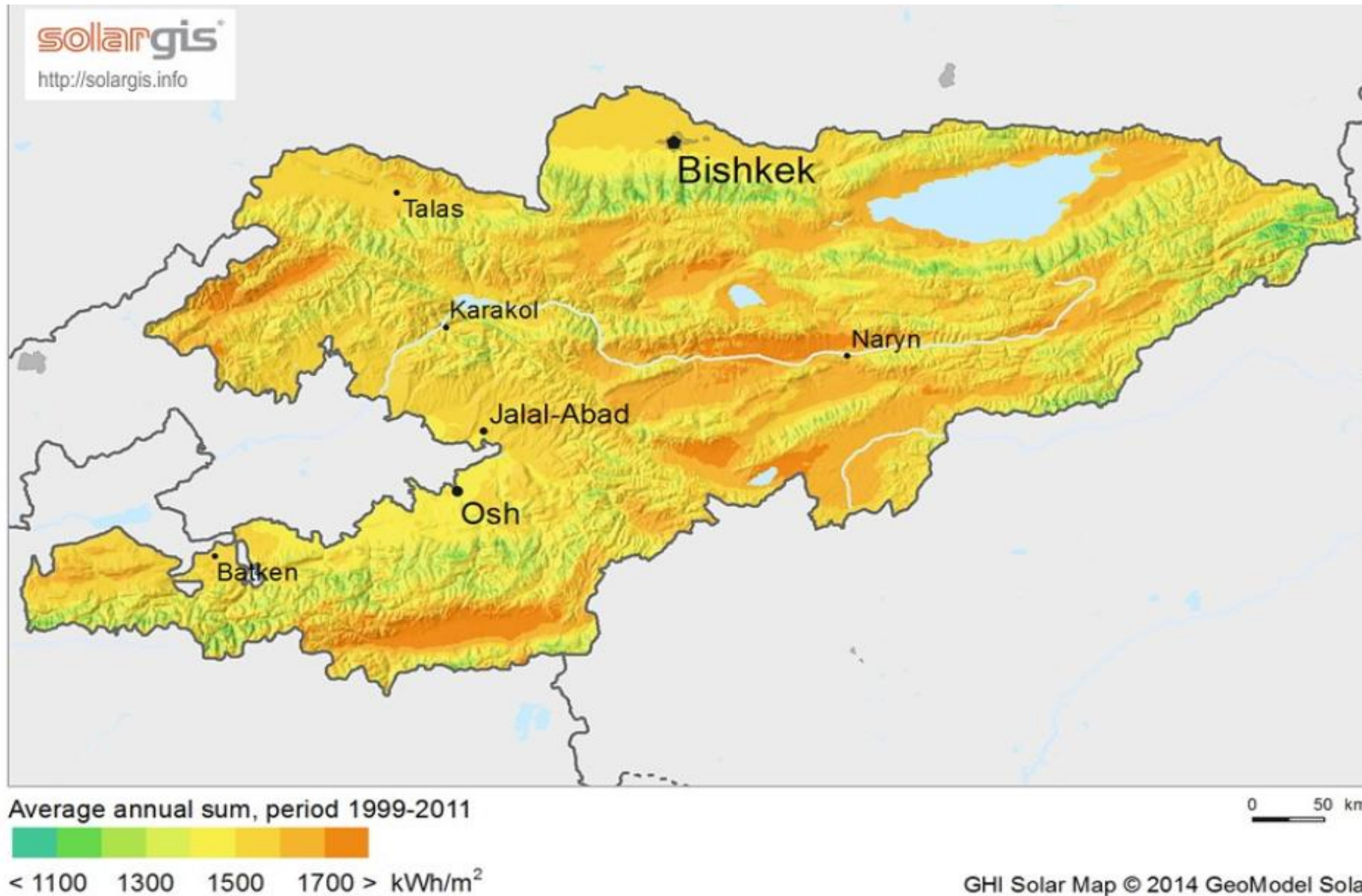
2 billion kWh

The wind energy potential

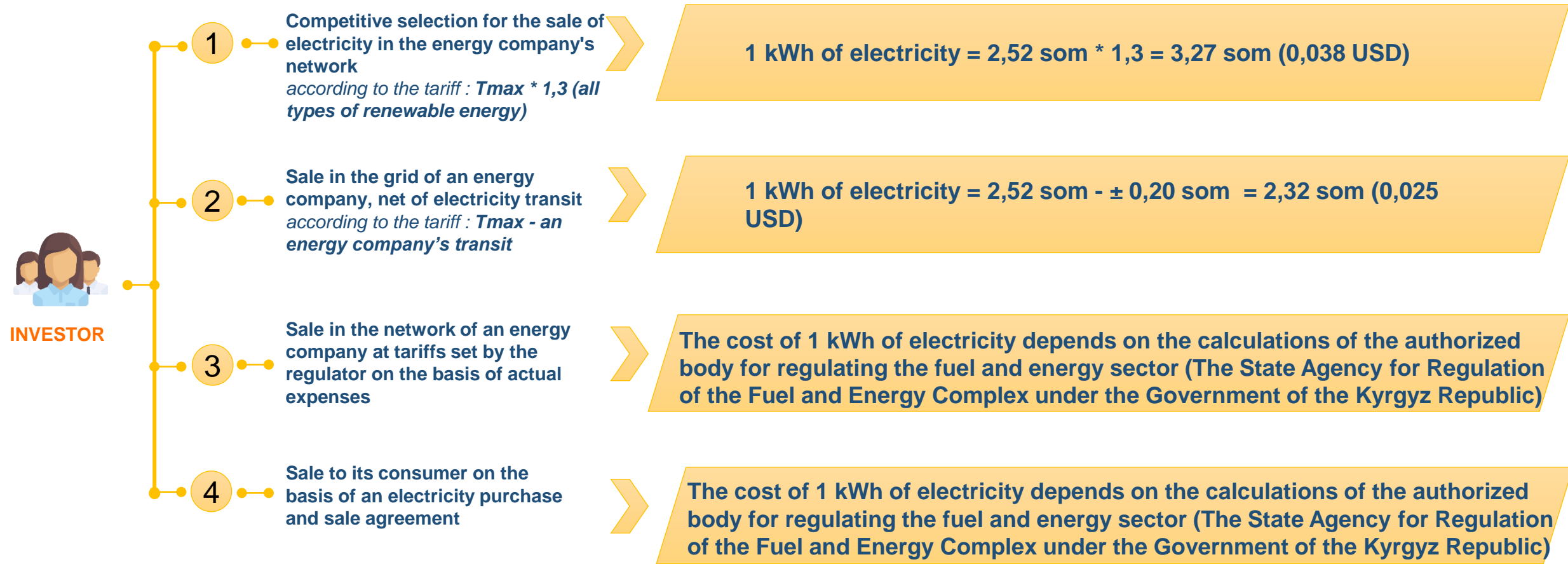
Global horizontal irradiance map (GHI)

Global horizontal irradiance (GHI)

Kyrgyzstan



Conditions and procedure for the implementation of activities for the generation and supply of electric energy using renewable energy sources in the Kyrgyz Republic



The Law of the Kyrgyz Republic No 99, dated 24 July 2019, «On amendments to certain Legislative Acts in the field of renewable energy sources», was developed and adopted

**Tmax – the maximum holiday rate on the territory of the Kyrgyz Republic*

THE LIST OF PERSPECTIVE SMALL HYDROELECTRIC POWER STATIONS-2021

№	Dam / river name	Power, <i>MW</i>	Electricity generation per year, <i>million kWh</i>	Construction costs	Cost price
				total, <i>million USD</i>	tariff, <i>som</i>
1	Kokomeren	17,20	101,00	14,86	1,56
2	Dzhardy-Kaingda	8,90	52,10	10,6	2,19
3	Ak-suu	6,60	38,04	6,8	1,94
4	Dzhel-Aryk (Chu)	10,00	66,70	14,4	2,41
5	On-Archa	3,0	17,70	3,6	2,18
6	Ylai talaa (tar)	15,1	86,60	15,5	1,92
7	Chandalash	13,6	82,70	14,08	1,98
8	Kara-Kulzha	14,0	85,50	15,97	2,01
9	Talas	5,4	36,75	8,37	2,45
Total		93,80	567,09	104,18	2,02

The Map of Priority Small HPPs



The List of Small HPPs

No	Names of HPPs	Capacity, MW	Location, river
1	Orto-Tokoi	25	Orto-Tokoy Reservoir
2	Kirov	21	Kirov Reservoir
3	Papan	20	Papan Reservoir
4	Karakul (Kara-Suu-1,2)	18	Kara-Suu river, (left)
5	Tayan	3,5	Sokh river
6	Tortkul	3	Tortkul Reservoir

Perspective small HPPs

ORTO-TOKOY SHPP:

Installed capacity – **25** MW

Average generation - **100** million kWh

Karakul SHPP:

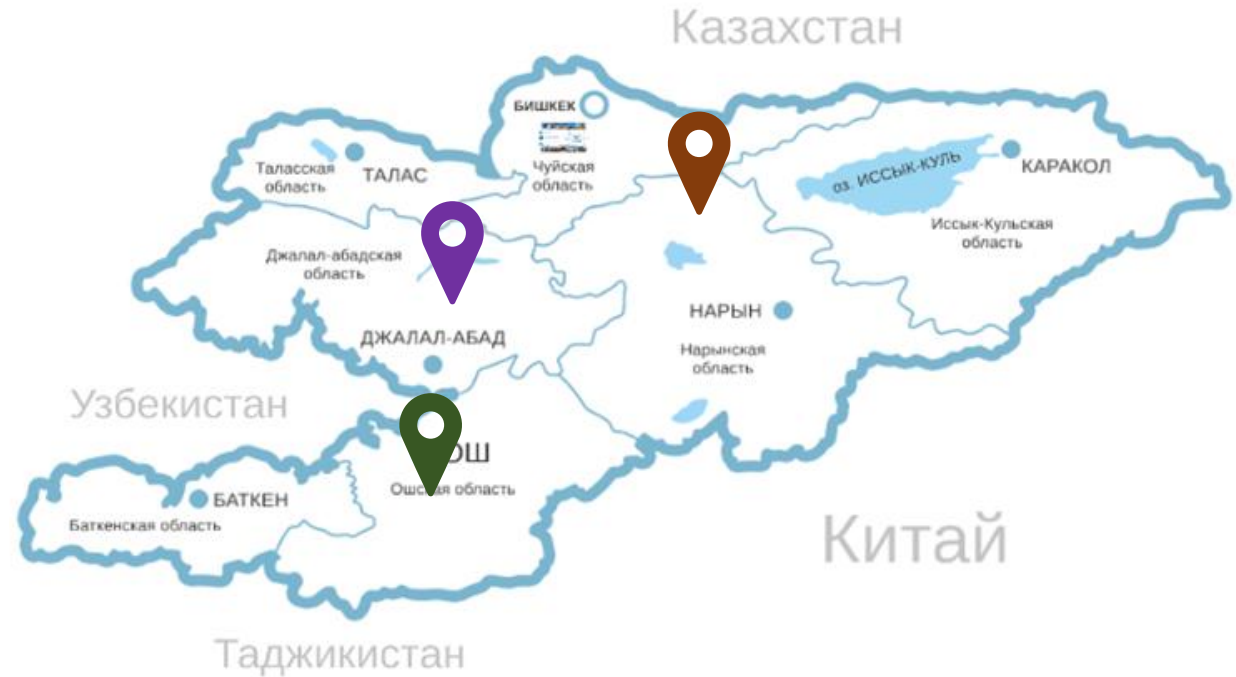
Installed capacity – **18** MW

Average generation - **110** million kWh

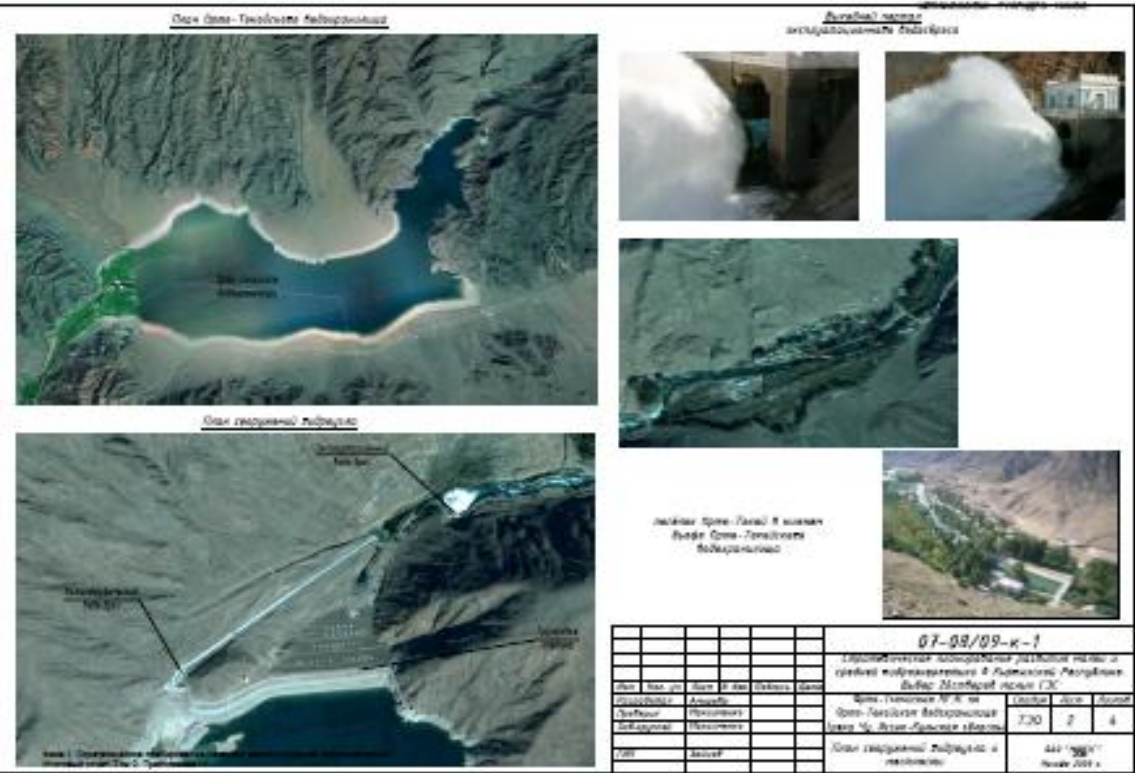
Papan SHPP:

Installed capacity – **20** MW

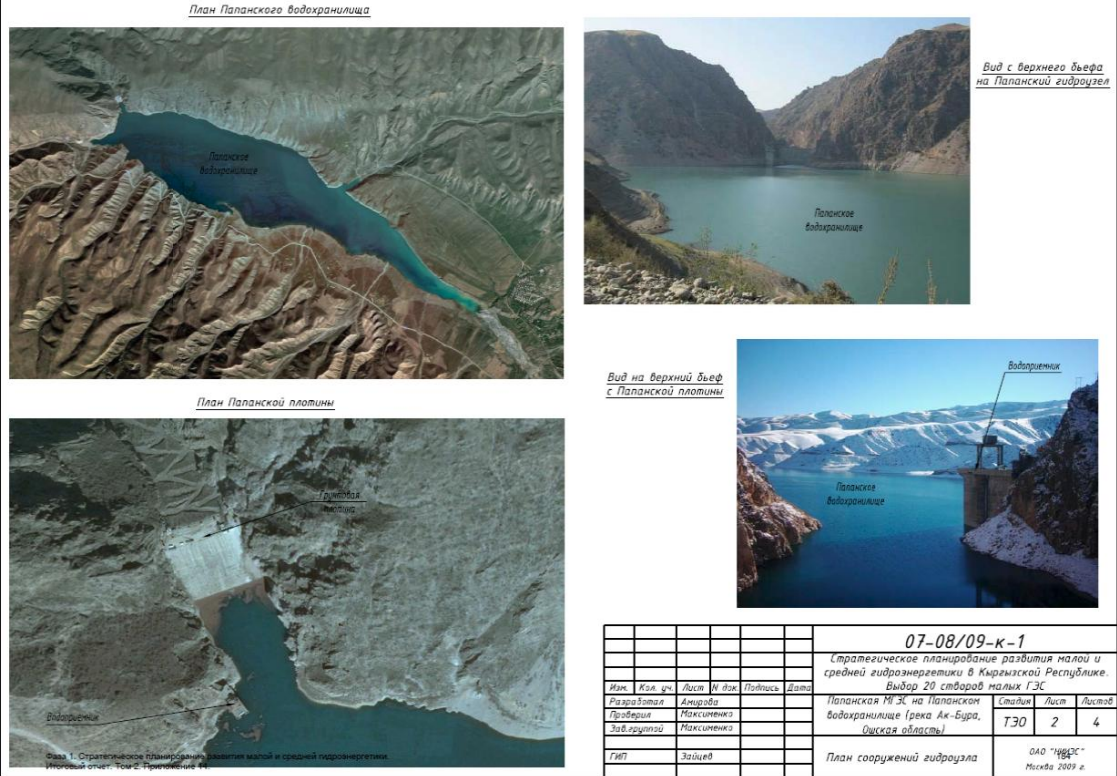
Average generation - **106** million kWh



Perspective small HPPs



Orto-Tokoy SHPP



Papan SHPP

Technical and economic parameters

Orto-Tokoy SHPP



Project cost – **23** million USD



Generation – **100** million kWh



SHPP POWER- **25** MW



Payback period – **10** year

Papan SHPP



Project cost – **28** million USD



Generation – **106** million kWh



SHPP POWER- **20** MW



Payback period – **10** year

Karakul SHPP



Project cost – **20** million USD



Generation – **110** million kWh



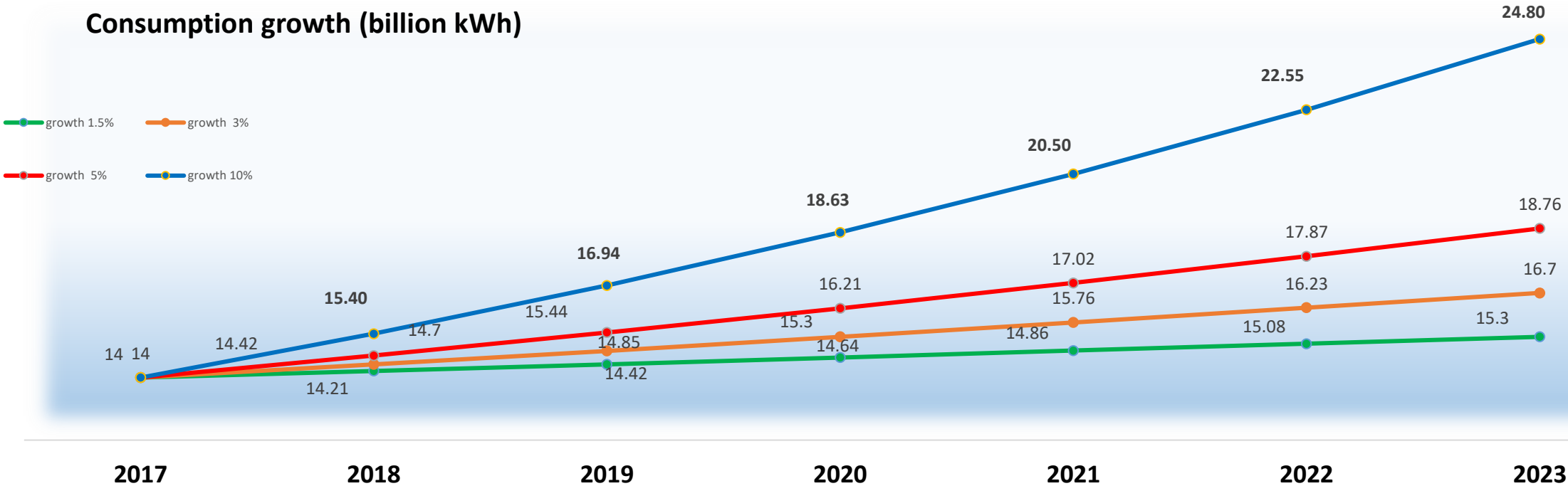
SHPP POWER- **18** MW



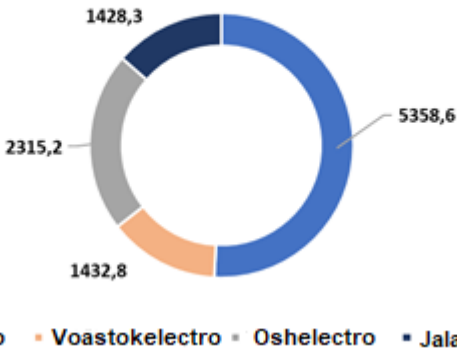
Payback period – **10** year

Marketing

Consumption growth (billion kWh)



Useful supply of electricity by distribution companies



In the medium and long term, a shortage of power is formed in the market

The key buyer of generated electricity will be distribution energy companies **with the condition of guaranteed purchase of the entire volume**

Project Implementation Roadmap

Obligations of the Government of the Kyrgyz Republic and the National Energy Holding Company OJSC	Investor obligation
<ul style="list-style-type: none">I. Obtaining a decision of the authorized state body on the issuance of quotas for the construction of HPPII. Decision-making on land allotment for the construction of HPPIII. Assistance in issuing permits for the construction of HPPIV. Issuance of technical specifications by energy companiesV. Creation of conditions for receiving generated electricity at a substation	<ul style="list-style-type: none">I. Attracting investment resources for the construction of HPPII. Infrastructure constructionIII. Construction of power lines to the point of electricity reception from distribution energy companiesIV. Attracting local labor for the construction and operation of HPP

Promising Markets for Electricity

CASA → 1000



The project involves the construction of a high-voltage power line connecting the energy systems of the Kyrgyz Republic and the Republic of Tajikistan with the Islamic Republic of Afghanistan and the Islamic Republic of Pakistan to export electricity to the Central Asian countries

Domestic Electricity Price is 3 US Cents

Options for cooperation



in the form of the investment project (direct investments) that assumes project financing



in the form of public-private partnership (PPP), including the following models:



- BOT (Build, Operate, Transfer)
- BOOT (Build, Own, Operate, Transfer)
- BOMT (Build, Operate, Maintain, Transfer)

State support (preferences)



Protection of the foreign investments



Assistance in implementation of electricity exports in the framework of the project "CASA-1000" (according to the rules of open access to the third parties)



Assistance in obtaining the licenses, permits and approvals



Equal operating conditions for the foreign and local companies



Possibilities of broad cooperation in the framework of PPP



Available qualified personnel

THANK YOU FOR ATTENTION!