ACTUAL PROBLEMS OF IMPROVING ENERGY EFFICIENCY IN CONSUMERS ELECTRICITY SUPPLY WITH USING OF RENEWABLE ENERGY SOURCES

UNECE-NNSTU Workshop on Energy Efficiency in Industrial and Building Sectors

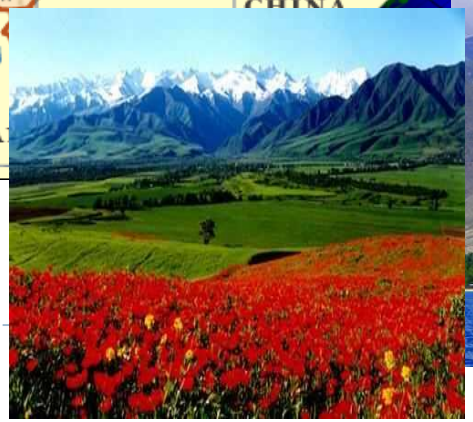
Isaev R.E.

Brief information on Kyrgyzstan

Geographical position – 39-43 d.w.
Territory – 200 thousand sq.km,
95% - mountains
Population – 6 million
Density of population 20 persons\sq.km

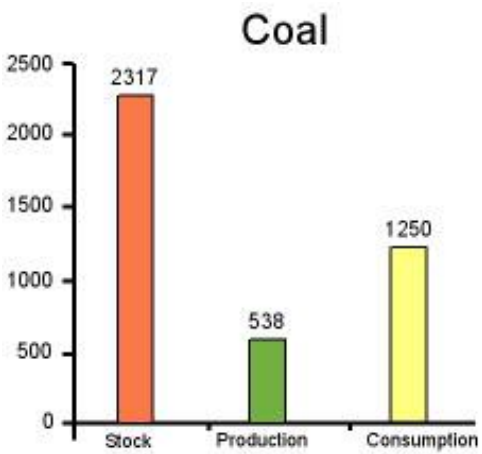
Population – urban 40%
– rural 60%

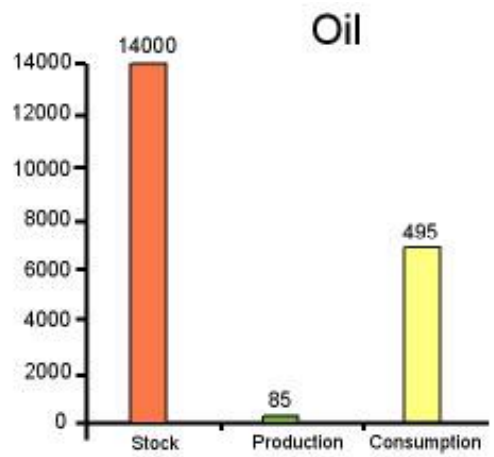
Borders with: Uzbekistan, Tajikistan, Kazakhstan, China

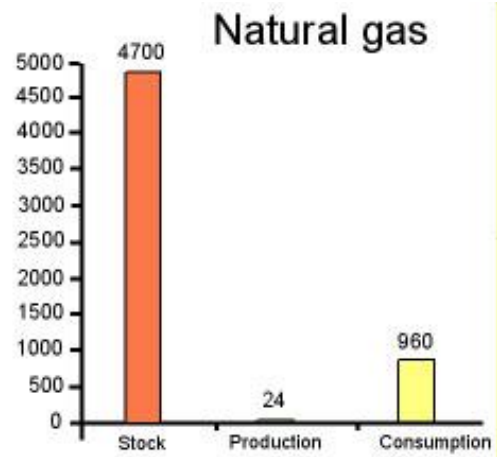


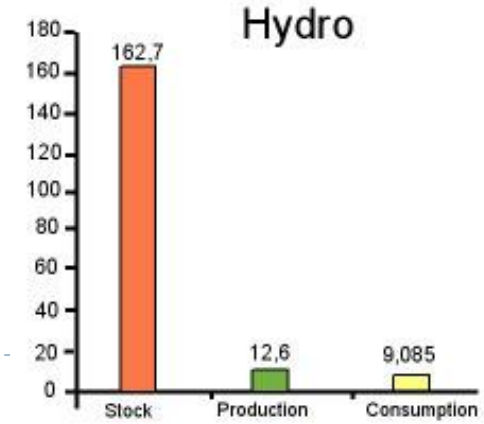
Fuel-Energy Complex of Kyrgyz Republic

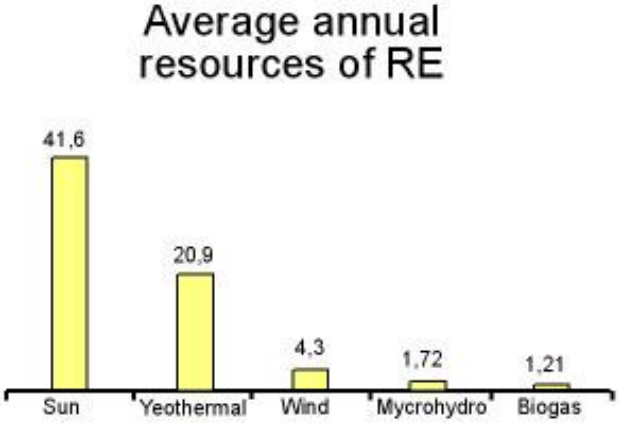
	Stocks	Production	Consumption
COAL	2317 bln.t	538 th.t	1250 th.t
OIL	4700 mln.м².	24.mln.м².	960 mln.м².
HYDRO	162,7 bln.kw.h.	14,0 bln.kw.h.	14,0 bln.kw.h.

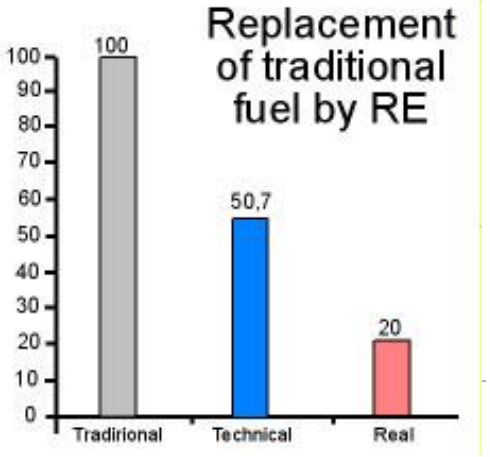




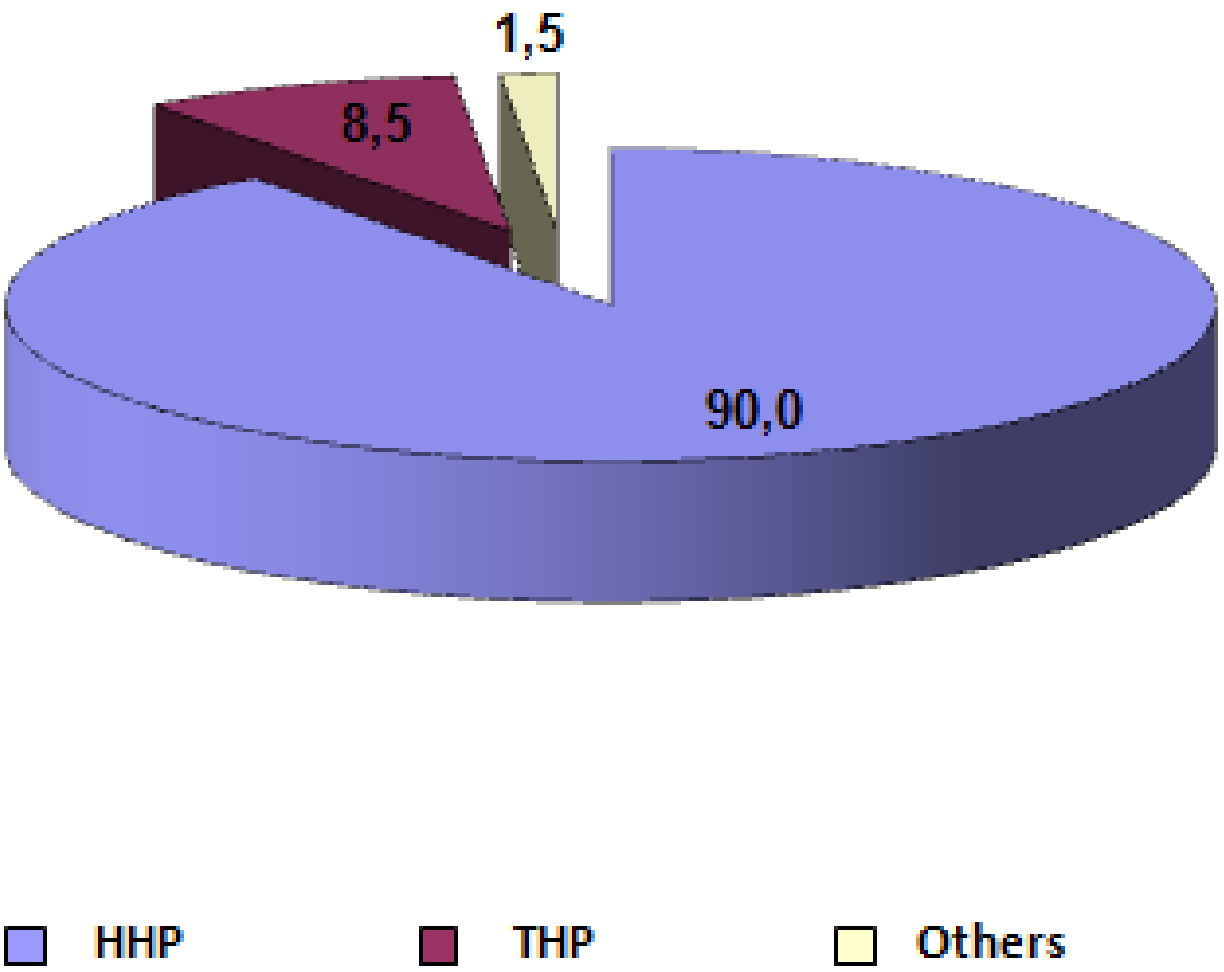








Structure of power (electricity) production in Kyrgyzstan



ENERGY COMSUMPTION

- With high rates of electrification, the country's electricity utilities are challenged to meet the population's growing demand for electricity, particularly during the winter months.
- The use of energy by various economic sectors has shifted substantially over the past two decades, with increases in the proportion used by the residential sector and decreases in the share utilized by the industrial and agricultural sectors. As of the early 1990s, the residential sector consumed 16% of the total electricity supplied, in contrast to 19% by government organizations and 65% by industry, agriculture, and commercial users. This was conditional on annual coal production of more than 5 million tons per year, of which 4.5 million tons were consumed within the country, as well as natural gas and fuel oil imports of 2.5 billion m3 and 600 thousand tons, respectively .
- The structure of electricity consumption has shifted dramatically since that time. Currently, an estimated 63% of electricity supplied within the country is consumed by the residential sector, whereas 12% is consumed by government entities and only 25% is utilized by the industrial, agricultural, and commercial sectors. Along with the changes in electricity consumption by sector, a reduction in other fuels has occurred as well. Now, only 1609 thousand tons of coal, 664 million m3 of gas, and 37 thousand tons of oil are used annually within the country .

EU PROJECTS and SUPPORT

- **THE LAW OF THE KYRGYZ REPUBLIC of July 26, 2011 No. 137 On the energy efficiency of buildings**
- **GEF / UNDP PROJECT "Improving Energy Efficiency in Buildings"**
- REGULATIONS:
- 1. ABOUT THE RULES AND PROCEDURE FOR CARRYING OUT ENERGY AUDIT AND ENERGY CERTIFICATION OF BUILDINGS IN THE KYRGYZ REPUBLIC;
- 2. ABOUT ECONOMIC STIMULATION OF ENERGY SAVING AND ENERGY EFFICIENCY IN BUILDINGS OF THE KYRGYZ REPUBLIC

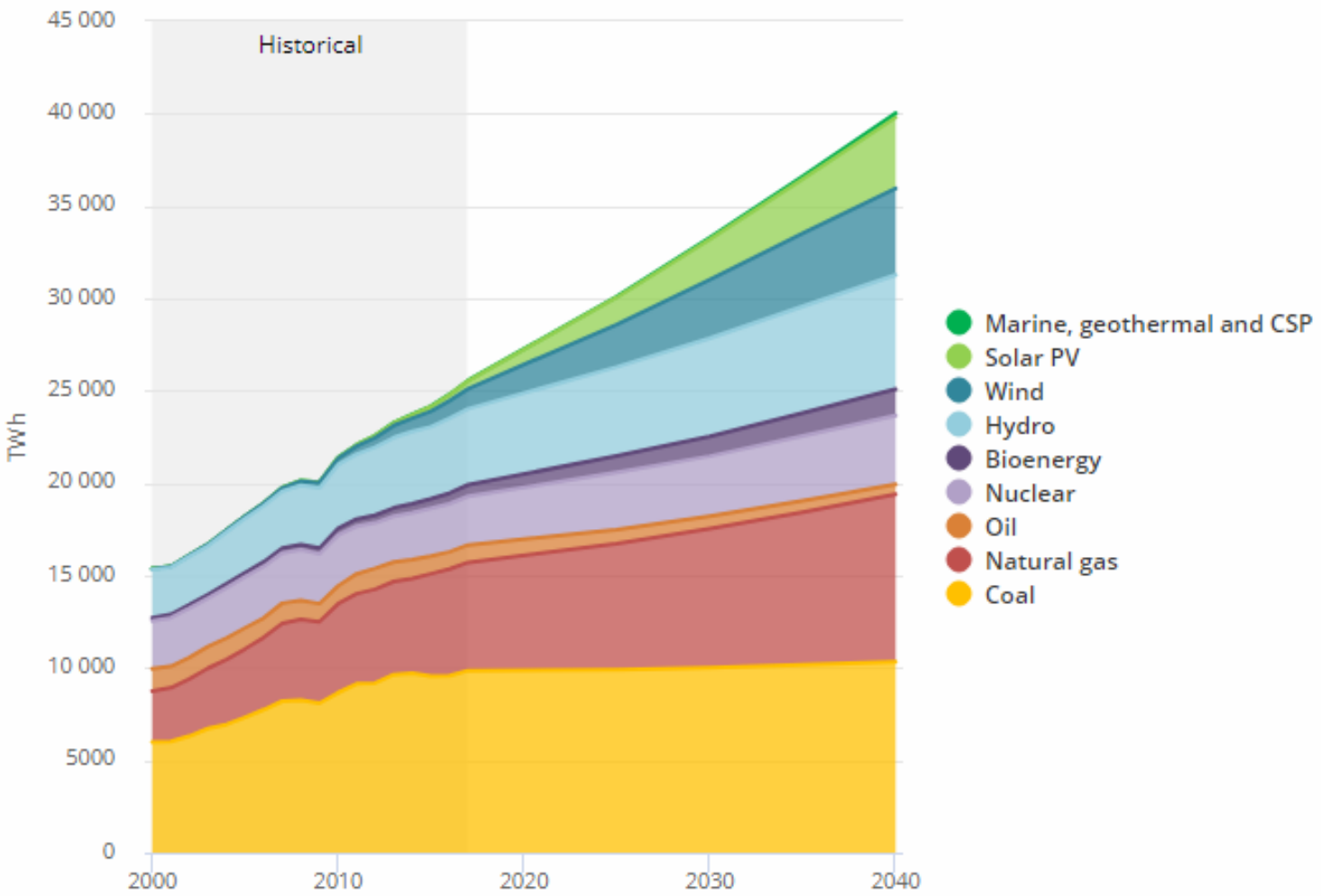
Cooperation with German Universities

The multicomponent air-to-water solar system was developed jointly by the University of Kassel (Kassel, Germany) and KSTU. Razzakov (Bishkek, Kyrgyzstan), as part of an international research project (Fig. 13). The prototype of the installation was implemented at the Rotor boiler house, which is located in Bishkek (KR). The installation is capable of converting the energy of two main sources of energy: solar radiation and the enthalpy of the surrounding air. This solution allows the seasonal solar power plant to maintain performance at night. The installation consists of three main components: the air collector, the water-air heat exchanger and the absorber .

CURRENT STUDIES and WORKS

- Research work "Energy survey of large budget organizations." Decrees of the Government of the Kyrgyz Republic “On limits for electric and thermal energy, natural gas”. In 2018, an energy survey of 178 structural subdivisions of five large budget organizations (MHIF, Ministry of Health of the Kyrgyz Republic, ICIT KR, State Border Service under the PKR and Ministry of Internal Affairs of the Kyrgyz Republic) was conducted.
- Global Practice in Energy and Extractive Industries of the World Bank. ECA region. ROAD MAP OF IMPLEMENTATION OF MEASURES FOR INCREASING ENERGY EFFICIENCY IN PUBLIC BUILDINGS OF THE KYRGYZ REPUBLIC

Rates of commissioning new capacities for energy supply using renewable energy sources



IEA/World Energy Outlook 2018

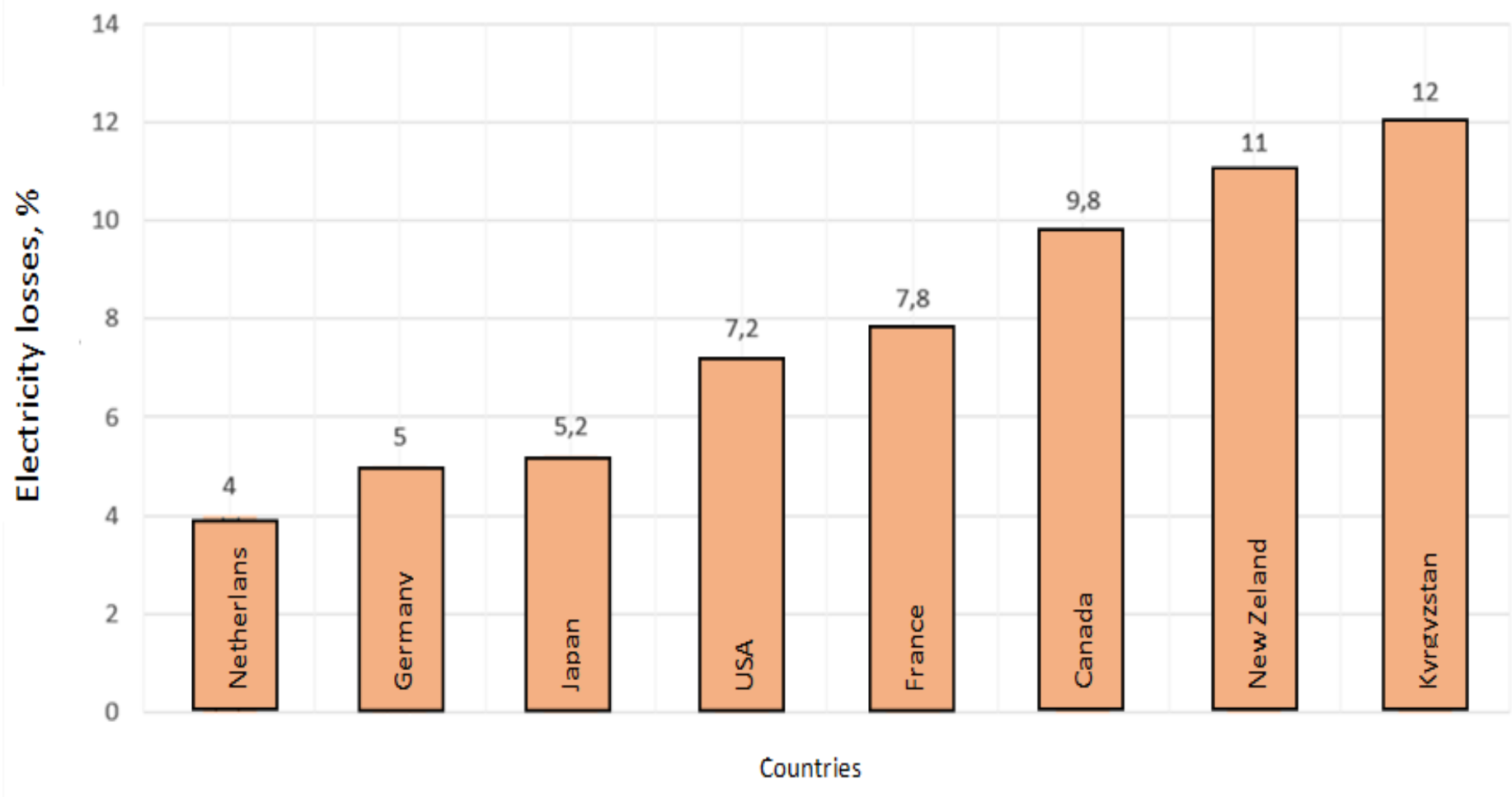
Functioning of the Kyrgyz energy system

- The total installed capacity of all generating stations of the Republic is 3940 MW
- Average annual output - 14.7 billion kWh
- In fact, to generate such a quantity of electricity, the installed capacity of 1,700 MW is sufficient.
- The utilization rate of generating stations - 43%
- Unused reserve - 2240 MW

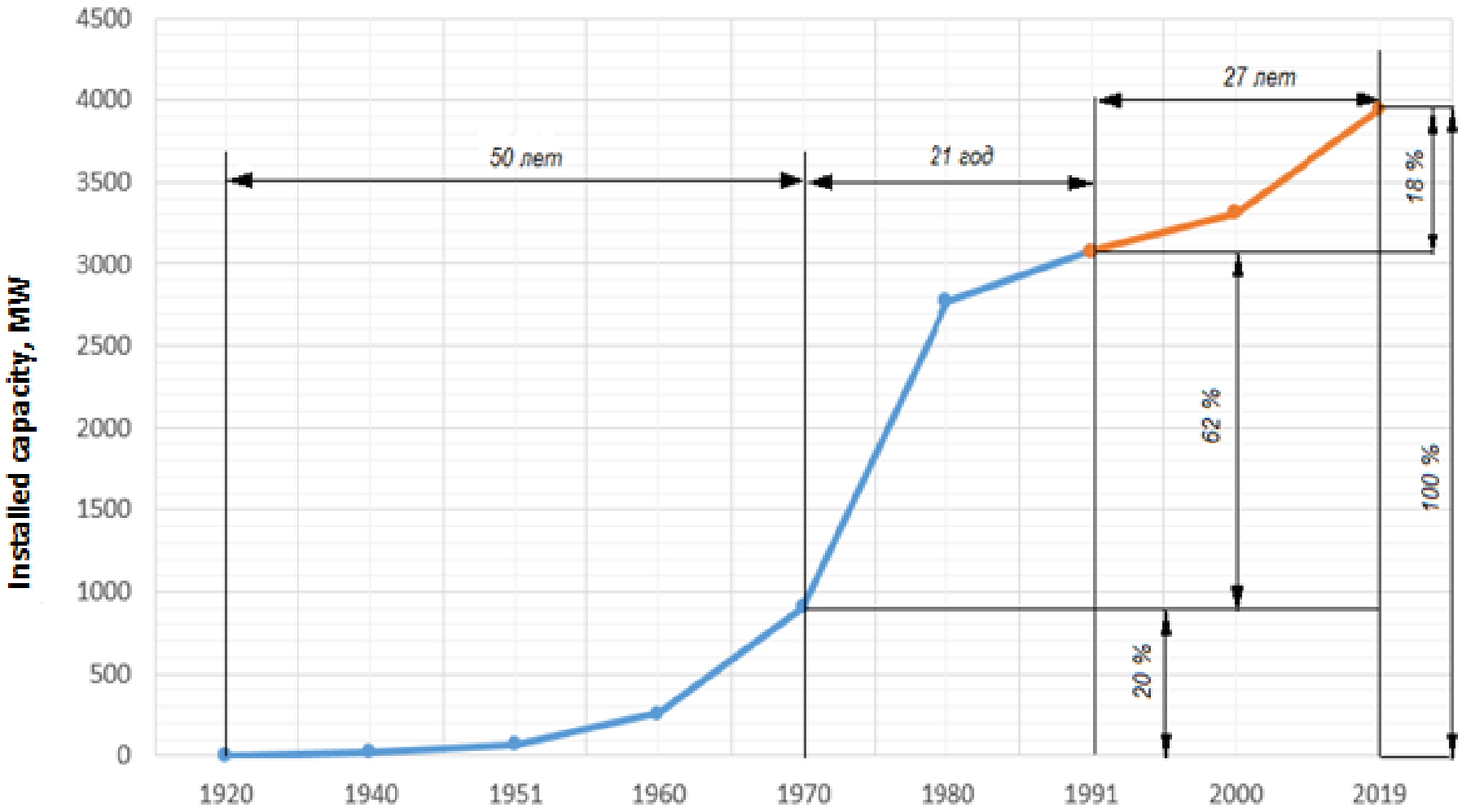
“Smart Grid” systems

- A fundamentally new approach to the organization of power supply technology, based on the use of modern IT technologies using self-restoring intelligent networks that are not built on building capacity, but directly on supplying the consumer with the necessary electrical energy
- RES technologies,
- Network with small generating capacity, interconnected in local and centralized networks
- Maximum load of generating stations
- Minimization of technological and technical losses in networks
- Systems are promising especially for countries with large territories or mountainous countries where there is a rather low density of consumers.

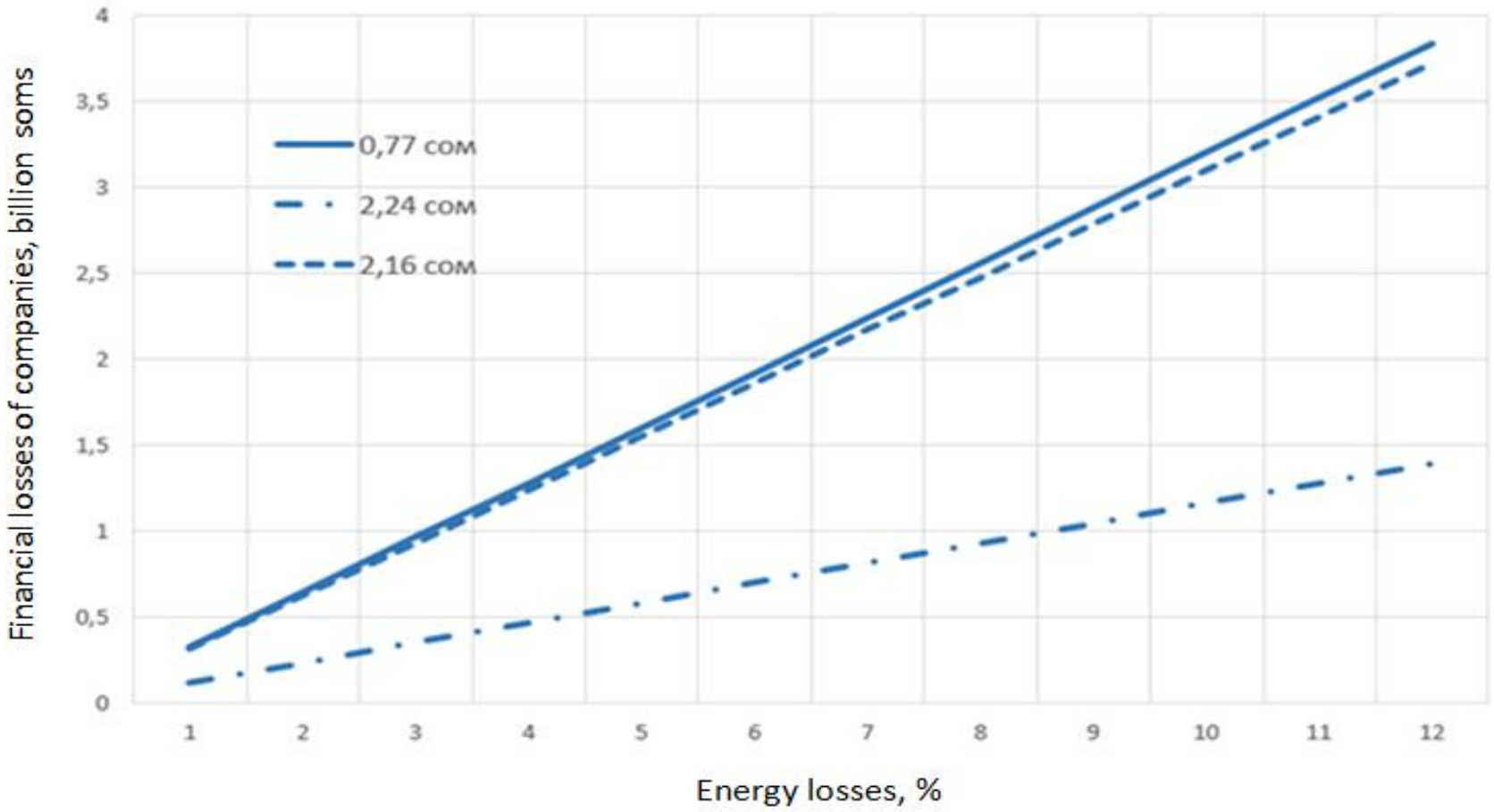
Power losses



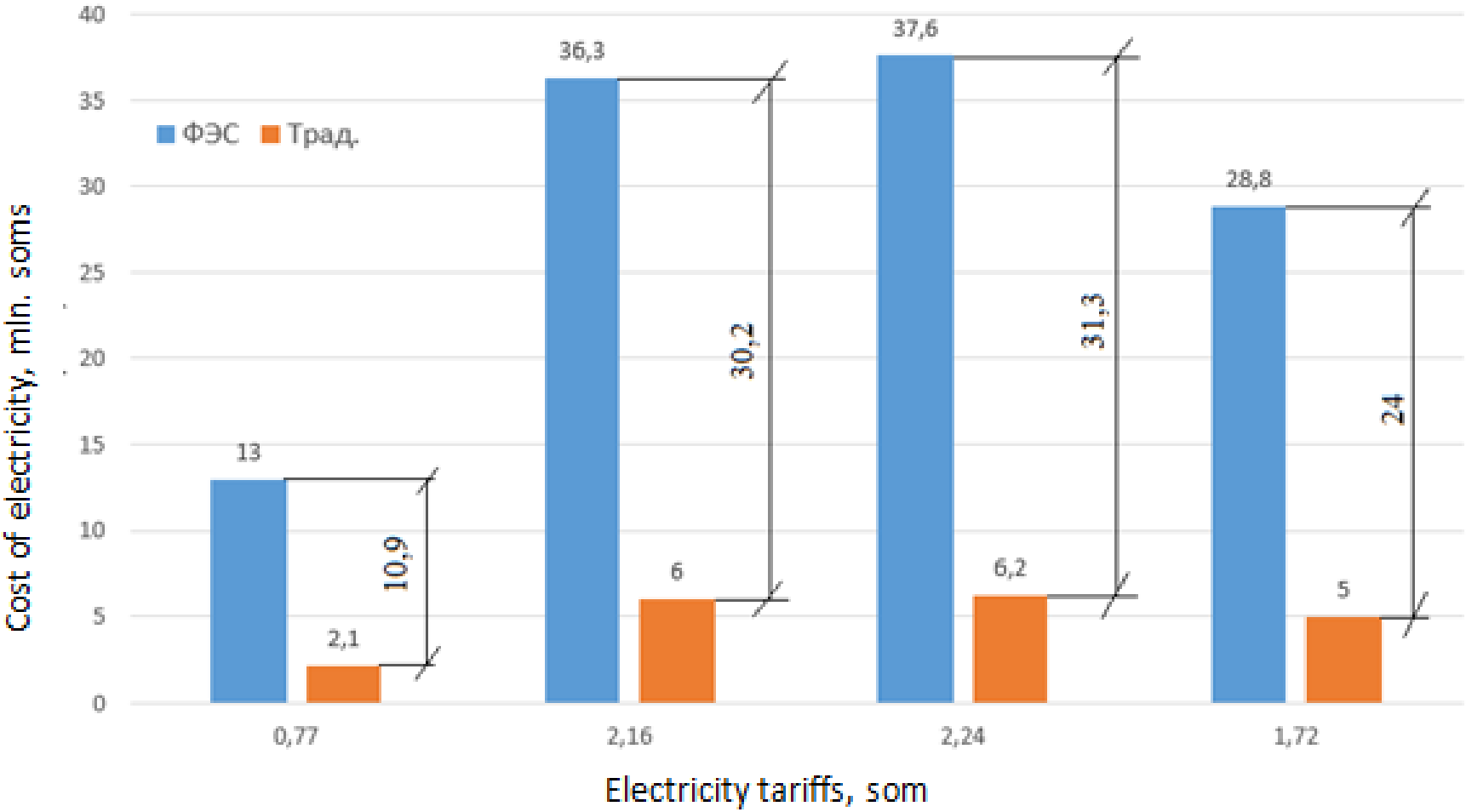
Increasing the installed capacity of power plants



Financial losses of power companies depending on losses in the power grids



Comparative cost of electricity for traditional networks and PV with an installed capacity of 1 MW



Current studies

- Pilot study – Smart grid testing VostokElectro

- Automation of power supply and power distribution systems in 10/0.4 kV networks (Smart Grid)
- Decrease in commercial and technical losses
- Improving the reliability, uninterrupted power supply to consumers and reducing the time and cost of switching production by automating processes
- Automation of monitoring parameters of the quality of electrical energy at distribution transformers
- Influence of the quality of electrical energy and voltage parameters on the level of electricity losses in medium and low voltage distribution networks are investigated
- Proposals were developed for the implementation of automation, voltage control and regulation devices at 10 / 0.4 kV transformers

Current studies

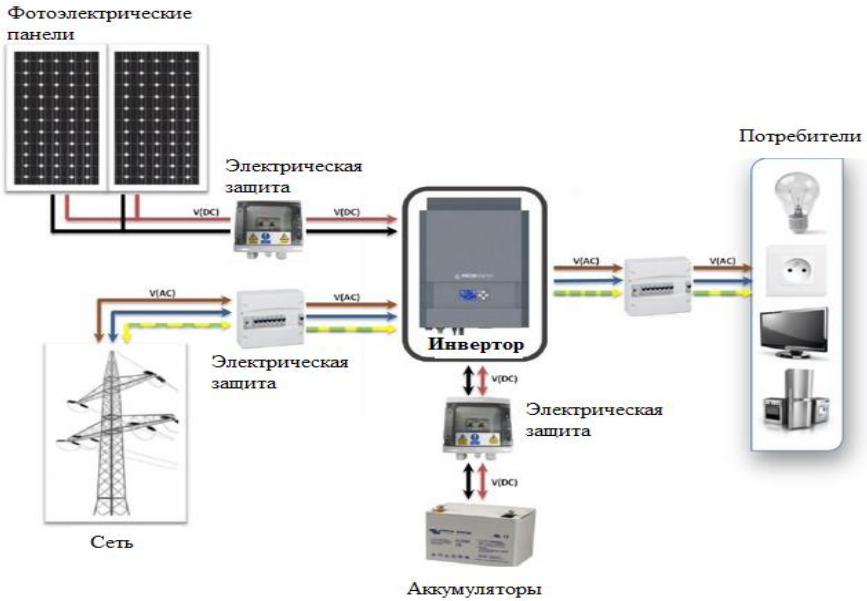
- Pilot study – Smart grid testing VostokElectro

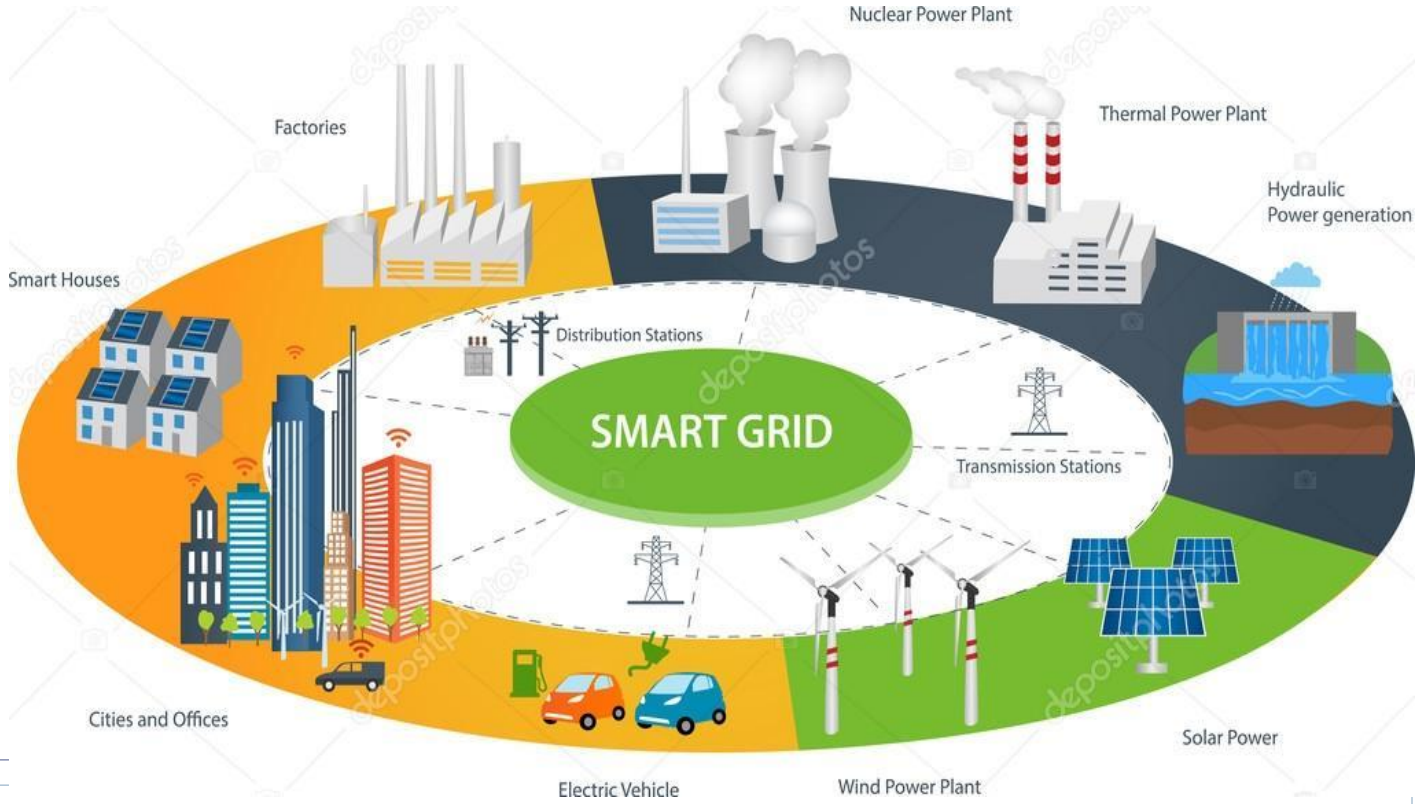
- - Studying the influence of the quality of electrical energy and voltage parameters on the level of electricity losses in medium and low voltage distribution networks.
- - Development of proposals for the introduction of devices and automation of control and voltage regulation at transformer points 10 / 0.4 kV.
- - The study of the application and combined work of renewable energy technologies in electrical distribution networks.

- **activities:**
- 1. Installation of meters for pilot transformers;
- 2. Replacement of expired household meters with simple electronic ones;
- 3. Acquisition and installation of 3 Reclosers 10 kV with automatic switching control;
- 4. Installation of the system of electricity balance and dispatch control and feeder management.

Current studies

- Pilot study – Micro-grid
- creation of conditions for the transfer of electrical energy generated by Renewable Energy Sources (RES) to the electrical network at the level of Households
- Installation at one of the social institutions of Karakol, namely, the Municipal Kindergarten No. 3 located in the research project implementation area, the Solar Power Station (Solar PV Station) with inverter equipment for transmission of electricity generated by the Station to the electrical network (Grid Invertor) for 10-15 kw.





Total installed smart meters:

Total registered consumers - 1,248,200 subscribers.

Installed smart meters - 230,000 subscribers (20%)

SUGESSTIONS

- Smart Grid RESe
- Energy efficiency startegy, energy auditors capacity building projects, esco tool
- The program of development of ecological electric transport

Thanks attention