

International Conference

“The prospects for introduction of “green” innovative energy efficiency technologies in the electric power industry of Turkmenistan”

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Energy nexus and trade in Central Asia as a factor in the development of renewable energy in the region

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Overview to the Central Asian Region Energy Capacity

- Central Asia: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
- Total population around 70 mln. People
- Area - 3 994 300 m²
- Coal Deposit 2% of the Proven World Reserves
- Natural Gas 4,5 of the Proven World Reserves
- The region has been identified as a potential supplier of hydrocarbon raw materials in different directions and to different markets
- Rich reserves of fuel and energy resources are unevenly distributed throughout Central Asia. Thus, of the explored coal reserves in the region, 88.6% of the coal reserves are concentrated in Kazakhstan, and 86% of oil reserves.
- Gas reserves are distributed between Turkmenistan (43%), Uzbekistan (30%) and Kazakhstan (27%)

Overview to the Central Asian Region Energy Capacity

- More than half of all energy consumed in the Central Asian republics comes from natural gas, about 3/4 of which is used in Uzbekistan
- Coal consumption ranks second, about 93% of which is used in Kazakhstan
- Uzbekistan uses 38% of the oil consumed in the region, including 34% from Kazakhstan.
- The region has 5.5% of the world's economically viable hydropower potential.
- The region's total hydropower potential is 937 billion. kWh of electricity per year
- A significant part of this potential (56.2%) is concentrated in Tajikistan, only 4.6% of it's potential is developed
- In terms of the country's annual hydropower potential, Kyrgyzstan (0.8 million kWh/sq.km) and Tajikistan (3.7 million kWh/sq.km) are particularly different.
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Overview to the Central Asian Region Energy Capacity

- In the energy balance of Kyrgyzstan and Tajikistan, hydropower is the main source.
- - The share of hydroelectric power stations in the installed capacity in Kyrgyzstan is 79%, in Tajikistan - 93%.
- In the structure of production of fuel and energy resources, its share is 77 and 96%, and in the structure of consumption - 43 and 40%, respectively
- In the structure of the regional fuel and energy balance, the share of hydropower is insignificant - about 3%, although the share of hydroelectric power plants in the installed capacity in the Central Asian reached 35%.
- RES - Of all types of renewable energy sources, wind and solar power stations have the greatest prospects in the Central Asia
- In world practice, the main problem that accompanies the implementation of these stations is the variability of their power, leading to fluctuations

Overview to the Central Asian Region Energy Capacity

- In Western countries, the problem of fluctuations is solved by improving the mechanism for predicting the power generated by renewable energy sources and ensuring the necessary power reserves at traditional stations (the so-called primary and secondary reserves (fast types of reserve)).
- It is believed that power fluctuations associated with the intermittent nature of solar stations in the evening and night hours are not a pressing problem, because The systems have a sufficient amount of slow, manually entered tertiary reserve.
- In the CAPS network, which have a weak interface with the Electricity system of Russia, such a simplified approach is not acceptable. As a rule, the main undersupply of electricity to consumers occurs precisely during peak hours, when the available capacity of power plants is underutilized due to a shortage of fuel (gas) or its high cost (fuel oil), in other words, due to the lack of available tertiary reserve.

Overview to the Central Asian Region Energy Capacity

Without taking special measures, the introduction of solar power plants in large volumes will pose a threat to the sustainability and energy security of the Central Asia Power System:

- it is necessary to accompany the construction of solar power plants with the introduction of energy storage devices;
- in the development of hydro potential, increase the emphasis on the creation of pumped storage stations;
- take measures to stimulate power reserves, incl. tertiary (mobile gas turbine units, power market, etc.).
- It is necessary to assess the maximum level of RES integration potential for all countries in the region.

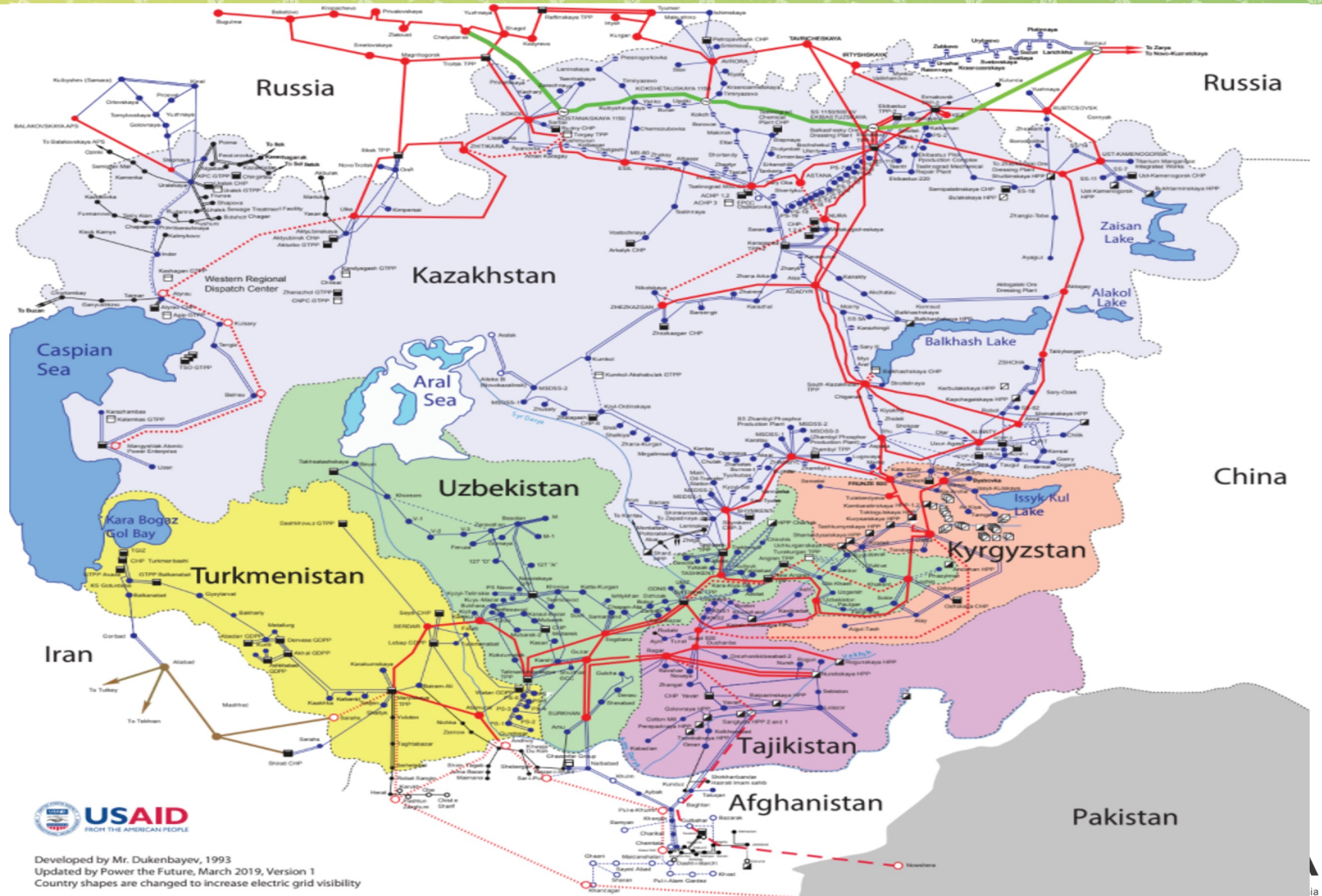
Regional Connectivity

Current Grid Snapshot:

Ageing: Developed in the 1970s under the Soviet Union

Fossil fuel optimized: Designed to optimize fossil fuels and water resources

Limited trade: Cross-border trading is only 10 -20 percent of what it was during the Soviet era



Regional Connectivity: CASA-1000



Regional Connectivity: CASA-1000

- Major new source of revenue in the market for 4.6 billion kWh/year (about \$400 million/year, to grow to \$1 billion)
- Supply period May-September for participating countries
- Funding: World Bank, USAID, IsDB, FCDO, EBRD, EIB



Regional Connectivity: Opportunities and Challenges- Economic aspects

Opportunities:

New market

Financial income

Attractive price

Cross-Sector development

Clean electricity instead electricity from fossil fuels



Opportunities:

Additional platform of High level regional
politic cooperation

Positive signal and image for international
community

Establishing new regional Institutes for the
cooperation between relevant Ministries
and Transmission companies.

Opportunities:

Community Support Programs under the Strategic projects:

Creating additional jobs in the local market in construction sector and in the other areas.

New elementary and vocational schools in the local level

Improving electricity and water supply.

Building Social Infrastructure and etc.

Challenges:

Perception of the population that Government instead to work on decrease local deficit of electricity, concentrate to sale electricity abroad.

The population perceives that they pay more then Transmission Company receives from export of electricity.

Opportunities:

Strengthening the electricity system

Technical possibility to import and export electricity

Opportunity for balancing from the third countries and not to keep "hot reserves" in third countries

Possibility to develop RES with balancing from third countries

Converter Stations and Back-to-Back stations will provide more flexibility and possibility to escape electricity blackout.