

International conference

"The prospects for introduction of "green" innovative energy efficiency technologies in the electric power industry of Turkmenistan" SEIT building, 62 Bayram Khan st, Mary, 19 March 2024

Studying renewable energy development practices of the Republic of Kazakhstan. Balance of energy capacities of the Republic of Kazakhstan, main areas of renewable energy development as an electric power industry sector

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#### **Renewable energy in the world**



By type, 2022

Funded by the European Union **29%** - share of renewable energy sources in electricity production,  $2022^{\circ}$ 

# Global weighted average cost of electricity from newly commissioned renewable energy technologies







#### Increasing renewable energy capacity by adding technologies, main and accelerated cases, 2023-2028





#### **Current state of the electric power industry**







#### **Generation breakdown**

<u>2024</u>

<u>2035</u>





\*The decision on the construction of a nuclear power plant will be made based on referendum results SECCA Sustainable Energy Connectivity in Central Asia

#### **Balancing electricity market in Kazakhstan**



**Need to introduce BEM** 



Advantages of introducing BEM

1. Systematic deviations by energy market actors, leading to significant deviations at the border with the Russian energy system.

2.Lack of financial responsibility for the imbalances created and economic incentives for balancing on the part of market actors,

3. Lack of interest of these actors in optimally planning the electricity generation-consumption schedule and participation in covering deviations

4. The balancing electricity market operates in a simulation mode without the procedure for real financial settlements of imbalances.

Note: this mode lasts about 16 years

 Targeted distribution of imbalance payments throughout the system (to make those who create imbalances pay).
Responsibility for deviations from daily electricity production and consumption schedules.

3.Creation of economic signals for market participants (so that they receive payment for participating in balancing).4.Using the regulatory potential of existing power plants and consumers.





### Imbalance –difference between the planned and actual generationconsumption balance





the European Union

According to KOREM JSC

#### **Positive and negative imbalance**



# **ELECTRIC POWER INDUSTRY OF KAZAKHSTAN**





Funded by the European Union

110

90

70



# **ELECTRICITY GENERATION AND SHARE OF RES**



# **ELECTRICITY GENERATION FROM RES**



#### **MAP OF OPERATING RES FACILITIES**



# **RES IN KAZAKHSTAN**

1

(2)

(3)

### **The Republic** of Kazakhstan

- occupies the 9th place in the world by area of territory
- significant potential of wind energy
- in the near future, it has every • opportunity to take a leading position in the world in the development of wind generation, which will be:
  - as stable as possible; •
  - evenly distributed (throughout the • country);
  - minimally affect the growth of tariffs for end consumers.





The climate in Kazakhstan is favorable for the construction of wind power plants due to the presence of wind corridors with a wind speed of more than 5 m/s, which is necessary for the operation of wind turbines.

The Caspian region, central and northern Kazakhstan, as well as southern and southeastern Kazakhstan have the highest wind energy potential.

According to the Ministry of Energy of Kazakhstan, the country's wind energy potential is estimated at 920 billion kWh of electricity annually.



### **SOLAR POTENTIAL MAP**

Solar energy has huge potential as a renewable energy source in Kazakhstan due to sparsely populated large territories and climatic conditions, especially in the south of the country, where the sun shines from 2,200 to 3,000 hours a year

In Kazakhstan, the solar energy potential is 2,5 billion kWh. The most preferred areas for solar generation are the Aral Sea region and the southern regions of Kazakhstan, experiencing a shortage of electricity.







# **INFORMATION AND CHARACTERISTICS OF KAZAKHSTAN'S HYDROPOWER POTENTIAL**

Hydropotential	Number of rivers	Category I over 10 billion kWh	Category II 2,5-10 billion kWh	Category III 2,5- 0,1 billion kWh	Category IV 0,1-0,01 billion kWh	Category V less than 0,01 billion kWh
South Kazakhstan	383	1	1	20	74	287
South-East Kazakhstan	874	-	5	89	340	440
East Kazakhstan	813	1	3	72	274	466
TOTAL	2070	2	9	181	688	1193

GW

#### Category I and II rivers

billion kWh







# PREFERENTIAL CONDITIONS FOR THE DEVELOPMENT OF RENEWABLE ENERGY IN KAZAKHSTAN





the European Union

Annual indexation of tariffs

# **KEY INDUSTRY DEVELOPMENT INDICATORS BY 2050**

# 5 year **SCHEDULE**

of organizing and conducting auctions for the selection of projects to construct renewable energy facilities

# 50% of production volume

share of alternative energy sources and renewable energy sources by 2050.

KEY INDUSTRY DEVELOPMENT INDICATORS BY 2050

> Implementation of the strategy to achieve carbon neutrality of the economy of the Republic of Kazakhstan by 2060



# $7 \ GW \ {}_{\text{by 2030}}$

of RES generating capacities are planned to be commissioned

### 15% of total generation

share of renewable energy sources from total generation in the country in 2030





# AUCTIONS FOR THE SELECTION OF PROJECTS TO CONSTRUCT RES FACILITIES



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# **RES IN KAZAKHSTAN**





# **AUCTIONS FOR RENEWABLES IN KAZAKHSTAN**



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