



Avantgarde
Group



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Electric power sector and Environment:

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Electric power industry and environment

- Long-term development of the sector in Kazakhstan
- Capacity market
- Supporting renewable energy
- Incentive regulation of electric grid companies
- Heat market
- Transition to a new environmental legislation

- Resolving energy trilemma (delivering accessible, secure, and clean energy) are the drivers for the power sectors' transformation globally
- The long-term strategy (incorporating a system-wide view of the power sector's development), accounting both for global trends and local challenges, is essential to identifying future technological preferences (targets) and developing associated regulation:
 - The wholesale and retail markets' mechanisms and regulatory principles
 - The purpose of capacity remuneration mechanism
 - Climate policy (RES, decentralization of electricity production and consumption, stimulation of industry decarbonization, environmental policy changes)
 - Sector flexibility and resilience
 - Tariff regulation for electric grid companies
 - Incentives for technological advancements and digital transformation
 - Access to project and other types of financing

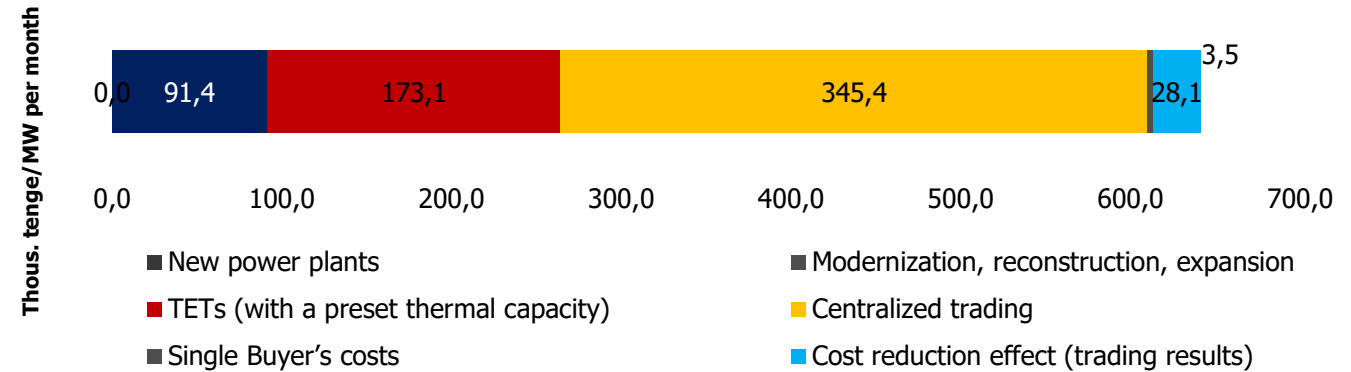
In the absence of such long-term strategic planning document the mechanisms designed to ensure efficient operation of Kazakhstan's electric power industry are fragmented and one-dimensional

- Capacity market has to focus not only on ensuring sufficient capacity but also on improving efficiency and environmental performance of existing and new fleet
- Capacity prices have to cover power plants fixed costs
- Electricity market liberalization has to be complemented by an efficient pricing policy; the marginal tariffs set for power plants can't make their operation unprofitable

Improving capacity market mechanisms

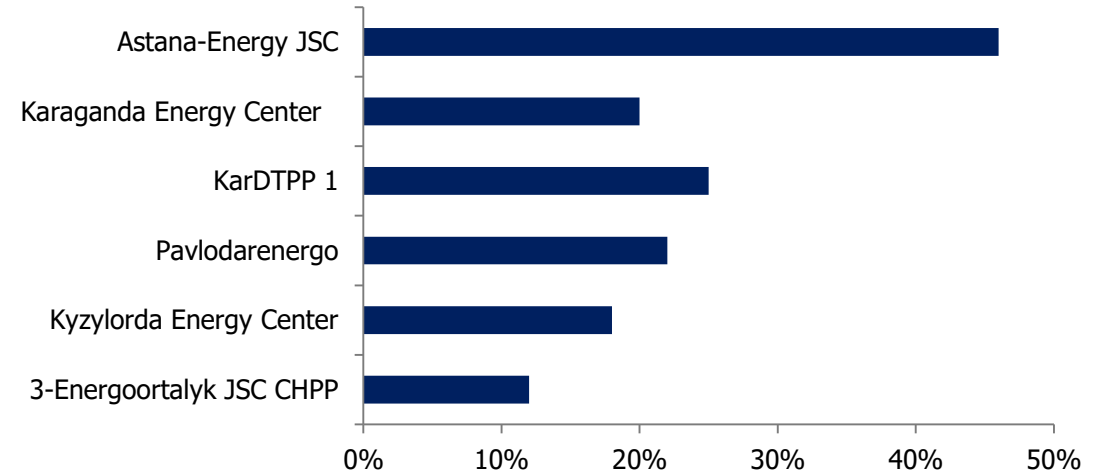
- **Goal setting:**
 - ✓ Harmonization of capacity market goals with the long-term sector objectives and those of related industries
 - ✓ Incorporation of specific technological, technical and environmental requirements into capacity selection criteria
- **Technologically neutral selection:** both generation and consumption (wholesale and retail markets' demand-side management) should have access to the capacity market
- **Market pricing:** marginal capacity tariff has to cover most of the fixed costs

Structure of a single capacity price in 2019 following the trading results



Source: FSC for RES

The share of fixed costs covered by the capacity market



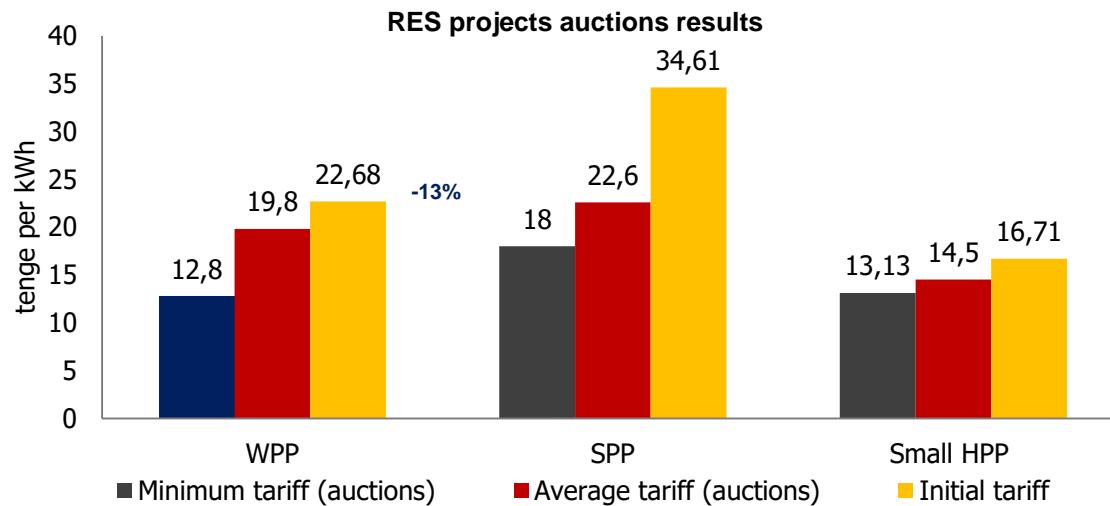
Source: power plant data

A high level of investment stability for investors into RES projects:

- tariff stability guarantees
- guaranteed purchase of the whole generated electricity volume
- guaranteed grid connection and access
- exemption from electricity transmission fees

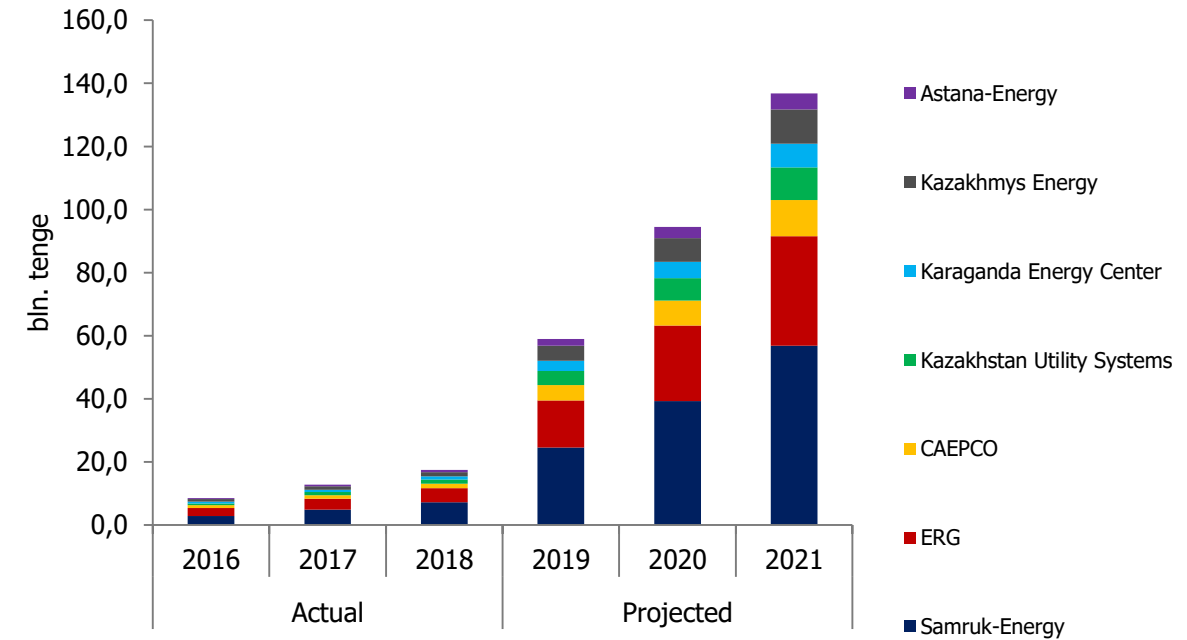
Greater transparency: transition to RES auction procedure

Price reduction



Despite price reduction in auctions, the cost of renewable energy support sources will go up significantly for traditional power plants due to capacity and electricity tariffs fixation until 2025.

Projected growth of expenditures on RES



Improving RES support mechanisms

- Taking into account the projected decrease (IRENA, BNEF) in the cost of WPPs and SPPs, the commissioning rate has to be reduced with the bulk commissioning to be postponed until after 2025
- The current mechanism of renewable energy support has to be revised, and any discrimination has to be eliminated. Changes in the tariff regulation of electric grid companies are required in order to stimulate integration of renewable energy facilities
- Transition to market-based mechanisms of payment for electricity generated from RES has to be completed after 2025, and electricity transmission service fee has to be introduced for power plants using renewable energy sources

Incentive regulation of electric grid companies

- Despite transition from the “cost-plus” to the “benchmarking” methodology in 2013-2015 regulation reverted to original methodology
- In 2015 Kazakhstan introduced RAB regulation, but in practice it has more of “cost-plus” features (the regulator defines the profit margin).

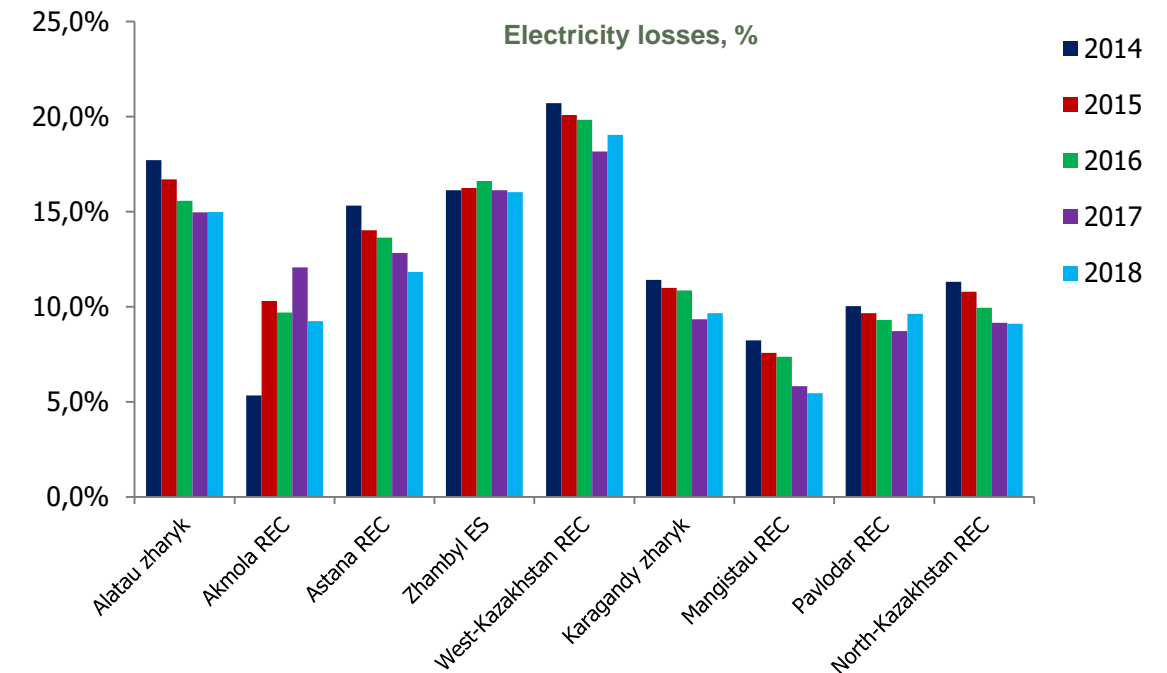
	RAB regulation	“Cost-plus”
Profit	Depends on the asset base value	Fixed percent of expenditures

In RAB regulation profit depends on the asset base value, but is also bound with quality and operation efficiency. This incentivizes investment (i.e. increase in assets) and ensures stability of their return.

When the Law “On Natural Monopolies” was adopted in 2018, the actual transition to incentive tariff regulation became possible, however, the mechanism details have not yet been elaborated.

Improving tariff regulation of electric grid companies:

- Harmonization of mid- and long-term development goals of the electricity transmission and distribution sector with the long-term electric power industry development strategy
- The tariff and profit rate calculation methodology has to take into account the requirements to improve efficiency, service quality, and innovations set by the regulator
- Transition to asset base calculation on the basis of total (capital and operating) expenditures – the TOTEX principle
- Establish an independent Regulator whose operation can be ensured by a special markup included in the tariffs



Despite gradual decrease in the losses of electric grid companies, lack of clear principles of energy efficiency stimulation and service quality improvement in the tariff calculation methodology sets Kazakhstan practice of RAB regulation apart from the universal one.

- Heat energy generation in Kazakhstan: CHPPs – over 62%; Heat consumption: population >50% and the industry 27%
- Heat energy production, transmission, distribution and sales are regulated (under combined service)
- According to the law, tariffs are set similar to RAB regulation, where profit depends on the value of the asset base:

$$\text{Income} = \text{Costs} + \text{Asset base} * \text{Rate of return} \Rightarrow$$

$$\text{Tariff} = \text{Income}/Q$$

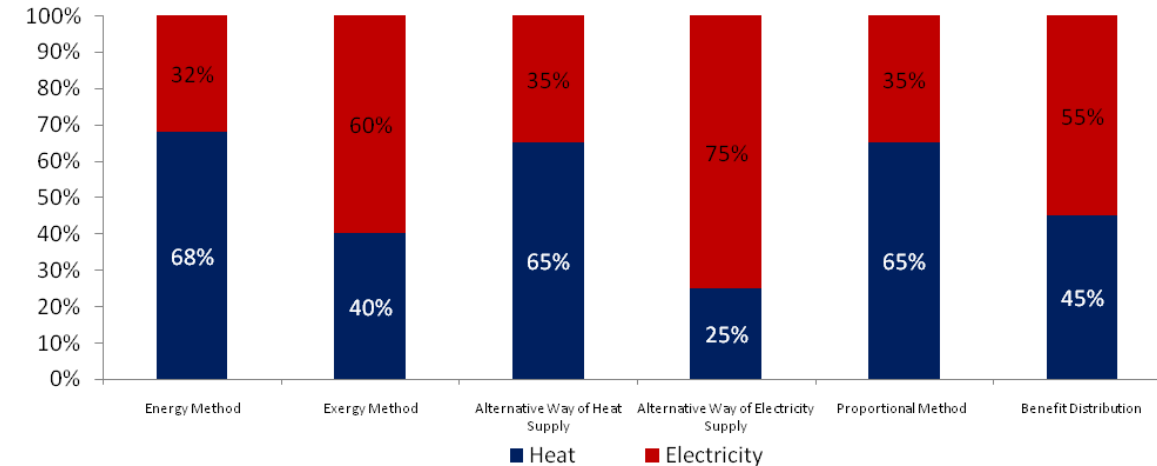
(where Q is the volume of heat generation or transmission)

- In practice, the regulator in seeking to reduce the tariff rates reverts to the “cost-plus” principles, thus affecting the progress of repair and replacement of boiler, CHPP, and heating network equipment.

Improving heat market regulation:

- Upon finalization of the draft law “On Heat Energy Supply” the heat energy sector priorities have to be coordinated with long-term plans of the electric power sector and the capacity market
- Complete transition to incentive regulation incorporating service efficiency and quality of supply targets and ratios; make provisions for the heat energy regulated companies to keep economic proceeds from a more efficient planning of operational expenditures (for the price control period)
- Improve interaction between the Regulator and the Ministry of Energy, so that they could implement a better coordinated policy for co-generation, and set marginal tariffs at a cost-effective level enabling products’ competitiveness on their respective markets
- Allow CHPP owners more flexibility in costs’ distribution between heat energy and electricity generation

Benefits distribution in various methodologies of CHPP cost distribution



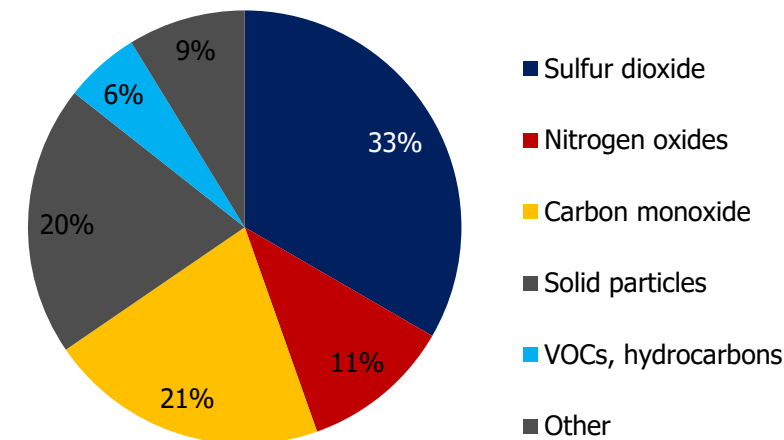
Use of the physical cost distribution method at the majority of CHPPs does not imply cross subsidization of heat by electricity

- Of all stationary sources, thermal power plants make the largest contribution to air pollution, accounting for around 40% of major emissions
- Permissible emissions of solid particles by coal-fired power plants in Kazakhstan are several times higher than the limits set in the EU

	Kazakhstan (current)	China (new)	USA	EU
Nitrogen oxides	450	100	135	200
Sulfur oxides	780	200	185	200
Solid particles	200	30	19	20

Source: Vision for the development of the electric power industry until 2050. Avantgarde Group -SEEPX Energy, AGMP 2017

Air emissions structure (2018)



The major changes in environmental legislation:

- ✓ **Environmental standards** – phased transition from sanitary to environmental standards
- ✓ **Integrated environmental permits (IEP) and best available technologies (BAT)** – emission standards are set on the basis of BAT
- ✓ Transition to mandatory **automated emission monitoring** for category 1 facilities (165 enterprises)

The planned changes in environmental legislation will be most tangible for category 1 enterprises in terms of obligations to introduce BAT and automated emission monitoring systems (AMS)

According to preliminary assessments only, BAT introduction will require 10 to 40 bln US dollars of investments. The major question is whether investments in BAT can be recovered

Improving environmental legislation:

- The cost of BAT introduction has to be accounted for in tariffs for natural monopoly entities
- As for energy producers (power plants), their expenditures on BAT introduction (for environmental purposes) have to be stimulated and accounted for in the capacity market mechanism.