

It is difficult to hope that Uzbekistan’s consumers will switch to relatively expensive alternative energy sources when electricity tariffs are relatively low, experts Nodira Mukhammadkulova and Shakhrizoda Rakhimova said.



Ministry of Energy of Uzbekistan. Photo: minenergy.uz

Climate change issues and the crisis in the energy market have led to the development of technologies for the use of alternative, more environmentally friendly and possibly renewable resources, which are called “green” technologies.

In Uzbekistan, the program of transition to a green economy and green growth until 2030 was adopted at the end of 2022. Earlier, the government announced plans to completely eliminate the use of coal, natural gas and petroleum products as fuel by 2050 in order to achieve carbon neutrality, or “zero emissions” (the amount of carbon dioxide emissions that do not exceed the amount absorbed by oceans and forests).

According to the program, by 2030, the share of renewable energy sources (RES) used will be about 30% of the country’s total electricity generation. By that time, wind power plants (WPPs) with a total capacity of at least 5000 MW and solar photovoltaic power plants (SPPs) with a total capacity of 7000 MW will be put into [operation](#).

In this regard, the issue of awareness of the population as consumers about the relevance of diversification of energy consumption, advantages and disadvantages of alternative energy sources is relevant.

Challenges to energy security in Uzbekistan

Uzbekistan is located in the heart of Central Asia, a region with a pressing problem of water scarcity. According to [the World Resources Institute](#), Uzbekistan ranks 29th among the countries that will be exposed to high levels of water stress by 2040. The expected level of stress is projected to be more than 80% in the entire Central Asian region. These figures are depressing, especially considering the [fact](#) that Uzbekistan’s population will exceed 42 million by 2040. According to [projections](#), **rapid population growth** could lead to water shortages ranging from 44-46%. Given the growing demand for water resources and their rapid depletion, it is important to take appropriate measures to address the problem.

According to the forecasts given in the Presidential [Decree](#) dated 01.04.2023, by 2023, water resources are expected to decrease from the long-term norm by 10-15% in the Syrdarya river basin and by 15-20% in the Amudarya river basin. At the same time, the Concept of Water Sector Development of the Republic of Uzbekistan for 2020-2030 [notes](#) that the average annual volume of water resources used by Uzbekistan is 51-53 billion m³, of which 80% (about 41 km³/year) falls on **transboundary rivers**. Reduction of water volumes in the Amu Darya and Syr Darya rivers will have a significant impact on water availability in Uzbekistan, which will entail serious social and economic consequences.

In Uzbekistan, 91% of water resources are directed to agriculture

Agriculture (91.0%) **Utilities (4.5%)** **Manufacturing (1.4%)** **Other Industries (1.4%)**
Fishery (1.2%) **Heat energy (0.5%)**

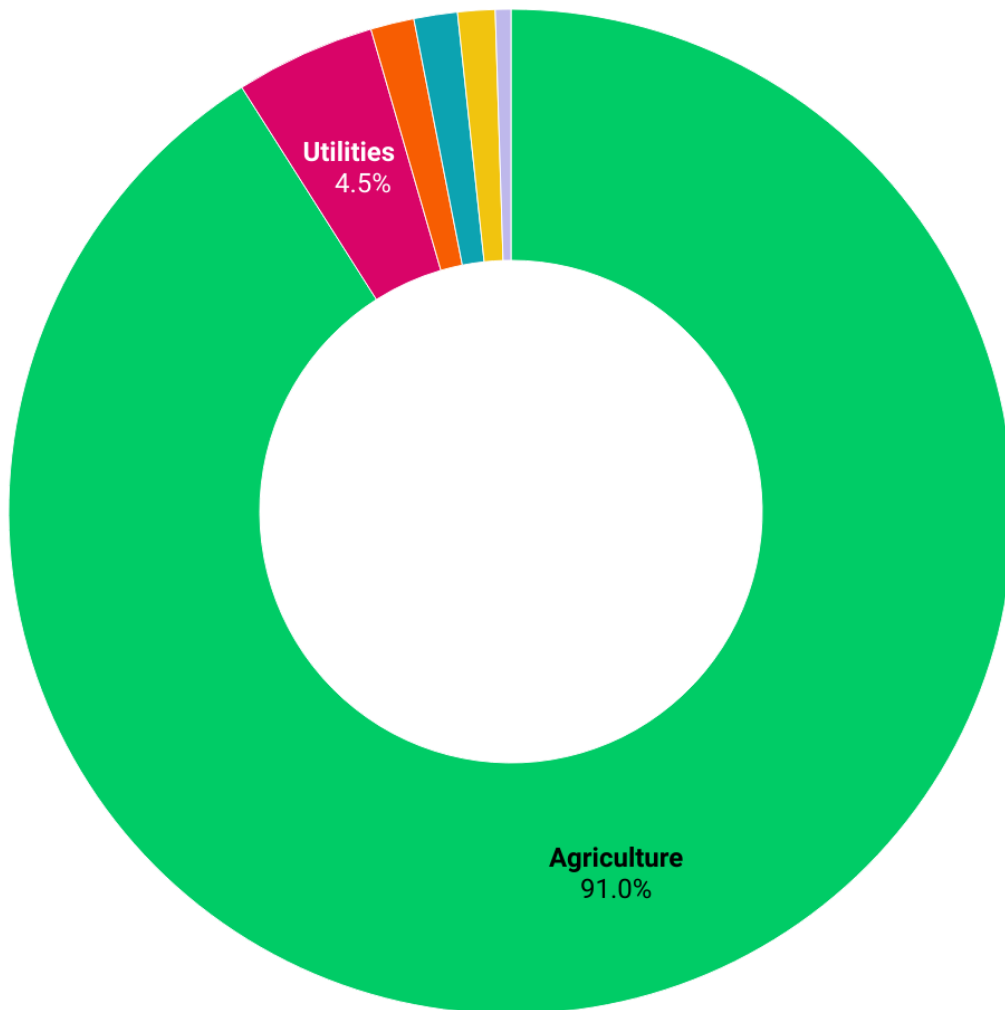


Chart: CABAR.asia • Source: Decree of the President of the Republic of Uzbekistan on Approval of the Concept of Water Sector Development of the Republic of Uzbekistan for 2020 • Created with Datawrapper

In addition to the above-mentioned, it should be noted that in neighboring Afghanistan the [Kosh-Tepa \(Kushtepa\) canal](#) is under construction, 280 km long, 100 meters wide and 8.5 meters deep, which will allow Afghanistan to irrigate 550 thousand hectares of land. Currently, one third of the canal has been constructed. After completion of construction,

Afghanistan’s consumption of water from the Amu Darya may increase from 7 to 17 cubic meters.

Agriculture, forestry and fisheries accounted for 25% of Uzbekistan's GDP in 2022

■ Service Sector ■ Manufacturing ■ Agriculture, forestry and fishery ■ Construction

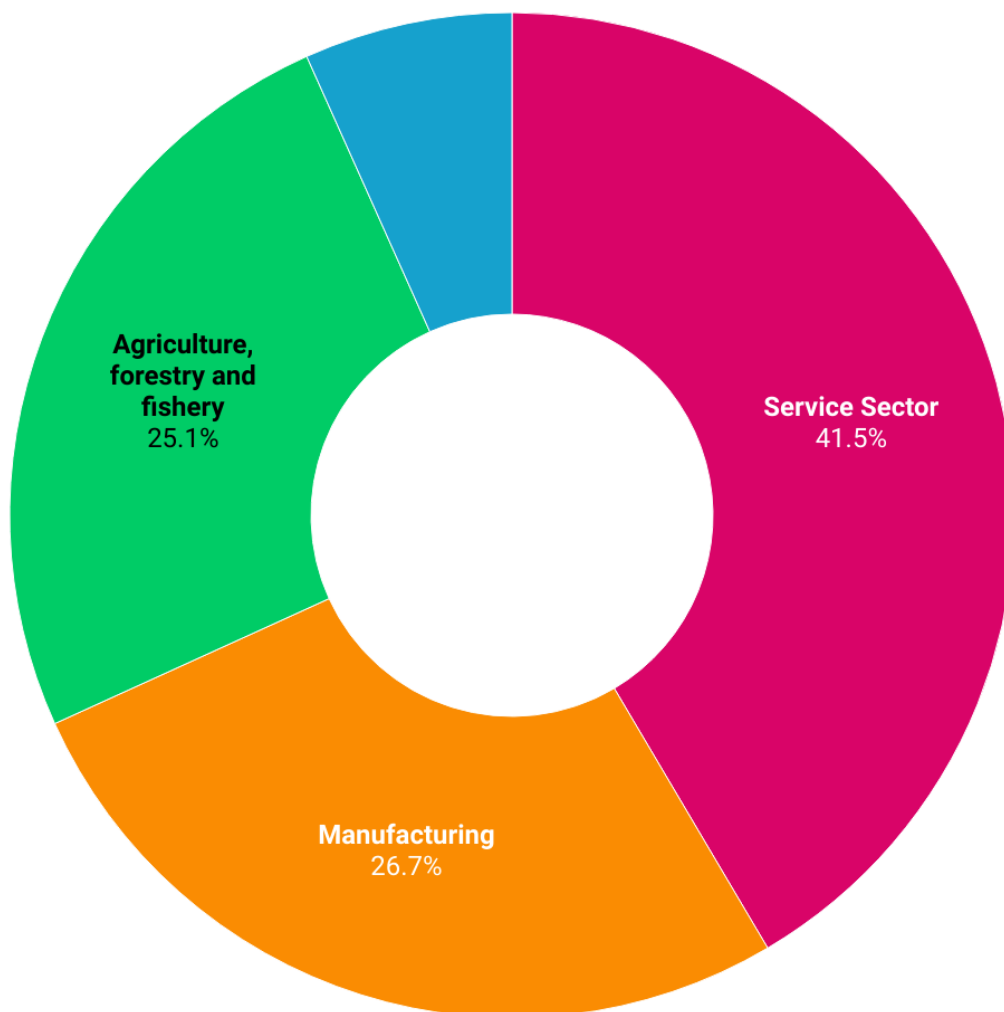


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While for Tajikistan, which, like Afghanistan, is located in the upper part of the Amu Darya, the construction of the canal will not be a big problem, Uzbekistan and Turkmenistan, which

are downstream of the main river of Central Asia, may [lose](#) up to 15% of their irrigation water. However, the new government that came to power does not intend to stop with the construction of the canal: by 2030, Afghanistan [plans](#) to build the Dashti-Jum hydroelectric power plant, which will accumulate most of the summer flow of the Panj River. Thus, the Taliban claim a significant part of water from the northern transboundary rivers.

According to experts, the implementation of these two projects may [lead](#) not only to economic and social problems in Uzbekistan and Turkmenistan, but also to an ecological catastrophe in Central Asia as a whole.

The situation in Central Asian countries, especially in Uzbekistan, is aggravated by the fact that Afghanistan is not a party to the UN Convention on the Protection and Use of Transboundary Watercourses and International Lakes and has not signed any agreements on water issues with other countries in the region. In other words, Afghanistan has no obligations either to its neighbors in the region or to the world community.

In addition to the disputed issues with Afghanistan, the terms of **joint operation** of such hydroelectric facilities as the Rogun and Kambarata hydroelectric power plants and the Karakum Canal remain relevant.

It follows that Uzbekistan has to solve a serious problem of water resources, which will affect the national security of the country and will have a profound impact on all vital spheres.

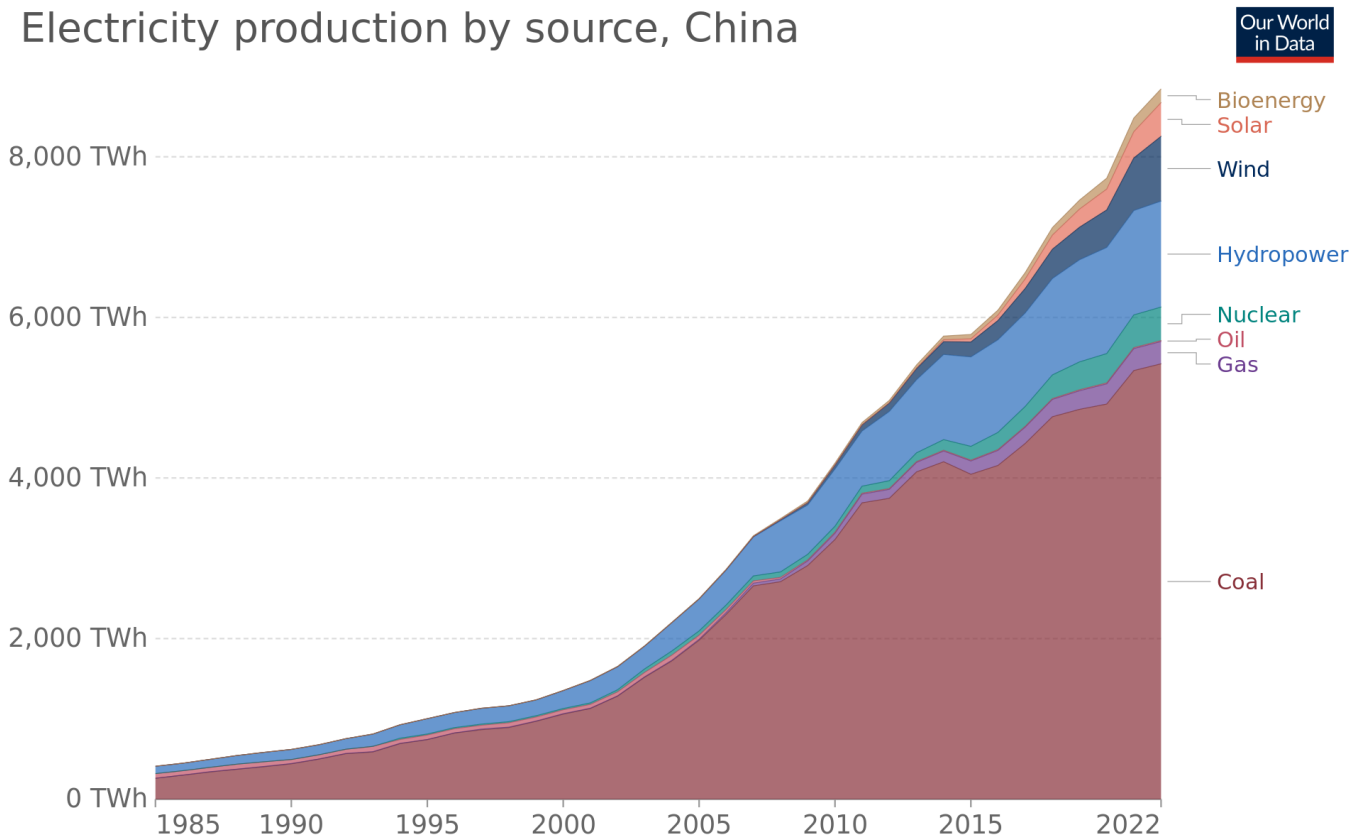
The role of water resources in the energy sector of Uzbekistan

The decrease of water resources in the Amu Darya and Syr-Darya rivers will also affect the energy sector of Uzbekistan, as the country has more than 30 [hydroelectric](#) power plants, whose productivity depends, among other things, on the annual inflow of water from these rivers[1]. Already in 2021, [according](#) to the Ministry of Energy of Uzbekistan, the total volume of electricity production at hydroelectric power plants decreased by 23% due to low water levels. At the same time, in terms of shares of electricity sources in Uzbekistan, hydropower accounts for the largest [share](#) - 11.9%. Electricity deficit in the country, in turn, is equal to [10-15%](#), as a result of which there is a shortage of electricity not only for the population, but also for enterprises, and the reduction in the capacity of hydroelectric power plants will further exacerbate this problem.

Renewable energy: salvation or reversal?

Unfortunately, alternative or renewable energy sources are not so sustainable and stable in terms of power generation. The operation of green energy sources depends on many different factors and has its positive and negative sides. Paradoxically, the increasing use of renewable energy sources, in particular solar energy, is increasing dependence on traditional forms of energy such as coal. For example, China, despite huge investments in solar energy and an increase in the number of solar power plants, [continues](#) to use coal to cover electricity outages caused by river shoaling caused by drought and heat, resulting in low power generation at hydropower plants, as well as instability of electricity supply during the day and due to climate change.

Electricity production by source, China



Source: Our World in Data based on BP Statistical Review of World Energy (2022); Ember (2023) •
 Note: 'Other renewables' includes waste, geothermal, wave and tidal.

This is not the only problem associated with the use of RES. The issue of **environmental pollution** during their production and further disposal is becoming topical, leading to a number of discussions and protests by environmental organizations and activists.

Risks and threats of renewable energy

Solar renewable energy sources, including solar panels, wind turbines are considered by some to be one terrific piece of green technology. While others label the wind turbine, for example, as too noisy, overly bulky, or dangerous to biodiversity.”[\[1\]](#)

The potential amount of green energy waste is alarming. Bloomberg New Energy Finance [estimates](#) that by 2025, spent batteries recovered from electric vehicles will weigh 600,000 tons.

The International Renewable Energy Agency (IRENA) [predicts](#) that the same number of old solar panels will have accumulated by then. IRENA expects the number of used solar panels to reach 78 million tons by 2050. In Europe, up to 300,000 tons per year of decommissioned wind turbine blades could accumulate over the next two decades, according to trade association [WindEurope](#).

The main disadvantages of RES:

The problem of disposing of turbine blades is one of the pressing problems associated with the operation of wind power plants (WPPs). Currently, up to 90% of everything in a wind turbine can be recycled. The problem lies in the blades. The blades are made of composite materials and are designed for long-term use, not recycling. One wind blade is about 40 meters long, weighs seven tons and makes up the 10% of a wind turbine that is difficult to recycle. This 10% has sparked a worldwide debate about the sustainability of this renewable energy source. Today, most of these blades are reused. However, the number of blades that will be retired in five or ten years will be so large that the entire system will have to be changed. **Solar panels** that use chemicals such as mercury, arsenic, chromium and other elements that are dangerous if not disposed of properly can also cause serious damage to the environment. There are also solar panels whose chemicals cannot be recycled, which can lead to soil contamination.

In addition to utilization, there is the issue of **low capacity** of solar panels at 220 W/m² at their **high prices**. In particular, from the economic point of view, for consumers represented by citizens at the existing prices in the country it is more profitable to make a deposit in the bank than to install expensive RES. In Uzbekistan, the payback period for solar panels is about 8-9 years, which is due to low electricity tariffs. For comparison, in developed countries this period does not exceed 3 years. [According](#) to the Ministry of Energy, the purchase and installation of a 2 kW unit (2 TV sets, 1 refrigerator, lighting of several rooms) is estimated, depending on the brand, from **18 to 30 million soums**. A 3 kW unit (+1 air conditioner) will cost **20-45 million soums**, while the average annual income per person is approximately [46.68 million soums](#). From this we can conclude that

the majority of the population cannot afford the purchase and installation of solar panels, which at the same time do not have sufficient capacity to fully cover their electricity needs. In addition, the production capacity of solar panels is significantly reduced if there is dust on its surface.

In order to maintain maximum power, the panels themselves need to be cleaned of dust and dirt on a regular basis, either with special equipment or with a certain amount of water. This again raises the issue of water scarcity. In addition, in cases of improper use of the panels, which will lead to their failure, repair of the equipment will be a difficult task, as the country does not yet have a sufficient number of service centers and specialists for technical maintenance.

The state initiative to install solar panels on at least 50% of the free part of the roof of commissioned multi-storey buildings, which is stipulated by the [Decree](#) of the President of the Republic of Uzbekistan № PP-57 from 16.02.2023 on acceleration of the introduction of RES and energy-saving technologies in 2023, makes the solution of these problems especially urgent. Realization of this requirement is possible provided that the following tasks are solved:

First, to solve the issue of panel surface contamination, you need to install a special system to clean the panels with air currents. This will save water.

Secondly, it is important to conduct an information policy to raise public awareness through an active mass information campaign, as low public awareness of the rules of solar panel operation can lead to a shorter panel lifetime or its rapid breakdown, which in turn can cause dissatisfaction among the population. Also important is the role of RES suppliers in informing and educating consumers on the rules of panel operation, and in expanding the maintenance network for the installed equipment.

Liberalization of energy prices: to be or not to be?

According to data for September 2022, Uzbekistan is among the [top 20](#) countries with the lowest electricity prices. Uzbekistan last raised gas and electricity tariffs in August 2019. Measures to liberalize energy prices and reforms in the energy sector have been repeatedly postponed.

For example, the government was scheduled to raise electricity and gas tariffs back in February-March 2020, but this measure was postponed due to the coronavirus pandemic. In October 2020, Ulugbek Mustafoyev, who is the chairman of Regional Electricity Networks,

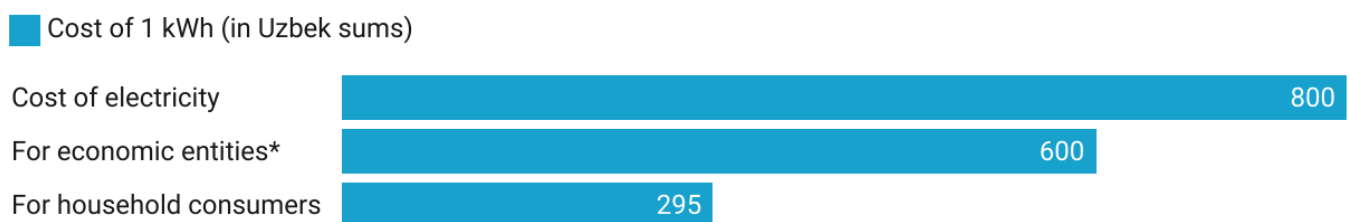
said that President Shavkat Mirziyoyev had set a task not to raise electricity tariffs in 2021-2022.

Mamarizo Nurmuratov, who is the chairman of the Central Bank, commented on the government’s plans to liberalize energy prices in Uzbekistan at a press conference on January 20, 2022. Based on calculations provided by the Chamber of Accounts, it was expected to increase tariffs for energy resources and utilities by an average of 27%. In particular, the cost of gas [was expected](#) to increase by 21% and electricity by 33%.

In May of the same year, the Ministries of Finance, Energy, and Economic Development and Poverty Reduction issued a joint statement on the need to reform the energy sector. On June 30, 2022, in accordance with the Cabinet of Ministers Decision, [it was decided](#) to introduce social norm of energy consumption and setting limits from July 15, 2022. This decision was taken because most of the state subsidies are used by budgetary organizations, companies, gas stations, thermal power plants and other legal entities, whose consumption has huge volumes. Later this decision [was postponed](#) by the decree of the Prime Minister of Uzbekistan Abdulla Aripov.

In the message of the President of Uzbekistan to the Parliament in December 2022, the need for transition to free market relations in the energy sector was again voiced. However, the price liberalization planned for May 2023 did not take place. Now we are already talking about the transition to market prices in 2026.

Tariffs in Uzbekistan do not cover the full cost of electricity generation and transmission



* For economic entities 1 kWh costs from 450 to 600 Uzbek sums.

Chart: CABAR.asia • Source: Economy Moliya Press • Created with Datawrapper

The need for reform in the energy sector is due to several factors.

On average, households using 200 kWh of electricity per month [receive](#) a conditional subsidy of 101 thousand soums, while families using 400 kWh of electricity receive 202

thousand soums.

Thus, the current tariffs mainly lead to the fact that subscribers whose incomes are relatively high and, accordingly, consume more energy resources, receive a larger amount of conditional subsidy.

Natural gas supply volumes have increased over the last 3 years

Volume in cubic meters.

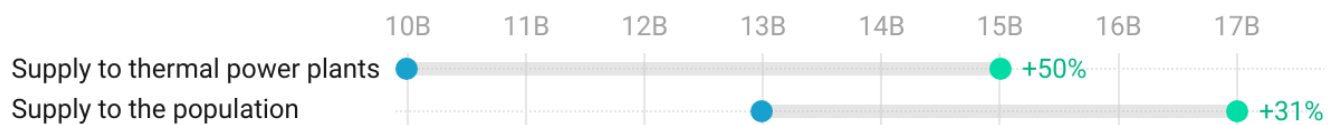


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According to the Ministry of Energy, the construction of new power plants with a capacity of 19 GW is required to provide 110 billion kWh of electricity per year.

To create additional capacity of this scale, at least \$25 billion is needed. Therefore, attracting private investment in this industry is the only way to create new capacity in the future. At the same time, one of the most important conditions for attracting private investment in the energy sector is the sale of electricity generated with their participation at cost-effective, i.e. favorable prices.

In addition, rate increases are an important tool to encourage changes in consumer behavior in favor of energy conservation. According to Professor Brenda Schaffer, who specializes in energy policy issues, “people will not turn off the fire in the gas burner as long as the price of matches is higher than the price of gas.

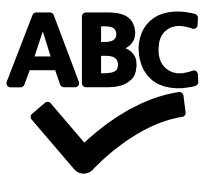
Thus, a solution to resource scarcity and the imminent energy crisis is possible if (in order of priority):

- improving energy efficiency;
- reducing losses in energy production and transit;
- modernization of existing facilities and construction of new ones;
- price liberalization;
- demonopolization of the electricity and heat energy market;

- diversification of energy sources and phased, rational introduction of alternative energy sources, in particular;
- ensuring maximum competitive environment in the RES equipment market and maintenance services market;
- ensuring regular monitoring and relevance of requirements to quality standards of imported, assembled and produced in the country equipment for RES and spare parts for them in accordance with international standards.

Given the rather high cost of alternative energy sources, the complexity of their proper operation and utilization, as well as relatively low electricity tariffs, it is not worth hoping that household and legal consumers will willingly switch to RES. Nor should we underestimate the probability of possible social unrest due to a sharp price increase as a result of tariff liberalization taking into account market realities. Therefore, it is vital to carry out these two processes step-by-step and in parallel, providing competent information support to consumers in the country – both legal entities and individuals.

[1] Wind turbines pose a danger to birds and bats. For example, in southern Spain, wind farms were built on the migration path of a huge number of migratory birds through Gibraltar due to errors at the planning stage. This fact, according to a report by the Spanish branch of the ornithological community SEO BirdLife, can have a negative impact on bird populations.



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