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INCREASING ENERGY EFFICIENCY AND DEVELOPING A SUSTAINABLE ENERGY SYSTEM IN UZBEKISTAN

Abstract: The article mentions that a number of measures are being implemented in Uzbekistan to increase energy efficiency and develop a sustainable energy system, such as “Tariff reforms and consumption efficiency”, “Development of renewable energy sources”, “Energy-efficient housing construction”, etc.

Keywords: baseline, renewable energy sources, solar power plants, wind power plants, solar panels.

By Resolution No. 204 of the Cabinet of Ministers of April 16, 2024, “baseline standards” of electricity for household consumers (up to 200 kWh) were introduced. Within this standard, a preferential price (450 soums/kWh) is applied, which encourages the population to save. As a result, 71 percent of consumers are using electricity within this standard, which has reduced the load

on the system and reduced outages and accidents. For example, in the summer of 2023 there was a mandatory restriction of 375 million kWh, while in 2024 there was an unrestricted supply. Development of renewable energy sources. It is planned to increase the share of renewable energy sources to 40 percent of total production by 2030. For this purpose, solar, wind and hydroelectric power plants are being built. In 2024, Uzbekhydroenergo commissioned 55 hydroelectric power stations (HPPs), with a total capacity of 430 MW. These stations generated 8.2 billion kWh of electricity. In partnership with Masdar, 100 MW of solar and 500 MW of wind power plants are being built in Navoi region, which will generate 1.8 GWh of cheap energy. As a result, the share of renewable energy sources in Uzbekistan will increase by 25 times.

It is planned to build 11 large, 9 medium, and 8 small hydropower plants in 2023–2030, generating 5.8 billion kWh of energy per year and saving 1.74 billion m³ of natural gas. Energy-efficient housing construction. With the support of the UNDP and the Global Environment Facility (GEF), the “Energy-efficient rural housing” project has been implemented since 2017. To date, about 30,000 energy-efficient houses have been built, and another 60,000 houses are planned and completed in 2022. These houses are equipped with thermal insulation materials such as basalt fiber and solar panels, reducing energy consumption by up to 30 percent.



Figure 1. Basalt slab

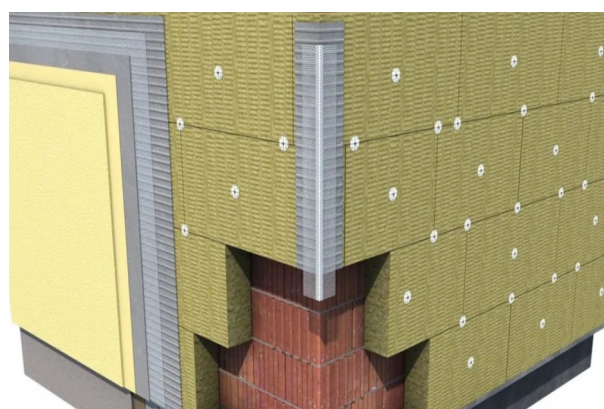


Figure 2. Cladding the exterior wall with basalt slabs

For example, 300-watt solar panels were installed in 121 houses in the Bukhara region. A model house with near-zero energy consumption is being built in the city of Nurafshan, Tashkent region. Supporting the population in need of social protection. With the support of the World Bank, it is planned to install free solar panels for more than 20,000 families in need of social protection as part of the "I Craft" project. During the heating season (November-February), 447 billion soums are being allocated as compensation to residents who consume up to 200 kWh, and 30.2 billion soums to consumers who consume 201-1,000 kWh. National Energy Efficiency Agency. Established in 2025, this agency provides subsidies to install energy-efficient equipment in large industrial enterprises, conduct energy audits in homes, and partially cover the costs of solar panels and heat pumps. Legislation and benefits. According to the 2019 Law "On the Use of Renewable Energy Sources," users of solar energy for personal needs are exempt from taxes and are not charged any additional fees. Interest on loans for the purchase of energy-efficient equipment is also reimbursed. According to the Ministry of Energy, no permit is required for the use of solar energy in Uzbekistan and no tax is paid for it. Also, if the population uses only renewable energy, they are exempt from property and land taxes for a period of 3 years.



Figure 3. Wind energy



Figure 4. Wind energy

Infrastructure modernization. To reduce accidents in the energy system, operational teams are operating at the Regional Electric Networks JSC. This system has ensured uninterrupted energy supply in 2024. Solar and wind energy. The government plans to increase the share of renewable energy in electricity generation to 40% (25 GW) by 2030. Solar power plants have been commissioned in Navoi and Samarkand, and new plants with a capacity of 4,300 MW are planned to be installed by 2023. Small hydropower plants and solar panels. It is planned to build about 3,000 small hydroelectric power plants by 2035 and install solar panels on 50% of the roofs of residential buildings. Natural gas sector reforms. Increased import volumes. Natural gas imports increased by 7.2 times in 2023, which increased budget expenditures by 25%. Extraction and processing. Additional capacities were commissioned at the Kandym gas processing complex and the Mubarak plant, creating the capacity to process 4.1 billion m³ of gas in 2018. In recent years, Uzbekistan's state policy on building energy-efficient buildings has been actively developing based on the principles of "green economy" and environmental protection. This policy aims to improve energy efficiency, expand the use of renewable energy sources, and reduce greenhouse gas emissions. The "Law on the Use of Renewable Energy Sources" (2019): This law supports the implementation of energy-efficient technologies and promotes the use of renewable energy sources (solar, wind, geothermal). In particular, tax incentives and the right to connect to the grid without a contract have been granted to those using solar energy for personal needs. The President's Decree in 2018, titled "Additional Measures to Improve State Regulation in the Construction Sector" (No. 5577), and the Resolution on "Increasing the Energy Efficiency of Economic Sectors and the Social Sphere" in 2019 (PQ-4422), are aimed at supporting energy-efficient housing construction. Additionally, the 2025 Resolution (PQ-100) outlines measures for reforming the provision of thermal energy to housing and buildings, reducing energy losses, and introducing innovative technologies. This document

prioritizes the installation of solar panels, heat pumps, and other energy-efficient equipment.

Energy-Efficient Housing Projects. The UNDP/GEF project (since 2017): In collaboration with the Ministry of Construction of Uzbekistan, the “Assisting the Development of Energy-Efficient Rural Housing in Uzbekistan” project is being implemented. Within this project, energy-efficient houses were built in Samarkand, Surkhandarya, Fergana, Khorezm, and Bukhara regions. These houses are equipped with heat insulation materials like mineral wool (basalt fiber), which reduces energy consumption by 30%. **Green Mortgage Scheme.** In the above-mentioned project, a green mortgage was piloted to attract private investments in five regions. This scheme aims to increase the demand for energy-efficient homes. Model projects, starting in 2018, were adapted to energy efficiency standards under the “Affordable Housing for Rural Residents” program. By 2019, the number of such houses exceeded 12,000. **Institutional Measures for Improving Energy Efficiency.** The National Energy Efficiency Agency (2025): This agency was established to implement a unified state policy in the field of energy efficiency, develop incentives, and introduce "green" standards. A non-budgetary fund also operates under the agency. **Digital Platform.** A digital platform for managing energy efficiency will be launched by September 1, 2025. **Green Standards.** By October 1, 2025, “green” standards for energy-efficient technologies will be introduced for manufacturers and importers. President Shavkat Mirziyoyev's 2017 address emphasized the need to increase efficiency through rational use of resources and the elimination of monopolies. **Improving legislation.** In 2018, the Cabinet of Ministers adopted Resolution No. 22 and in 2024, Resolution No. 319, updating the rules for the use of electricity and natural gas. Meters were connected to an automated system, and consumer rights and obligations were clearly defined.

A "Single Situation Center" has been established, and the activities of hydroelectric power plants and reservoirs are being monitored online.

International cooperation and investments. With the support of the International Finance Corporation (IFC), public-private partnership (PPP) projects worth \$700 million are being implemented. More than 50 projects with a total value of more than \$26 billion are designed to generate 24 gigawatts of power. An agreement signed with Kazakhstan and Azerbaijan in 2024 will allow for the export of "green" energy to Europe. Public events and analyses. From May 13 to 15, 2025, the "Uzbekistan Energy Week" is being held in Tashkent, where energy efficiency and renewable energy issues are being discussed. By 2030, the population of our Republic is expected to reach 41 million and the economy to grow 1.5 times. This will lead to an increase in energy demand, which is why new power plants and natural gas production plants are being commissioned.

So, we can conclude that Uzbekistan is implementing a wide range of measures on energy efficiency, such as definitional reforms, development of renewable energy sources, construction of energy-efficient housing, social support, and international cooperation. These reforms serve not only to optimize energy consumption, but also to environmental sustainability. Ambitious goals such as increasing the share of "green" energy to 54 percent by 2030 and reducing greenhouse gas emissions by 35 percent demonstrate the country's determination to achieve sustainable development.

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