

Modernization of Solar and Wind Renewable Energy Stations in Uzbekistan

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ABSTRACT

This research paper is devoted to the modernization of solar and wind power plants in Uzbekistan. The use of renewable energy sources in the country has been developing rapidly in recent years, and this process is becoming increasingly important in ensuring energy security and strengthening environmental sustainability. Introduction: Energy Landscape and Renewable Role.

Keywords: Renewable energy, Solar energy. Wind energy. Energy modernization. Sustainable energy Green energy transition. Clean energy technologies.

INTRODUCTION

Uzbekistan's energy sector is overwhelmingly fossil fuel based. In 2019, natural gas accounted for over 90% of primary energy production. Electricity generation has similarly relied on thermal power (gas/coal) and hydropower; renewables beyond hydro were negligible until recently. Total domestic energy supply in 2019 was about 47.1 Mto, with oil and coal contributing the remainder and hydropower about 1%. In practice, renewables (solar, wind, hydro, bio) provided roughly 10% of electricity in 2019 and early 2020.

Against this backdrop, the government has set ambitious decarbonization goals. Uzbekistan's Paris Agreement commitments and climate strategies include cutting CO₂/GDP by 10–35% by 2030, and pursuing carbon neutrality by 2050. In support, renewables are to play a large role: official targets range from 20–25% renewable electricity by 2025–2030. The 2019–2030 Green Economy Strategy explicitly calls for raising renewables to “more than 25% by 2030” (from ~10% in 2019). The 2020 Concept Note sets medium-term goals of 5 GW solar and 3 GW wind by 2030 (initially zero large-scale solar in 2019). Current plans even aim for 8 GW of solar+wind by

2026. Recent policy statements have floated an overall clean energy capacity of 20–25 GW by 2030, covering roughly 40% of demand. These targets are driven by rising electricity demand (projected >7%/year growth) and the need for energy security, as well as international climate commitments.

Government Policies and National Strategies

The government has enacted a comprehensive suite of laws and strategies since 2017. In 2017, the Strategy of Action 2017–2021 began structural reforms, emphasizing energy intensity reduction and expansion of renewables. In 2019, key laws were passed: the Law on Renewable Energy Sources (May 2019) offers tax, customs and other incentives for renewable projects, and a Public-Private Partnership (PPP) Law (May 2019) facilitates private investment in infrastructure, including power plants. The Legal and regulatory framework was further strengthened by the Law on Investment Activities (Dec 2019) and decrees on energy efficiency (e.g. Aug 2019 decree mandating 25% renewables by 2030) and smart grids.

Uzbekistan's long-term strategies highlight renewables.

The Strategy for Innovative Development 2019–2021 (adopted Sept 2018) set a goal of $\geq 20\%$ renewables by 2025. In October 2019, the Green Economy Transition Strategy 2019–2030 was adopted. It aims for an even higher renewable share ($>25\%$ by 2030) and calls for widespread modernization and clean technology adoption. In May 2020, a Concept Note for 2020–2030 was approved, specifying that Uzbekistan should increase total capacity from 12.9 GW (2019) to 29.2 GW by 2030, and raise generation to 120.8 TWh by 2030. Crucially, it quantified renewable targets: 5 GW solar and 3 GW wind by 2030. Updated Ministry of Energy plans (2021–22) call for 4 GW each of solar and wind by 2026 and consider raising 2030 targets to 7 GW solar and 5 GW wind.

Additional policies support deployment and modernization. A 2019 Decree on Energy Efficiency set the 25% by 2030 renewable share and provided subsidies for energy-saving investments. The Programme of Measures for Hydropower 2017–2021 addresses modernization of existing hydro plants. Regulatory reforms – unbundling state utility Uzbekenergo in 2019–2020, establishing competitive auctions, and improving PPA/tariff frameworks – aim to attract investors. The government has also launched net metering programs to allow businesses and households to sell surplus solar power to the grid. In summary, Uzbekistan has created a robust policy framework (laws, strategies, and targets) to modernize its energy sector toward renewables.

Current Modernization Efforts in Solar and Wind

Uzbekistan has moved rapidly from near-zero renewables to dozens of utility-scale projects under construction or operation. Competitive bidding platforms (e.g. IFC's Scaling Solar program) have attracted global developers. Solar photovoltaic (PV) has led the way. The country's first large PV plant (100 MW, Navoiy, by Masdar) began operation in 2021, with PPAs at record-low tariffs. By 2024, several large PV projects came online: for example, two 220 MW solar parks in Jizzakh and Samarkand (built by Masdar/IBL and local partners) became operational. In total, as of October 2024 the Ministry of Energy reports 9 solar power plants (SPPs) with solar capacity in the GW range; by April 2025 this had grown to 11 solar PV plants. The annual generation from solar in 2024 reached about 4.86 TWh, up sharply from 0.434 TWh in 2022 and 0.577 TWh in 2023.

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