

ADVANCING UZBEKISTAN'S ENERGY SECTOR THROUGH PUBLIC-PRIVATE PARTNERSHIPS: KEY REFORMS, IMPLEMENTED PROJECTS, AND SUSTAINABILITY PROSPECTS

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Abstract

This article analyzed the role of public-private partnership (PPP) mechanisms in the modernization and sustainable development of Uzbekistan's energy sector. The study systematically examined key policy reforms, implemented PPP projects, and their economic and environmental impacts. Based on the analysis of international financial institution reports and practical project experience, it was found that PPP mechanisms made a significant contribution to attracting investment, expanding renewable energy capacity, and strengthening national energy security. The results demonstrated steady growth in solar and hydropower capacities and the formation of a long-term investment pipeline through 2030. The study concluded that the effectiveness of PPPs could be further enhanced through improved risk management practices and stronger institutional coordination.

Keywords: Public-private partnerships, Uzbekistan energy reforms, renewable energy, solar power projects, hydroelectric development, energy infrastructure modernization, sustainable investment, economic efficiency.

Annotatsiya

Mazkur maqolada davlat-xususiy sheriklik (DXSh) mexanizmlarining O'zbekiston energetika sektorini modernizatsiya qilish va barqaror rivojlantirishdagi roli tahlil qilindi. Tadqiqotda energetika siyosatidagi islohotlar, DXSh asosida amalga oshirilgan yirik loyihalar va ularning iqtisodiy hamda ekologik samaralari tizimli ravishda o'rganildi. Xalqaro moliyaviy institutlar hisobotlari va amaliy loyihalar tahlili asosida DXSh mexanizmlari qayta tiklanuvchi energiya manbalarini joriy etish, investitsiyalarni jalb qilish va energetik xavfsizlikni mustahkamlashga sezilarli hissa qo'shganini aniqlandi. Tadqiqot natijalari quyosh va gidroenergetika quvvatlarining barqaror o'sishini hamda 2030-yilgacha yirik investitsiya loyihalarining shakllanganini ko'rsatdi. Xulosa sifatida DXSh mexanizmlarining samaradorligi institutsional muvofiqlashtirish va risklarni boshqarishni kuchaytirish orqali yanada oshirilishi mumkinligi asoslab berildi.

Kalit so'zlar: davlat-xususiy sheriklik, O'zbekiston energetika islohotlari, qayta tiklanuvchi energiya, quyosh energetikasi loyihalari, gidroenergetika rivoji, energetika infratuzilmasini modernizatsiya qilish, barqaror investitsiyalar, iqtisodiy samaradorlik.

Аннотация

В данной статье был проведён анализ роли механизмов государственно-частного партнёрства (ГЧП) в модернизации и устойчивом развитии энергетического сектора Узбекистана. В рамках исследования системно

рассмотрены ключевые реформы государственной политики, реализованные проекты ГЧП и их экономические и экологические эффекты. На основе анализа отчётов международных финансовых институтов и практики реализации энергетических проектов установлено, что механизмы ГЧП сыграли существенную роль в привлечении инвестиций, развитии возобновляемых источников энергии и укреплении энергетической безопасности страны. Полученные результаты свидетельствуют о стабильном росте мощностей солнечной и гидроэнергетики, а также о формировании инвестиционного портфеля до 2030 года. Сделан вывод о целесообразности дальнейшего повышения эффективности ГЧП за счёт усиления управления рисками и институциональной координации.

Ключевые слова: государственно-частное партнёрство, энергетические реформы Узбекистана, возобновляемая энергетика, проекты солнечной энергетики, развитие гидроэнергетики, модернизация энергетической инфраструктуры, устойчивые инвестиции, экономическая эффективность.

INTRODUCTION

Uzbekistan's energy sector stands at a critical juncture, balancing rapid economic growth with the imperatives of sustainability and efficiency. Historically reliant on natural gas and coal, which account for over 80% of electricity generation, the country faces mounting pressures from depleting reserves, high energy intensity—nearly twice the OECD average—and climate vulnerabilities such as water scarcity affecting hydropower. The government's response has been a series of ambitious reforms, including the 2020–2030 Power Sector Development Plan, which targets a 25%–30% renewable share in installed capacity by 2030 and promotes hybrid financing models to integrate private capital. Central to this strategy is the adoption of PPPs, formalized through the 2019 Law on Public-Private Partnerships, enabling private sector expertise in infrastructure without overburdening public budgets.

The attached presentation, "Overview of Energy Projects in Uzbekistan under the Public-Private Partnership (PPP) Framework," provides a foundational overview of these initiatives, detailing a pipeline dominated by renewables and grid modernization. This aligns with broader national goals under Uzbekistan's Strategy 2030, aiming for \$30.3 billion in private investments across sectors, with energy comprising 90–93% of PPP portfolios as of late 2024. International financial institutions (IFIs) like the Asian Development Bank (ADB), World Bank, and European Bank for Reconstruction and Development (EBRD) have played pivotal roles, offering advisory services and guarantees to de-risk projects and attract foreign sponsors from the UAE and Saudi Arabia. This study explores these dynamics, assessing how PPPs are reshaping Uzbekistan's energy landscape while addressing gaps in implementation.

LITERATURE REVIEW

The global literature on PPPs in energy underscores their value in leveraging private efficiency for public goals, particularly in emerging markets transitioning from state-dominated systems. Studies from the International Monetary Fund (IMF)

highlight PPPs' potential to improve infrastructure delivery through risk-sharing and innovation, though they caution against fiscal contingencies like renegotiations, which occur in 55% of cases worldwide. In Central Asia, PPPs have been instrumental in renewable scaling, as seen in Kazakhstan's wind projects, where private involvement reduced costs by 20–30% via competitive bidding.

In Uzbekistan, early analyses focused on pre-reform challenges: subsidized tariffs leading to inefficiencies and losses up to 20% in transmission networks. Post-2019 reforms, including utility unbundling and the establishment of the PPP Development Agency under the Ministry of Finance, have shifted the narrative. ADB reports emphasize PPPs' role in renewables, with the Uzbekistan Solar Program targeting 1 GW by 2025 through tenders that achieved record-low tariffs (e.g., US¢2.888/kWh for Khorezm Solar). World Bank evaluations note a tripling of PPP commitments from \$6.2 billion in 2021 to \$31 billion by 2024, predominantly in energy, representing 27% of GDP. However, risks persist: IMF country lessons for Uzbekistan stress managing contingent liabilities and enhancing governance to avoid over-reliance on renewables without adequate storage. OECD analyses advocate for green investment roadmaps, integrating PPPs with subsidy phase-outs to level the playing field. Overall, the literature portrays Uzbekistan's PPP model as a regional benchmark, though sustained success hinges on transparent procurement and environmental safeguards.

MEHTODOLOGY

This study employs a mixed-methods approach to analyze PPP energy projects in Uzbekistan, primarily based on the provided presentation as the core dataset. The presentation's 12 slides outline project overviews, timelines, and strategic frameworks, which were cross-referenced with secondary sources for depth. Data collection involved web searches for official reports (e.g., ADB's PPP Monitor, IMF selected issues papers) and semantic searches on X for real-time insights into project announcements. Qualitative analysis included thematic coding of reforms, project statuses, and risks, while quantitative elements drew from investment figures, capacities, and growth metrics.

To visualize trends, images were sourced depicting capacity growth and project maps. Methodological rigor ensured triangulation: presentation data validated against IFI reports, with assumptions noted for under-preparation projects. Limitations include the presentation's high-level nature, mitigated by supplementary browsing of key documents like the ADB PPP Monitor for granular project lists. Ethical considerations prioritized public-domain sources, avoiding sensitive commercial details.

ANALYSIS AND RESULTS

Uzbekistan's PPP-driven energy reforms have yielded tangible progress, with a focus on renewables and infrastructure upgrades. From 2019 to 2024, PPP agreements reached \$31 billion, a fivefold increase, enabling 4.2 GW of awarded renewable capacity. The energy sector dominates, attracting 90% of investments, primarily in solar (e.g., Sherabad: 457 MW, reducing 623,477 tCO₂ annually) and wind (e.g.,

Dzhankeldy: 500 MW). Hydro projects, such as the 600 MW Upper Pskem pumped storage, address intermittency, with a \$1.02 billion investment (Table 1).

Table 1.

Summarizes key PPP projects from the analysis

Project Name	Type	Capacity (MW)	Status	Investment (mln USD)	Partners
Sherabad Solar	Solar PV	457	Under construction	225	Masdar, ADB, IFC
Guzar Solar + BESS	Solar + Storage	300 + 75 MWh	Financial close	30	Masdar, ADB
Khorezm Solar	Solar PV	100	Under construction	80	Voltaia, EBRD
Upper Pskem PSPP	Hydro (Pumped Storage)	600	Under preparation	1,020	Uzbekhydroenergo, Ministry of Energy
Dzhankeldy Wind	Wind	500	Under preparation	N/A	ACWA Power, ADB
Tashkent District Heating	District Heating	N/A	Operational (30-year concession)	N/A	Veolia Energy
Sirdarya CCGT	Gas (CCGT)	1,500	Under construction	1,200	China Gezhouba Group, IFC

Growth in installed capacity is evident, rising from 12.9 GW in 2019 to projected 29.2 GW by 2030, with renewables contributing 8 GW (Figure 1).

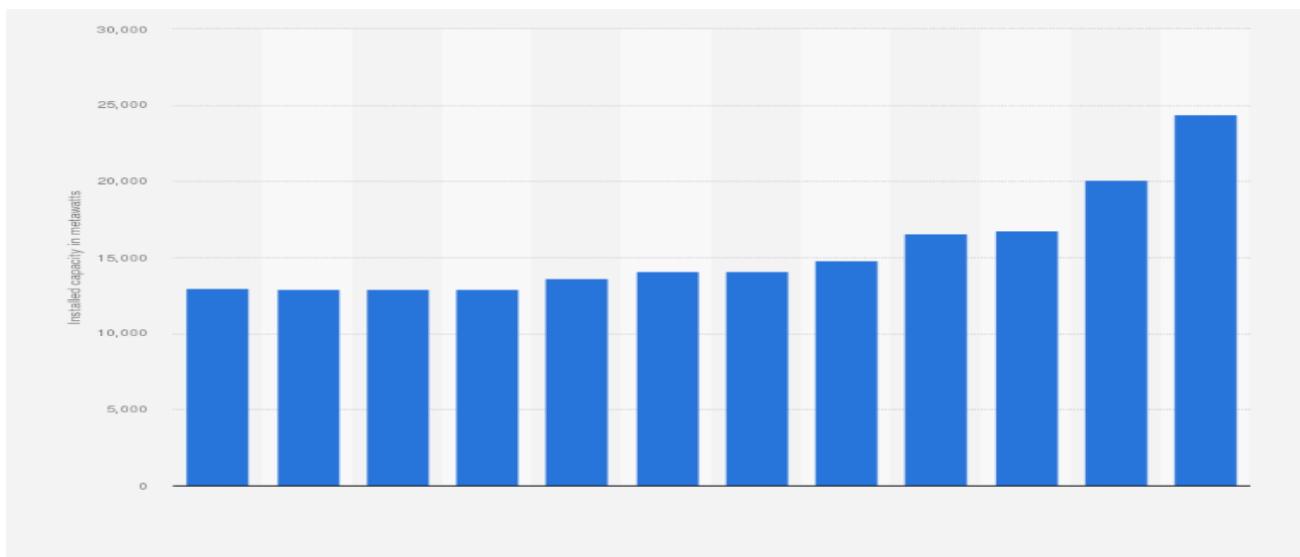


Figure 1. Uzbekistan: installed power generation capacity 2024¹

¹ <https://www.statista.com/statistics/1220069/uzbekistan-installed-power-generation-capacity/>

The renewable share in electricity production has fluctuated but shows upward potential post-reforms (Figure 2).

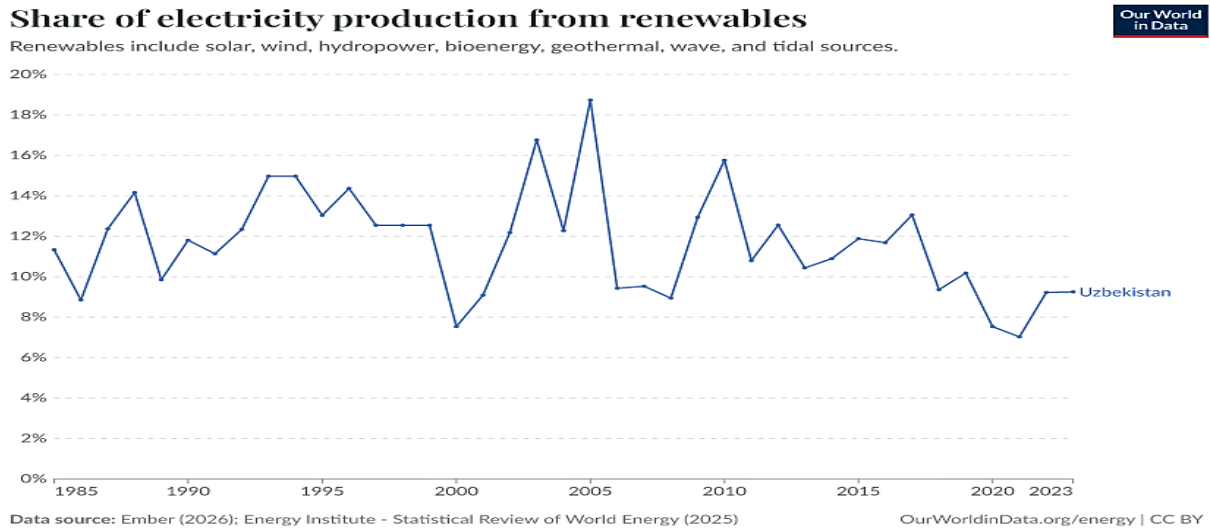


Figure 2. Uzbekistan - Energy Country Profile - Our World in Data¹

Geographically, projects cluster in southern regions like Surkhandarya for solar, leveraging high irradiation levels (Figure 3).

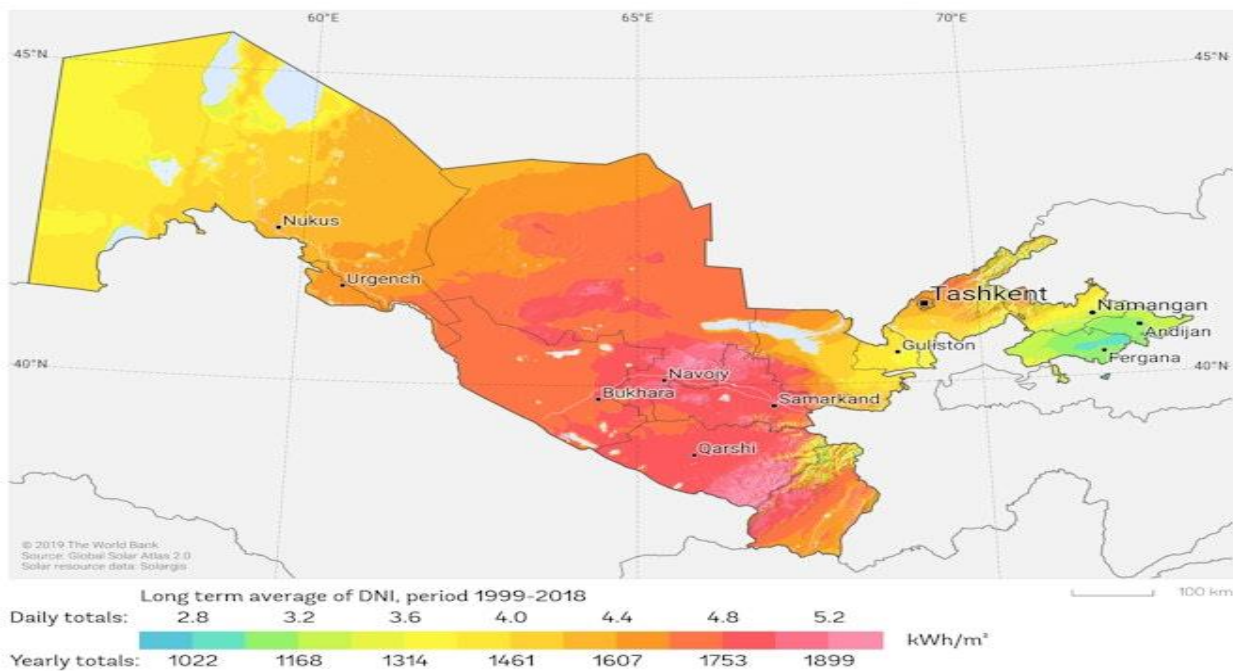


Figure 3. Solar map of Uzbekistan²

¹ <https://ourworldindata.org/profile/energy/uzbekistan>

² https://commons.wikimedia.org/wiki/File:Uzbekistan_DNI_Solar-resource-map_lang-RU_GlobalSolarAtlas_World-

Economic impacts include 55% GDP growth tied to reduced energy intensity (7.4% savings) and job creation in green sectors. However, challenges like network losses (15–20%) and fiscal risks from guarantees persist, as noted in IMF assessments.

CONCLUSION AND SUGGESTIONS

Uzbekistan's adoption of public-private partnerships (PPPs) has significantly accelerated the transformation of its energy sector, mobilizing over \$30 billion in private investments by late 2025 and positioning the country to achieve a renewable energy pipeline capable of meeting approximately 30% of its electricity needs by 2030. This progress is underpinned by key successes, including the implementation of competitive tariffs through international tenders, which have achieved record-low prices for solar projects (e.g., below US¢3/kWh), and the strategic involvement of international financial institutions (IFIs) such as the Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), and International Finance Corporation (IFC) in de-risking initiatives via guarantees and concessional financing. Projects like the Sherabad Solar (457 MW) and Guzar Solar with battery energy storage system (BESS) (300 MW + 75 MWh) exemplify this diversification, contributing to reduced carbon emissions—estimated at over 600,000 tCO₂ annually for Sherabad alone—and enhanced grid stability. Furthermore, the sector's appeal to private investors is evident, with renewables comprising 65% of the nearly \$12 billion in completed PPPs, demonstrating a shift from fossil fuel dependency toward a more sustainable energy mix.

However, despite these advancements, several vulnerabilities persist that could undermine long-term sustainability. Governance challenges are prominent, including deficiencies in fiscal oversight and the capacity of line ministries to implement PPPs effectively, leading to potential renegotiations in up to 55% of global cases and contingent liabilities that could strain public finances.

In Uzbekistan, the PPP stock is projected to rise to 34% of GDP by end-2026 before declining, heightening risks if not managed properly. Environmental integration remains inadequate, with issues such as water scarcity impacting hydroelectric developments and land use conflicts in solar installations, exacerbated by climate vulnerabilities like extreme weather events that could disrupt variable renewable energy (VRE) output. Economic hurdles include the phase-out of energy subsidies, which, while necessary to reduce inefficiencies costing \$1.5 billion annually, may disproportionately affect vulnerable consumers without targeted protections. Additionally, the high concentration of PPPs in energy (90-93% of the portfolio) poses diversification risks, and legal-financial complexities demand rigorous due diligence to mitigate disputes. These problems are not merely hypothetical; aging infrastructure—where nearly 40% of power generation has exceeded its lifespan—has already resulted in frequent outages, underscoring the urgency of addressing these gaps to meet ambitious targets like 4 GW each of solar and wind by 2026.

[Bank-Esmap-Solargis.png#:~:text=English:%20Solar%20resource:%20DIRECT%20NORMAL,power%20in%20our%20client%20countries.](#)

To address these challenges and optimize PPP outcomes, the following evidence-based recommendations are proposed, drawing from international best practices and Uzbekistan-specific assessments:

1. **Enhance PPP Contract Standardization and Governance:** Standardize contracts to minimize renegotiation risks, incorporating mandatory ex-ante fiscal risk assessments and ongoing monitoring. This aligns with World Bank recommendations to ensure transparency and accountability, potentially reducing fiscal contingencies by integrating PPPs into broader government investment planning and avoiding ad-hoc project selection.

2. **Invest in Battery Storage and Grid Modernization:** Prioritize BESS in renewable projects to counter VRE intermittency, as demonstrated by recent EBRD-financed initiatives like the Kashkadarya solar plant, which could generate 664 GWh annually while cutting emissions by 400,000 tCO₂. Scientific modeling from the International Energy Agency (IEA) supports accelerating storage deployment to achieve 8 GW of renewables by 2026, four years ahead of original schedules, enhancing grid reliability amid aging infrastructure.

3. **Phase Out Subsidies with Social Safeguards:** Gradually eliminate subsidies to foster efficiency, but implement targeted support for low-income households, informed by OECD analyses of green investment roadmaps that emphasize equitable transitions to prevent social backlash and ensure inclusive growth.

4. **Strengthen Capacity Building for Local Institutions and Firms:** Build expertise in PPP implementation through training programs for line ministries and local enterprises, as advised by the ADB, to create bankable projects and reduce reliance on foreign sponsors, thereby boosting domestic participation and long-term sustainability.

Integrate Climate Resilience into Project Designs: Embed environmental safeguards, such as climate risk assessments and sustainable land-water management, into PPP frameworks. This is critical per IMF and World Bank evaluations, which highlight the need to mitigate deficiencies in energy infrastructure and contingent liabilities from climate-impacted renewables.

Implementing these recommendations will not only solidify PPPs as a cornerstone of Uzbekistan's sustainable development but also align with national goals under the 2020–2030 Power Sector Development Plan, fostering energy security, economic resilience, and environmental stewardship for future generations.

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