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Nuclear Energy's Ascent: Reshaping Central Asia's Energy Landscape

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Introduction

The first quarter of 2025 saw Central Asian countries—Kazakhstan and Uzbekistan—making significant strides in nuclear energy. In April 2025, Uzbekistan commenced construction of its first small-capacity nuclear power plant. As the country aims to increase the portion of green energy in its domestic energy mix from 16 per cent in 2025 to 54 per cent by 2030, it has identified nuclear energy as the most practical alternative to fossil fuels.¹ On similar lines, acknowledging the potential of nuclear energy, Kazakhstan established the Agency of the Republic of Kazakhstan for Atomic Energy² on March 18 aimed to undertake responsibilities of the Kazakh Energy Ministry in the area of subsoil use, which includes uranium mining, use of atomic energy, ensuring safety from radiation, and the Semipalatinsk nuclear safety zone's creation and operation.³ In May 2025, the International Atomic Energy Agency (IAEA) team visited Kazakhstan for a five-day seminar on selecting a site for the construction of the first nuclear power plant with the Zhambyl District in the Almaty Region being the preferred area. Kazakhstan is actively and seriously planning the development of its first nuclear power plant, focussing on nuclear safety, and taking lessons from global best practices. These developments are timely, as Kazakhstan's Strategy 2050 aims to achieve a 2 GW nuclear capacity mix by 2050.⁴ Furthermore, Kazakhstan's recent referendum on the construction of the country's first nuclear power plant, held in October 2024, saw 71 per cent of participants vote in its favour. The outcome of the referendum was significant considering that Kazakhstan inherited the traumatic memories of Soviet nuclear tests at Semipalatinsk-21.

The present status of nuclear energy in the five Central Asian countries present a varied picture. Kazakhstan and Uzbekistan are working towards developing nuclear power capacity to enhance energy security and diversify their energy mix, while Kyrgyzstan is exploring the possibility of introducing Small Modular Reactor (SMR) technology.⁵ Turkmenistan and Tajikistan, at present, do not have specific plans for developing nuclear energy.

Existing Energy Landscape of Central Asia

Central Asia is rich in energy resources, Kazakhstan, Uzbekistan, and Turkmenistan hold significant fossil fuel reserves, while Tajikistan and Kyrgyzstan have abundant hydropower potential. However, this resource distribution has led to various challenges across the region. Three of them warrant mention:

- (a) **Dependency on fossil fuels:** Most Central Asian countries remain reliant on fossil fuels for electricity generation and energy consumption. According to the United Nations

Economic Commission for Europe (UNECE), fossil fuels account for 95 per cent of the total energy supply in the five countries.⁶

(b) Ageing energy infrastructure: Central Asia's power generation and transmission infrastructure is the legacy of the Soviet era. It has posed significant hindrances including electricity shortages, inadequate power generation, and poor condition of the transmission network.⁷ There is a need to upgrade transmission and distribution infrastructure.

(c) Uneven resource distribution and interconnectivity: Despite a historically interconnected electricity grid, Central Asian countries now manage their own power generation, transmission, and distribution. Electricity generation capacity varies significantly across the region, with mountainous nations like Kyrgyzstan and Tajikistan relying on hydropower, while resource-rich Kazakhstan primarily uses coal (over 80 per cent). Although electricity access is widespread, individual power sectors face numerous challenges, including seasonal fluctuations in supply and demand.⁸

Nuclear Energy in Central Asia's Energy Landscape

(a) Kazakhstan's Effect: By showing a successful nuclear power project, Kazakhstan could inject confidence in other Central Asian countries to consider similar initiatives. Despite Kazakhstan's grim historical experience with atomic tests, the decision to pursue nuclear energy demonstrates the country's objective approach to meeting its growing energy demands and ensuring energy security. This assertive move by Kazakhstan is likely to influence or steer the energy strategies of neighbouring countries, particularly Uzbekistan and Kyrgyzstan, which face energy challenges such as ageing infrastructure and dependency on natural gas and hydropower resources. Further, as Kazakhstan advances in nuclear energy capacity, there are prospects for developing the nuclear supply chain. The supply chain could allow related industrial and technological developments that countries in the region might seek to participate. In the context of regional safety and regulatory standards, the new nuclear energy agency in Kazakhstan is not only vital for Kazakhstan but also serves as an example for the entire region. By engaging with the International Atomic Energy Agency (IAEA), Kazakhstan's approach will provide a safe, transparent, and standardised framework, and its efforts will surely have a ripple effect in the region.

(b) Diversification in the Regional Energy Mix: Central Asia's current energy landscape is dominated by fossil fuels, followed by hydropower. The successful establishment of a nuclear agency in Kazakhstan can facilitate or expedite the region's efforts towards achieving low-carbon emissions, a stable energy source, and mitigating climate change. Introducing

nuclear power will provide a vital opportunity for the region to diversify its energy portfolio and begin a new chapter in its power generation strategy. Furthermore, Central Asian countries are highly vulnerable to the impact of climate change and are therefore investing in renewable energy sources. As nuclear energy offers continuous baseload capacity, it will complement renewables and fossil fuels.

(c) *Potential for Regional or Intergovernmental Cooperation:* The advent of nuclear power in Central Asia could necessitate regional or intergovernmental cooperation in the region. Drawing inspiration from the recent BRICS+ Business Forum, where members emphasised cooperative frameworks to advance peaceful nuclear technology, the Central Asian governments can also look beyond bilateral agreements towards more multilateral cooperation arrangements, which would facilitate partnerships. Furthermore, as Uzbekistan and Kazakhstan develop nuclear power, the regional framework could inspire discussions on grid connectivity and energy trade, thereby enhancing stability.

To sum up, for neighbouring Central Asian countries, a nuclear-powered Kazakhstan could become a reliable source of electricity, an alternative to volatile hydro and traditional suppliers, and encourage them to adopt nuclear energy in their respective energy strategies. Nuclear energy can provide a consistent baseload of electricity, enhancing stability and reliability. It is a crucial aspect of the region's energy security. The success of the nuclear program will not only shape Kazakhstan's energy future but also mould the course of nuclear energy development and the dynamics of energy security in Central Asia.

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- ² "Kazakhstan sets up nuclear energy agency," *World Nuclear News*, March 19, 2025, <https://www.world-nuclear-news.org/articles/kazakhstan-sets-up-nuclear-energy-agency>. Accessed on May 25, 2025.
- ³ Burc Eryugur, "Kazakh president signs decree on creation of agency for atomic energy," *Energy Terminal*, March 19, 2025, <https://www.aa.com.tr/en/energy/energy-diplomacy/kazakh-president-signs-decree-on-creation-of-agency-for-atomic-energy/48082>. Accessed on May 27, 2025.
- ⁴ "Kazakhstan announces the creation of a nuclear energy agency," *Enerdata*, March 21, 2025, <https://www.enerdata.net/publications/daily-energy-news/kazakhstan-announces-creation-nuclear-energy-agency.html>. Accessed on May 27, 2025.
- ⁵ David Dalton, "Kyrgyzstan/Russia Signs Agreement To Help Develop SMRs," *Independent Nuclear News*, January 24, 2022, <https://www.nucnet.org/news/russia-signs-agreement-to-help-develop-smrs-1-1-2022>. Accessed on May 27, 2025.
- ⁶ Craig Turp-Balazs, "Can renewables help Central Asia overcome its fossil fuel addiction?" *Emerging Europe*, March 15, 2024, <https://emerging-europe.com/analysis/can-renewables-help-central-asia-overcome-its-fossil-fuel-addiction/>. Accessed on May 31, 2025.
- ⁷ Anna Jordanová, "Ageing Energy Infrastructure is Holding Central Asia Back," February 28, 2025, <https://www.bourseandbazaar.org/articles/2023/2/28/ageing-energy-infrastructure-is-holding-central-asia-back>. Accessed on May 31, 2025.
- ⁸ Kedar Mehta et. al., "The Energy Situation in Central Asia: A Comprehensive Energy Review Focusing on Rural Areas," *Energies*, Vol.14, No.10, 2021, 2805, <https://www.mdpi.com/1996-1073/14/10/2805>. Accessed on June 1, 2025.