

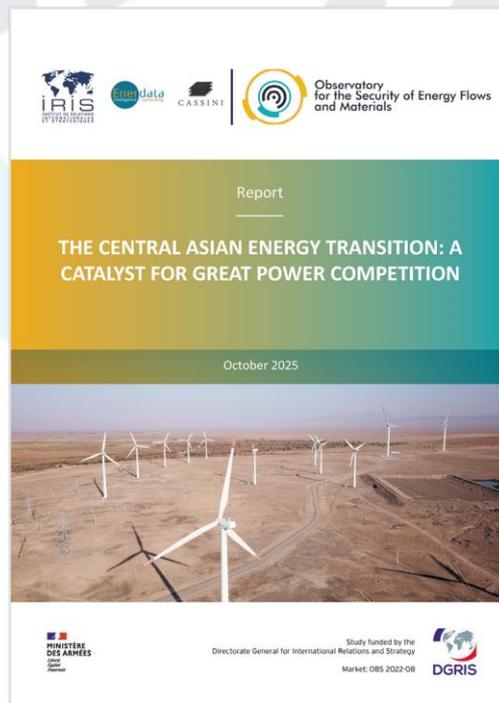


Observatory  
for the Security of Energy Flows  
and Materials

- EXECUTIVE SUMMARY -

# THE CENTRAL ASIAN ENERGY TRANSITION: A CATALYST FOR GREAT POWER COMPETITION

October 2025





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for the Security of Energy Flows  
and Materials

The Observatory for the Security of Energy Flows and Materials is coordinated by IRIS, in consortium with Enerdata and Cassini, under a contract with the Directorate General for International Relations and Strategy (DGRIS) of the Ministry for the Armed Forces. Its purpose is to analyse the energy strategies of three key actors: China, the United States, and Russia.

The consortium also aims to provide a geopolitical perspective on energy issues, in connection with defence and security challenges; to combine different approaches – geopolitical, economic, and sectoral; to draw on the complementarity of tools – qualitative analysis, economic and energy data, and interactive mapping; and to bring together various networks – academic, expert, public, and private.

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The Ministry for the Armed Forces regularly commissions external studies from private research institutes, following a geographical or sectoral approach that complements its internal expertise. These contractual relationships form part of the development of defence foresight, which, as highlighted in the latest White Paper on Defence and National Security, must *“be able to rely on independent, multidisciplinary, and original strategic reflection, integrating both academic research and specialised institutes”*.

A large number of these studies are made public and available on the Ministry’s website. In the case of a study published only in part, the Directorate General for International Relations and Strategy may be contacted for further information.

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## CENTRAL ASIA'S OUTDATED ENERGY SYSTEMS

In the 1950s, the USSR developed the Central Asian Power System (CAPS) to secure energy supply throughout southern Kazakhstan, Turkmenistan, Uzbekistan, Kyrgyzstan and Tajikistan. The CAPS was based on a barter system: Kyrgyzstan and Tajikistan, with abundant water resources, supplied electricity to the other three countries, which provided gas, oil and coal in return. Since the independence of the Central Asian republics in 1991, their populations have doubled, and hydrocarbon producers have opened to international trade. Since, the CAPS has fragmented, undermining regional energy security. Central Asian energy production and transport infrastructures are now obsolete, leading to significant losses. The ageing of these infrastructures reflects chronic underinvestment, itself a result of the heavy subsidisation of energy prices.

The outdated energy systems in Central Asia have significant environmental and social consequences. Major regional cities record among of the highest levels of fine particulate pollution (PM2.5) in the world, due to their heavy reliance on coal and ageing infrastructure, along with poor regulation of old vehicles and polluting emissions. Furthermore, energy security issues exacerbate socio-spatial inequalities. They are fuelled by corruption, and can trigger large-scale social movements, such as the *Qandy Quantar* movement in Kazakhstan in January 2022, the deadliest uprising since the country's independence.

## THE RUSSIAN GAS INDUSTRY EASTWARD PIVOT PUTS CENTRAL ASIA UNDER PRESSURE

Seeing an opportunity in the insufficient gas production of Kazakhstan and Uzbekistan, Vladimir Putin proposed the establishment of a tripartite gas union with these two countries, aimed at meeting domestic demand and coordinating gas transit to China in December 2022. Central Asian states are aware of the risks of increased political and economic dependence on Russia, yet they seem to consider the social and environmental risks stemming from their fragile energy systems as more pressing. Nevertheless, Gazprom's loss of the European market has placed Uzbekistan and Kazakhstan in a fairly comfortable negotiating position to demand that imports of Russian gas occur strictly on commercial terms and without political concessions.

In Turkmenistan, gas sales account for three-quarters of total exports. China has gradually become the main destination for Turkmen gas. However, Gazprom's eastward pivot places Turkmenistan in a situation of heightened competition – both on the Chinese market and

within Central Asia and Russia itself. Turkmenistan must therefore seek markets further afield, whether westward (towards the Caucasus, Turkey and Europe) or southward (towards Iraq, Pakistan and India). Yet, the development of the necessary infrastructure to reach these markets faces significant economic and geopolitical obstacles.

## **RENEWABLE ENERGIES: CHINA'S DOMINANCE IN THE SECTOR LIMITS PARTNERSHIP DIVERSIFICATION**

To address their energy needs, Kazakhstan and Uzbekistan have set ambitious targets for solar and wind power development. Expanding renewable generation capacity, however, requires an increase in flexibility capacity. Hence, the energy transition in Central Asia does not necessarily entail greater autonomy from Russian hydrocarbons. On the contrary, it may create conditions favourable to increased Russian gas penetration in regional markets. To limit Moscow's growing influence, Central Asian countries could enhance the integration of their electricity grids, thereby fostering synergies among their energy systems. To strengthen their strategic position in a region capable of supplying critical minerals and potentially low-carbon energy, European actors could support this process of regional power grid integration – technically, economically and technologically.

Although the renewable energy (RE) sector appears to present Central Asian countries with an opportunity to diversify their partnerships, Chinese actors are predominant. As a result, Chinese companies could impose their technical standards across Central Asia's renewable sector, thereby limiting competition from other players. This would enable China to strengthen its influence over the region's energy systems by creating dependencies on its technologies and materials. Kazakhstan and Uzbekistan plan to export low-carbon electricity to Europe in the coming years. Despite the potential of their territories for renewable energy development, it remains difficult to imagine these countries becoming electricity exporters to the EU in the near future, given the domestic challenges they face. Reinforcing national energy systems through deeper regional grid integration is mandatory before considering broader macro-regional integration with the European Union. The ambitions of Kazakhstan and Uzbekistan align with China's strategic vision of a Eurasian interconnected power grid. By investing in Central Asian electricity systems, China is thus paving the way for its surplus power generation capacity to supply markets along an "energy Silk Road" stretching all the way to Europe.

## NUCLEAR ENERGY IN CENTRAL ASIA: REGIONAL AMBITIONS AND SINO-RUSSIAN RIVALRY

Central Asia's nuclear landscape is paradoxical. The region produces nearly 50 % of the world's primary uranium production, but it has no nuclear plant in operation. Confronted with fragile energy systems and mounting environmental concerns, Kazakhstan, Uzbekistan and now Kyrgyzstan seek to integrate nuclear power into their energy mixes. Behind the economic and security arguments lies an issue of regional leadership, on which the strategies of Moscow and Beijing are intertwined.

On the 6<sup>th</sup> of October 2024, Kazakhstan approved the construction of a nuclear power plant at Ülken by means of referendum. This project marks the first step in establishing a “nuclear cluster”, an integrated atomic industry encompassing upstream, downstream and operational activities. In June 2025, Rosatom was designated as the lead partner in the Ülken consortium, alongside EDF (France), CNNC (China) and KHNP (South Korea). Yet, Astana is careful to diversify its partnerships: Beijing is expected to build the next two plants, a sign of Kazakhstan's determination to avoid overdependence on Russia.

Unlike Astana, Uzbekistan does not aim for industrial autonomy but focuses on increasing electricity production instead. Since 2017, close cooperation with Moscow has led to the Forish plant project, which was restructured in 2024 into six Russian RITM-200N SMRs. Uzbekistan could thus become the first Central Asian country to operate a nuclear power plant, a prestige goal for President Mirziyoyev, who hopes to turn it into a source of national attractiveness. While Rosatom retains a dominant role (design, construction and fuel supply), Tashkent has been expanding its ties with Beijing, notably since a cooperation agreement signed in 2024. The objective remains to diversify partnerships without challenging structural dependence on Russia.

Kyrgyzstan, long absent from the nuclear industry, has joined the regional dynamic under the pressure of its fragile energy system. Its geographic and seismic constraints make an SMR plant the only feasible option. A protocol was signed with Rosatom in 2022, but project advancement remains limited. Like its neighbours, Bishkek also seeks closer ties with China, though with no tangible progress so far.

In all three countries, Rosatom imposes itself as an unavoidable partner, due to shared Soviet-era technical standards and its attractive financing model, which minimises risk for contractors. These agreements also further Moscow's enduring influence – through technology supply, fuel cycle control, and operational management of future sites.

Given Rosatom's growing vulnerabilities in the context of international sanctions, China is emerging as an alternative. Nuclear power is a cornerstone of the Belt and Road Initiative, with the goal of exporting 30 reactors by 2030. China is already active in Kazakhstan via the Ulba fuel assembly plant and the Alashankou border corridor, which serves as an alternative route to Russia for exporting uranium and assembled fuel. Moreover, Chinese projects are generally more financially competitive than Russian ones. However, China's limited expertise in the back end of the fuel cycle remains a weakness that preserves Russia's dominant position.

As for the United States and the European Union, their involvement remains confined to the mining and environmental sectors. EDF was selected in the Ülken consortium, but its participation will depend on the role it is assigned alongside Rosatom. Washington, through its FIRST programme promoting U.S. nuclear technologies, is investing mainly in local training and remains largely on the sidelines.

## THE MINERAL WEALTH OF CENTRAL ASIA

With an area equivalent to that of the EU, but six times less populated, Central Asia is marked by a Soviet mining heritage. Between 2017 and 2023, mineral resource exports accounted for 20% to 33% of total exports. In 2024, 70% of the region's critical metals were exported to China. Kazakhstan and Uzbekistan dominate the sector, together producing half of the world's uranium and hosting major state-owned mining companies such as Kazatomprom, and the Navoi Mining and Metallurgical Combine. Although Tajikistan and Kyrgyzstan have less developed mining industries, the mining sector remains essential in relation to the size of their economies, and both countries also have significant potential. Turkmenistan, focused primarily on gas, exploits its mineral resources only to a limited extent.

Since the outbreak of the war in Ukraine, international interest in Central Asia's critical metals has increased. Rare earth elements, of which China controls 60% of production and 90% of refining – and which are essential in manufacturing many future-oriented technologies – embody this dynamic. The region's uranium resources are also highly sought after, especially given the instability in Russia and West Africa – two key regions in the nuclear fuel supply chain. Central Asian governments have capitalised on this renewed interest, multiplying investment announcements, exploration initiatives and new deposit discoveries in order to attract foreign partners. Kazakhstan has relaunched exploration efforts; Uzbekistan has simplified its regulatory framework; and Kyrgyzstan has lifted its moratoria on uranium and thorium. While the region already has significant proven mineral reserves, it could harbour even greater potential, although this remains uncertain.

Following Russian withdrawal after the fall of the Soviet Union, China strengthened its foothold in the regional mining sector during the 2000s and 2010s and is now the region's dominant partner. In response to Beijing's growing control over critical metals and its export restrictions imposed since 2023, the European Union and the United States are attempting to catch up. The EU is bolstering its presence through public financing and by developing the Middle Corridor to secure trade routes between the two regions. The United States, despite official statements of intent, has struggled to turn plans into action – hampered by sanctions affecting Central Asian countries and their neighbours, and by geopolitical tensions revived under the Trump administration. Other actors – including South Korea, Japan, India and Turkey – are also seeking to diversify their sources of metal supply and have become increasingly active in the region.

However, ageing and poorly maintained infrastructure continues to limit the sector's competitiveness. The lack of exploration since the collapse of the Soviet bloc and long lead times for bringing new mines into production also hinder growth, while governance challenges, anti-China sentiment, and environmental risks associated with mining fuel social tensions. Finally, the growing debt of Tajikistan and Kyrgyzstan regarding China raises concerns about potential dependencies that Beijing could leverage.

# THE GEOPOLITICAL ANALYSIS OF ENERGY ISSUES IN THE FIELD OF DEFENCE AND SECURITY

The Observatory for the Security of Energy Flows and Materials is coordinated by IRIS, in consortium with Enerdata and Cassini, under a contract carried out on behalf of the Directorate General for International Relations and Strategy (DGRIS) of the Ministry for the Armed Forces. It is led by Sami Ramdani, Research Fellow at IRIS, and brings together a team of around twenty researchers and professionals.



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