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Observatory for the Security of Energy Flows and Materials

Report

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

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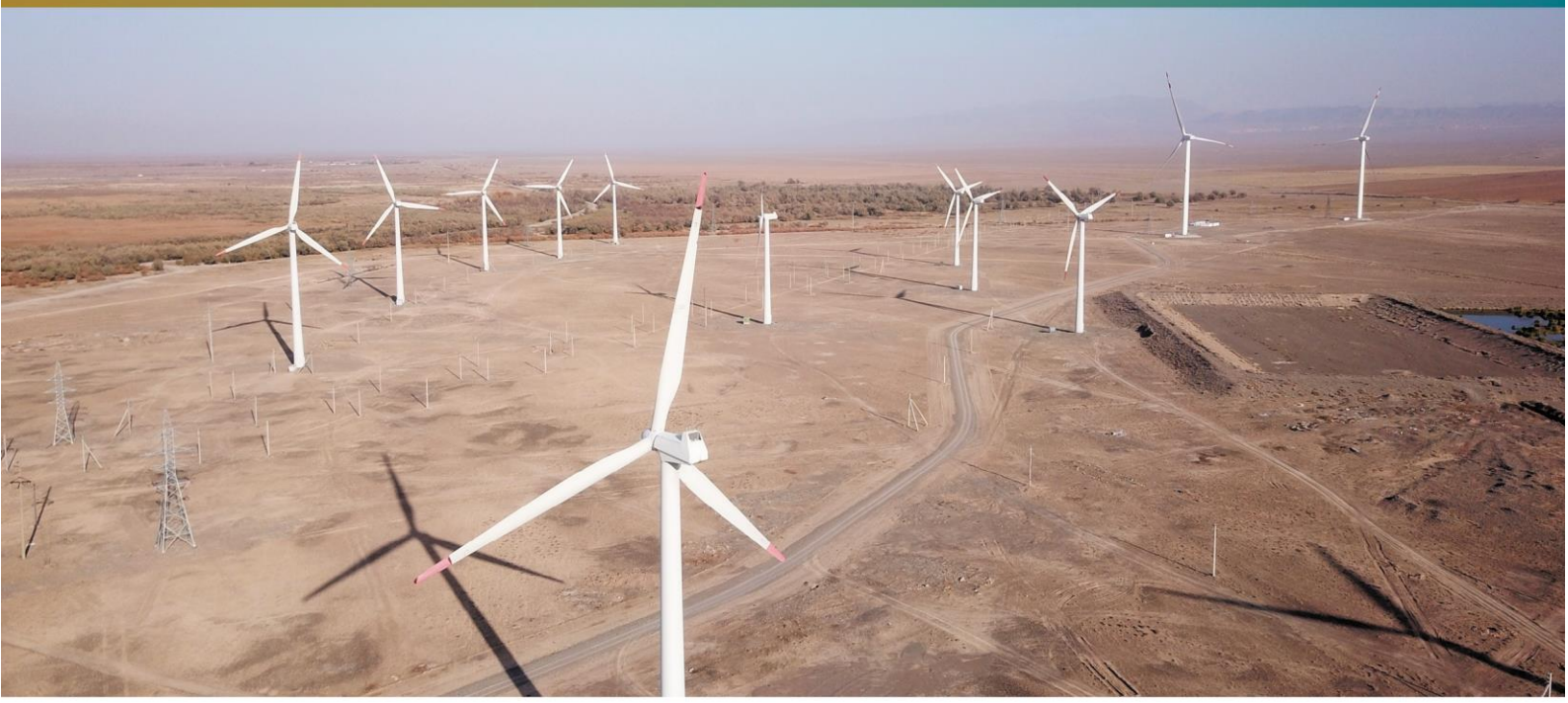

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The consortium also aims to provide a geopolitical perspective on energy issues, in connection with defence and security challenges; to combine different approaches – geopolitical, economic, and sectoral; to draw on the complementarity of tools – qualitative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

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ANALYSIS OF CENTRAL ASIAN STATES' ENERGY MIXES

Central Asia, comprising Kazakhstan, Turkmenistan, Uzbekistan, Kyrgyzstan and Tajikistan, faces a complex mix of energy challenges and opportunities. At stake are the legacies of a shared Soviet past, authoritarian political regimes, and the unequal distribution of abundant fossil fuel reserves, water and minerals. To better understand these dynamics, we will first examine the structure of the energy systems of each Central Asian country since the Soviet era, before analysing their environmental and social consequences.

1. Structure of Central Asian countries' energy systems

The CAPS: formation and fragmentation

In the 1950s, the USSR developed the Central Asian Power System (CAPS) in order to secure energy supply between southern Kazakhstan and the four other Central Asian republics. The CAPS was based on barter agreements, exploiting each republic's energy potential. Tajikistan and Kyrgyzstan, over 90% covered by mountains ranging from 300 to 7,494 metres in altitude, account for 76.3% of the Aral Sea basin's tributaries[1]. Kazakhstan, Uzbekistan and Turkmenistan, downstream, are rich in oil, coal and gas. In summer, the upstream republics supply water and electricity to industries, agricultural sectors and populations downstream in exchange for fossil fuels to endure the freezing winters, ensuring heating periods spanning six to nine months[2].

With the independence of the Central Asian republics in 1991, the CAPS fragmented. The Interstate Coordinating Water Commission and its subsidiary bodies, founded under the 1992 Almaty Agreements, rapidly lost political commitment due to their unanimity-based decision-making process and the new attraction of downstream republics for international markets where resources can be sold at better prices[3]. The doubling of the regional population since 1970 has further heightened tensions over resource distribution[4].

Lacking fossil fuels and faced with growing domestic demand for electricity, the upstream republics began retaining water during the thaw season, drying out the downstream republics in summer, raising fears of winter flooding and increasing fossil fuel combustion downstream[5]. The exceptionally cold winters of 2008 and 2009 forced the upstream countries to carry out

[1] Katarzyna Kosowska and Piotr Kosowski, « Energy security of hydropower producing countries—The Cases of Tajikistan and Kyrgyzstan », *Energies* 15, n°17 (September 2022).
[2] Murodbek Laldjebaev, « The water-energy puzzle in Central Asia: The Tajikistan perspective », *International Journal of Water Resources Development* 26, n°1 (March 2010).
[3] International Crisis Group, *Central Asia: Water and Conflict* (Brussels: International Crisis Group, May 2002).
[4] World Bank, « Population, total », *https://data.worldbank.org/indicator/SP.POP.TOTL* (accessed on August 27, 2025).
[5] U.S. Government Publishing Office, *Water sharing conflicts and the threat to international peace* (Washington D.C., November 18, 2014).

extraordinary water releases and pushed Uzbekistan to increase gas prices so as to avoid shortages[6].

National energy mixes

Kazakhstan

Kazakhstan, the regional leader, is the world's top uranium producer, a major oil exporter, and possesses significant coal and gas reserves[7]. The country's energy wealth has led to a heavy dependence on fossil fuels, especially coal, which in 2023 accounted for 49.2% of its primary energy consumption, 70% of its electricity generation, and 25% of household energy use[8; 9]. To reduce this dependence, Kazakhstan is betting on the deployment of renewable energies (RE) (see Part III) and nuclear power (see Part IV), while seeking to limit energy, technological, and diplomatic dependencies through its so-called "multi-vector" policy, aimed at diversifying relations with China, Russia, Turkey, the United States, and the European Union.

However, obstacles hinder Kazakhstan's ambitions, as its electricity grid remains unstable. As a Soviet-era legacy, 53% of power plants have reached the end of their service life, the transmission network shows more than 65% wear, and most housing depends on outdated municipal heating systems[10]. The humidity as well as the ash and sulphur emissions from Kazakh coal further accelerate infrastructure degradation[11]. Moreover, the grid renewal is hampered by heavy energy subsidies, amounting to 5.8% of GDP between 2010 and 2023, despite significant liberalisation efforts since 1991[12]. The development of renewable energies also raises the issue of Kazakhstan's inflexible grid, which relies on Russian imports in the north and Uzbek imports in the south to meet peak demand. Dependence on Uzbekistan makes the country's south particularly vulnerable to the weaknesses of the Uzbek gas sector.

Turkmenistan

Turkmenistan, holder of the world's fourth-largest natural gas reserves and Central Asia's leading gas producer, relies heavily on its domestic production to supply its industrial, electricity, and residential sectors: 87% of Turkmen energy is generated with gas[13]. Thanks to its abundant reserves and the renewal of its electricity generation fleet, the country is less exposed to energy insecurity than its neighbours.

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[6] Murodbek Laldjebaev, op. cit.: 2.
[7] International Energy Agency, *Kazakhstan 2022 Energy Sector Review* (Paris: IEA, 2022).
[8] International Energy Agency, « Energy system of Kazakhstan », *https://www.iea.org/countries/kazakhstan* (accessed on July 31, 2025).
[9] Samruk Energy, *Heading to a green future* (Astana: Samruk Energy, 2023).
[10] International Energy Agency, op. cit.: 7.
[11] Arys Nurgaliuly and Saule Smagulova, « Economic assessment of energy security of the regions of Kazakhstan », *Economics – Innovative and Economics Research Journal* 13, n°2 (July 2025).
[12] « Impacts of Fuel Subsidies on Kazakhstan's Energy Pricing », *Ec[ON]omyKZ*, March 5, 2025.
[13] United Nations Economic Commission for Europe, *Turkmenistan – Energy Policy Brief* (Geneva: UNECE, 2025).

Nonetheless, legislative efforts to deploy renewable energies and improve energy efficiency (see Part III) have so far failed to overcome the inefficiency of the Turkmen energy system. The lack of concrete legal frameworks, chronic corruption, and low energy prices have hindered grid modernisation, with transmission losses approaching 12%[14]. Furthermore, despite significant tariff reforms in 2020, the prices charged by the state monopoly Türkmenergo remain insufficient[15].

Uzbekistan

Uzbekistan is Central Asia's third largest gas producer. Even more than Turkmenistan, its energy security depends on natural gas. Following the promotion of liquefied gas as a transport fuel, the transport sector now accounts for 10% of national gas demand[16]. To reduce dependence, the country has launched a programme for the development of renewable energies and a nuclear power plant (see Parts III and IV).

As illustrated by the winters of 2008 and 2009, Uzbekistan struggles to meet its domestic energy demand. National energy subsidies amounted to $3.8 billion in 2020, while electricity and gas consumer prices covered only 30% and 20% of production costs, respectively[17; 18]. As a result, most energy infrastructure is over 30 years old, and electricity distribution losses reach 12.47%[19]. In the gas sector, the ageing transmission network limits the flexibility of electricity generation, even though this flexibility is essential for integrating intermittent renewable energy into the national grid. Currently, the maximum hourly consumption variation allowed on the network by the operator Uztransgaz JSC is 300,000 cubic metres, while a gas turbine can typically vary its consumption by 100,000 cubic metres per hour – and Uzbekistan has eleven gas-fired power plants[20]. To secure its energy supply, Uzbekistan must therefore modernise its transmission networks to make them more efficient and flexible, in addition to addressing the issue of insufficient gas production (see Part II).

[14] U.S. Department of State, « 2024 Investment Climate Statements: Turkmenistan », *https://2021-2025.state.gov/reports/2024-investment-climate-statements/turkmenistan/* (accessed on September 18, 2025).
[15] Mirjana Radovanović, Sanja Filipović and Andrea Andrejević Panić, « Sustainable energy transition in Central Asia: status and challenges », *Energy, Sustainability and Society*, n°11 (December 7, 2021).
[16] Anna Kuklina and Anna Galkina, « New challenges for Uzbekistan's energy sector and the role of the gas industry », *E3S Web of Conferences*, n°107 (2023).
[17] « Energy subsidies cost more than $1 billion a year », *KUN.UZ*, September 20, 2023.
[18] International Energy Agency, *Uzbekistan 2022 Energy Policy Review* (Paris: IEA, 2022).
[19] International Energy Agency, « Uzbekistan: Energy Security », *https://www.iea.org/reports/uzbekistan-energy-profile/energy-security* (accessed on September 8, 2025).
[20] Kh.A Shamsiev, B.Kh Shamsiev and Sh.V Khamidov, « Increasing the reliability of the united power systems of central Asia in conditions of energy transition », *E3S web of conferences,* n°384 (2023).

Kyrgyzstan

Kyrgyzstan, an upstream republic, derived 23.8% of its total energy production from hydropower in 2022[21]. The remainder of its needs are met by Russian and Kazakh oil[22], Russian gas substituting declining Uzbek exports[23], and coal that is largely produced domestically. To strengthen energy independence, Minister of Energy Taalaibek Ibraev has predicted an end to coal and electricity imports by 2027[24]. In addition, a 2018 development plan for renewables excluding large-scale hydropower (see Part III), the formalisation of a Kyrgyz nuclear programme in 2022 (see Part IV), and the 2025 announcement of 1,162 MW of capacity additions in dams and gas turbines aim to match growing electricity demand[25]. Despite these efforts, cross-subsidies in the energy sector barely cover production costs, half of power plants require renovation, and grid losses reach 20%[26]. Moreover, 19% of the population depends on municipal heating networks, aged between 30 and 50 years[27]. The dilapidation of infrastructure led to falling temperatures in Bishkek's heating network in 2018, and frequent power outages occur during winter demand peaks[28].

Tajikistan

Tajikistan, whose independence was disrupted by the 1992–1997 civil war, is the poorest of the former Soviet republics. The country's total energy supply depends 42.4% on hydropower, alongside domestically produced coal, Russian oil replacing Kazakh supplies redirected to Europe since the outbreak of the war in Ukraine[29], and Uzbek natural gas[30].

The country struggles to meet domestic energy demand, requiring the urgent addition of new electricity generation capacity, which has been slow to materialise. Corruption hampers the progress of new energy projects, while 80% of hydropower capacity will have exceeded its service life by 2030, and transmission losses amount to 17%[31]. In addition, energy subsidies burden Barki Tojik, the state-owned company responsible for the power system, which with

[21] International Energy Agency, *Kyrghyzstan 2022 Energy Sector Review* (Paris: IEA, 2022).
[22] Arailym Temirgaliyeva, « Kyrgyzstan bolsters oil products imports », *Kazinform*, February 26, 2025.
[23] Baktygul Osmonalieva, « Kyrgyzstan increases gas imports from Russia », *24 KG*, January 3, 2025.
[24] Vagit IsMaylov, « Kyrgyzstan Plans to Stop Importing Coal and Electricity by 2027 », *The Times of Central Asia*, October 7, 2025.
[25] Sergey Kwan, « Turkish Company to Build Hydropower Plants in Kyrgyzstan and New Heat and Power Plant for Bishkek », *The Times of Central Asia*, September 16, 2025.
[26] « The Electricity Sector in the Kyrgyz Republic to Benefit from support from the World Bank and the Government of Switzerland », *World Bank Group*, January 31, 2023.
[27] Kedar Mehta *et al.*, « Comprehensive analysis of the energy legislative framework of Kyrgyzstan: Investigation to develop a roadmap of Kyrgyz renewable energy sector », *Cleaner Energy Systems*, n°2 (2022).
[28] Catherine Putz, « Bitter Cold Hits Bishkek, Chinese-Repaired Power Plant Breaks Down », *The Diplomat*, January 30, 2018.
[29] Sabina Aliyeva, « Tajikistan Shifts Focus to Russian Gas as Kazakhstan Redirects Exports », *Kursiv*, February 20, 2025.
[30] « Tajikistan sees uptick in natural gas imports from Uzbekistan », *Trend News Agency*, February 4, 2025.
[31] Elena Shadrina, « A Double Paradox of Plenty: Renewable Energy Deployment in Central Asia », *Eurasian Geography and Economics*, n°1 (2022).

$1.2 billion of debt represents 80% of state-owned enterprise liabilities[32]. The criminalisation of electricity meter fraud, with penalties of up to 10 years' imprisonment, illustrates the severity of the situation[33].

2. Environmental consequences

The composition and ageing of Central Asia's energy systems impact the environment by degrading air quality and contributing to global warming, thereby heightening the urgent need for a regional energy transition.

Air pollution

The common dependence of Central Asian countries on fossil fuels, burned in Soviet-era infrastructures, combined with weak regulation of pollutant emissions, creates serious air pollution problems. These contribute to mortality from cardio-respiratory diseases and infections, and have made major cities significant global hotspots of fine particulate (PM2.5) pollution[34].

Coal combustion is the main cause of pollution in large urban centres. In Dushanbe, where air quality remains below hazardous thresholds for only five days of the year, 60% of the city's electricity and its surroundings is produced at the Dushanbe-2 coal-fired power plant. District heating is coal-based, and national industries have increased their coal consumption since 2012 due to the instability of Uzbek gas imports[35]. Tashkent, Bishkek, Almaty, Astana and Ashgabat face similar challenges, though with lower levels of pollution, further aggravated by the lack of pollutant regulation.

The import of older-generation vehicles further reduces the efficiency of the regional fleet and worsens pollution. Although Kazakhstan and Uzbekistan have attempted to ban their sale on national territory, Kazakh measures struggle to be enforced[36] while Uzbekistan only prohibits the import of vehicles registered before 2011[37]. In Bishkek, 90% of vehicles are over ten years

[32] Katarzyna Kosowska and Piotr Kosowski, *op. cit.:* 1.
[33] « En pleine crise énergétique, le Tadjikistan veut envoyer en prison les mauvais payeurs », *Connaissance des Énergies and AFP*, April 7, 2025.
[34] Madina Tursumbayeva *et al.*, « Cities of Central Asia: New hotspots of air pollution in the world », *Atmospheric environment*, n°309 (2023).
[35] A. Gani, « As Tadjikistan reindustrialises, citizens feel brunt of worsening air quality », *Dialogue Earth*, March 30, 2025.
[36] International Energy Agency, *op. cit.:* 7.
[37] International Energy Agency, *op. cit.:* 18.

old, and weak regulation of petroleum product quality encourages the use of inefficient fuels[38].

Air pollution also affects households, where coal and biomass are used to cope with winter blackouts and compensate for the poor energy efficiency of housing. Although municipal heating is inexpensive, network instability and unequal access encourage reliance on fuels harmful to human health.

Vulnerability and contribution to climate change

While Central Asian countries are not major contributors to climate change, the carbon intensity of their economies is particularly high due to their dependence on fossil fuels. In a context of economic growth, this indicator underscores the urgency of national transitions towards efficient and decarbonised energy systems. Moreover, Central Asia's semi-arid climate is especially vulnerable to climate change: the melting of glaciers in upstream countries and the disruption of water cycles will only worsen regional water insecurity[39].

3. Social consequences

The structure of the regional energy sectors reinforces Central Asia's social challenges. It deepens socio-spatial inequalities, fuels corruption, and risks destabilising the region politically.

Socio-spatial inequalities

The instability of energy networks and air pollution in Central Asia intersect with socio-spatial inequalities. Poor household insulation and limited financial resources of low-income families make them particularly vulnerable to the health risks of low-quality fuels and stoves.

Those disparities are even more pronounced in rural areas, where more than 50% of Central Asia's population lives. These areas suffer especially from inadequate insulation and limited, unstable connections to electricity, heating and gas networks[40]. In Tajikistan and Kyrgyzstan, remoteness is compounded by high altitude and extreme temperatures: grid intensity is unstable, power cuts are frequent, and households more systematically use coal, wood, or cow dung for heating and cooking. These regions also face depleted wood reserves, which are

[38] Kenesh O. Dzushupov *et al.*, « Air pollution in Bishkek, Kyrgyzstan: driving factors and state response », *Public Health Challenges*, n°4 (October 17, 2022).
[39] Weili Duan *et al.*, « Managing the water-climate- food nexus for sustainable development in Turkmenistan », *Journal of cleaner production*, n°220 (2019).
[40] Kedar Mehta *et al.*, « Need of energy transition at roof of the world: Correlative approach to interpret energy identity of high-altitude Central Asian communities », *Energy for sustainable development*, n°76 (2023).

slow to regenerate at such altitudes, and volatile coal prices – in 2022, the price of a tonne of coal rose from €51 in July to €63 in November.

Corruption

Corruption, identified in 75% of regional energy projects in 2019, hampers Central Asia's energy development by undermining its attractiveness to investors[41].

In Kazakhstan, Uzbekistan and Tajikistan, corruption in the energy sector and inefficiencies resulting from state control are particularly visible in the fossil fuel industry. Infrastructure operation and renovation contracts are billed at inflated prices by national or Russian companies with untraceable funds, before being subcontracted at low cost – or sometimes not executed at all. These financial arrangements benefit especially those close to Putin in Kazakhstan, through the involvement of Transneft in the Caspian Pipeline Consortium[42], and in Uzbekistan, where a network of shell companies has been set up (see Part II). In Turkmenistan, the halt of gas exports to Russia in favour of China in 2016 reduced Moscow's traditional role, but the Turkmen president's inner circle continues to profit from gas revenues that enter national budgets little, if at all[43]. Such embezzlement leads to industrial accidents and ageing infrastructure, calling into question the credibility of these three states[44].

In Kyrgyzstan and Tajikistan, corruption takes the form of more direct embezzlement and biased tendering procedures. In Kyrgyzstan, maintenance contracts for the Toktogul, Shamaldy-Sai, Uch-Kurgan and At-Bashi dams were awarded to the inexperienced Russian contractor Gidroremont-VKK rather than to specialised domestic builders, raising concerns[45]. In addition, free electricity delivery has been used as a form of bribery[46]. In Tajikistan, the underfunding of the Rogun mega-project led President Emomali Rahmon in 2010 to compel underpaid civil servants to donate part of their salaries, raising $180 million whose destination remains unclear[47]. Such strategies distort competition, increase the cost of the regional energy transition, and encourage governments to maintain their ineffective grip on the energy sector.

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[41] Junxia Liu, « Investments in the energy sector of Central Asia: Corruption risk and policy implications », *Energy policy*, n°133 (2019).
[42] Sydney P. Freedberg, Agustin Armendariz, Tanya Kozyreva and Thomas Rowley, « Putin's pipeline: How the Kremlin outmanoeuvred Western oil companies to wrest control of vast flows of Kazakhstan's crude », *ICIJ*, November 22, 2024.
[43] Crude Accountability, *Turkmenistan: A Model Kleptocracy* (Linden: Crude Accountability, 2021).
[44] « Petrofac Back in Favour in Turkmenistan After Falling Foul of Berdimuhamedov », *Turkmen News*, March 18, 2024.
[45] « Kyrgyzstan: Former Deputy Director of largest electricity company that owns major HPPs accused of corruption », *Business & Human Rights Resource Centre*, March 5, 2018.
[46] Maria Levina, « Kyrgyzstan: Deterring corruption could improve governance in energy sector », *The Times of Central Asia*, January 31, 2019.
[47] « Tajikistan: Company suspected of being a vessel for govt. corruption pays US lobbyist to promote Rogun HPP », *Business & Human Rights Resource Centre*, February 13, 2014.

Nonetheless, some albeit insufficient efforts have been made to reassure investors. Kazakhstan, Kyrgyzstan and Tajikistan have joined the Extractive Industries Transparency Initiative launched by the United Kingdom; Kazakhstan and Uzbekistan have digitalised border trade exchanges; and Kazakhstan has made public court rulings on business-related cases[48].

Political instability

The widespread poverty of a large share of the population, combined with heavy energy price subsidies, leaves political and energy systems in deadlock. Liberalising energy prices allows infrastructure renovation and foreign investment attraction, but any poorly managed increase could shake the socio-political order.

This was the case in Kazakhstan in 2022, with the *Quandy Quantar*, the deadliest uprising since independence. On 1 January 2022, three years after the transfer of power from Nursultan Nazarbayev to Kassym-Jomart Tokayev, LPG prices were administratively raised from 60 to 120 Tenge in the town of Zhanaozen, prompting local workers to mobilise[49]. The movement quickly spread to Almaty, where participants demanded reforms and Nazarbayev's definitive withdrawal from political life. On 4 January, the government unsuccessfully attempted to calm protests by reducing LPG prices to 50 Tenge, followed by the dissolution of parliament on 5 January. President Tokayev then appealed to the Collective Security Treaty Organisation to restore order, and a coalition of 2,500 Russian, Belarusian, Kyrgyz and Tajik troops intervened from 7 to 15 January in a deadly operation that officially left 238 people dead[50].

Although energy prices were only the trigger in this case, energy subsidies can be seen as a social contract, a form of redistribution of state revenues[51]. Such a contract exists in every Central Asian country.

4. Key takeaways

- Central Asia's energy systems, inherited from the Central Asian Power System (CAPS), stem from infrastructures, pricing mechanisms and task allocations dating back to the Soviet era. Integration into the global economy, population growth, national interests

[48] Junxia Liu, *op. cit.:* 41.
[49] Zehra Aksu, Gökhan Tuncel and Ahmet Ugur, « Collective security treaty organization and energy security policies: the 2022 Kazakhstan events », *Akademik Yaklaşımlar Dergisi*, n°2 (2024).
[50] Emmanuel Grynszpan and Charlotte Delmas, « Kazakhstan : un an après le 'janvier sanglant', le pays ignore les victimes », *Le Monde*, January 10, 2023.
[51] Julien Thorez, « La crise de January 2022 au Kazakhstan, une lecture géographique : XXIIIe journée Monde Iranien », *Inalco*, April 1, 2022.

and the deterioration of infrastructure have led to the fragmentation of the CAPS and the precariousness of regional energy security.

- Energy in Central Asia is closely linked to environmental issues. Ageing infrastructures and dependence on fossil fuels harm populations through pollution, while the prospect of accelerated climate change threatens to exacerbate water tensions among countries struggling to green their economies, which remain highly carbon intensive.
- Energy insecurity overlaps with Central Asian social dynamics. The geographical isolation of rural populations – particularly in mountainous regions – intensifies energy supply instability, poor air quality and energy inefficiency. Corruption, opening the door to Russian influence, worsens the inertia of energy systems and the concentration of wealth. Finally, the drive to reduce energy price subsidies, which function as a form of social contract and wealth redistribution, risks fuelling political instability and reinforcing Russia's regional significance.

RUSSIA'S GAS INDUSTRY EASTWARD PIVOT PUTS CENTRAL ASIA UNDER PRESSURE

1. Kazakhstan and Uzbekistan struggle to meet domestic demand while honouring export obligations

Kazakhstan

According to the *Energy Institute Statistical Review of World Energy* (EI-BPstat), proven gas reserves in Kazakhstan amount to 2.3 trillion cubic metres[52]. Around 98% of these reserves are located in the west of the country, with 85% concentrated in a few large fields (Tengiz, Kashagan, Karachaganak[53], Zhanazhol, and Imashevskoye). Kazakhstan is seeking partners for exploration. In July 2024, the national company QazaqGaz, in collaboration with Chevron Corporation and its subsidiary Chevron Munaigas Inc., signed a contract for geological exploration at the Zhalibek site in the Aktobe region[54].

Table 1: Natural gas production in Kazakhstan[55]

2020	2021	2022	2023	2024
55.1 bcm	53.8 bcm	53.3 bcm	59.1 bcm	59 bcm

Kazakhstan aims to increase its natural gas production over the next five years to reach 74 bcm by 2030. This growth would be driven by the commissioning of the Rozhkovskoye, Anabai and Urikhtau fields from 2023 onwards. Gas produced in Kazakhstan is mainly associated petroleum gas, which requires processing before it becomes marketable[56]. In 2024, Kazakhstan produced 29.7 bcm of marketable natural gas, of which 21.2 bcm were supplied to the domestic market[57].

With just over 30 bcm of processing capacity[58], Kazakhstan is unable to meet both domestic demand and its export obligations. Untreated gas is therefore sent to Russia for processing. Kazakh gas exports have dropped sharply in recent years. In 2021, they stood at 16 bcm, a 19.2% decline compared to 2020. In 2022, they fell to 4.6 bcm before rising again to 5.3 bcm

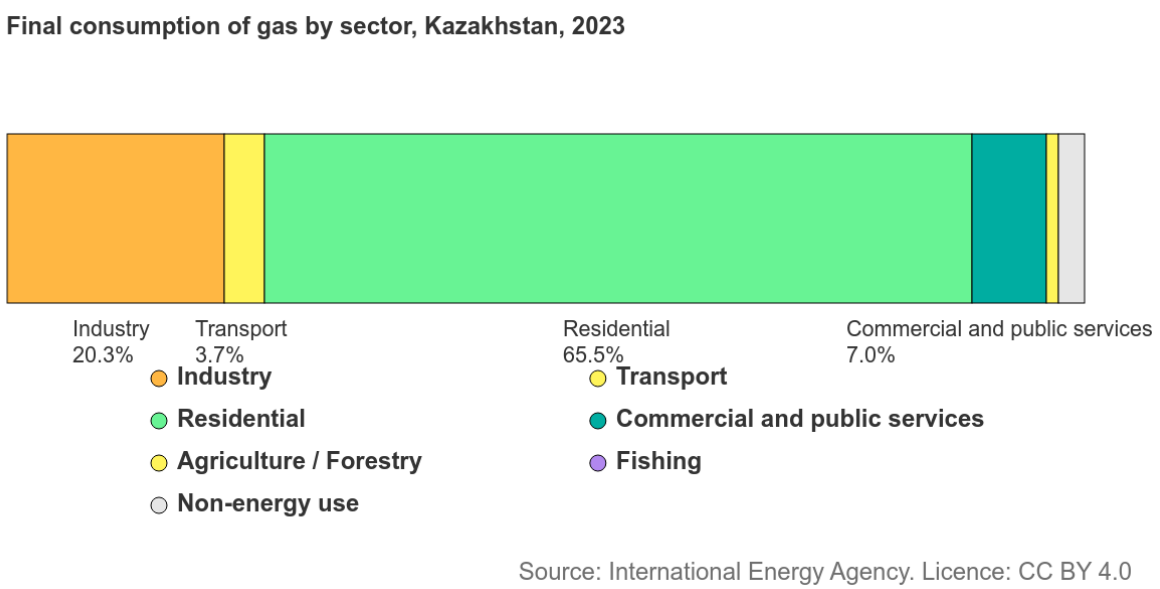
[52] BP, *Statistical Review of World Energy* (London: BP, 2021).
[53] Karachaganak accounted for 38% of the country's gross production in 2023, followed by Tengiz (27%) and Kashagan (20%).
[54] Aiman Nakispekova, « Where Does Kazakh Gas Flow Worldwide », *The Astana Times*, November 4, 2024.
[55] *Ibid. :* 55.
[56] Energy Institute, *2025 Statistical Review of World Energy* (London: EI, 2025).
[57] Dana Omirgazy, « Kazakhstan to Expand Access to Natural Gas to 12.8 Million People This Year », *The Astana Times*, April 23, 2025.
[58] International Energy Agency, *op. cit.* : 7.

in 2023, which represented 85.1% of the annual target[59]. This reduction is explained by the authorities' priority to meet domestic demand over exports.

To address this situation, Kazakhstan plans to inaugurate four new gas processing plants between 2026 and 2030: two at Kashagan (with capacities of 1 bcm and 2.5 bcm), one at Karachaganak (4 bcm), and one at Zhanaozen (900 million cubic metres)[60]. The Qatari company UCC Holding is in charge of developing the Kashagan plants[61].

In Kazakhstan, domestic gas demand more than doubled between 2010 and 2022, rising from 9.0 bcm to 19.3 bcm[62], and is expected to reach 32.4 bcm by 2030. Consumption is set to increase further due to the transition of thermal power plants from coal to gas. In 2023, gas accounted for 28.5%[63] of electricity generation. Household gas consumption is also rising progressively as the national gasification programme advances. UCC Holding is involved in this programme through the construction of pipelines and a compression station. In 2024, 12.8 million people had access to gas, representing 62% of the population[64]. In non-gasified regions, energy needs are met by coal and LPG.

Figure 1: Gas consumption by sector in Kazakhstan (2023)



Source: International Energy Agency. Licence: CC BY 4.0

[59] Aiman Nakispekova, *op. cit.:* 55.
[60] *Ibid*.: 60.
[61] « Gas deal between Kazakhstan and Qatari UCC Holding to be finalized within 2 months – Energy Ministry », *Interfax*, March 1, 2024.
[62] Evgeniya Mayburova, « Unlocking the value of flared gas in Kazakhstan's upstream oil and gas sector », *S&P Global*, June 26, 2024.
[63] International Energy Agency, *op. cit.*: 8.
[64] Dana Omirgazy, *op. cit.:* 58.

China is the main customer for Kazakh natural gas exports. In 2017, Kazakhstan planned to export 10 bcm/year to China until 2023. This target was never met. Kazakhstan delivered 7.37 bcm to China in 2020, 5.6 bcm in 2021, 5.07 bcm in 2022, and 5.857 bcm in 2023. Exports to Russia have also declined, falling from 9 bcm (January–August 2020) to 8.2 bcm in 2021, 7.9 bcm in 2022 and 3.6 bcm in 2023. In 2017, when export levels were at their peak, Kazakhstan exported 14.7 bcm to Russia[65]. Gas exports to Uzbekistan also peaked in 2017 at 1.5 bcm, before falling to 0.4 bcm in 2019, 0.1 bcm in 2020, and stopping altogether from 2021 onwards.

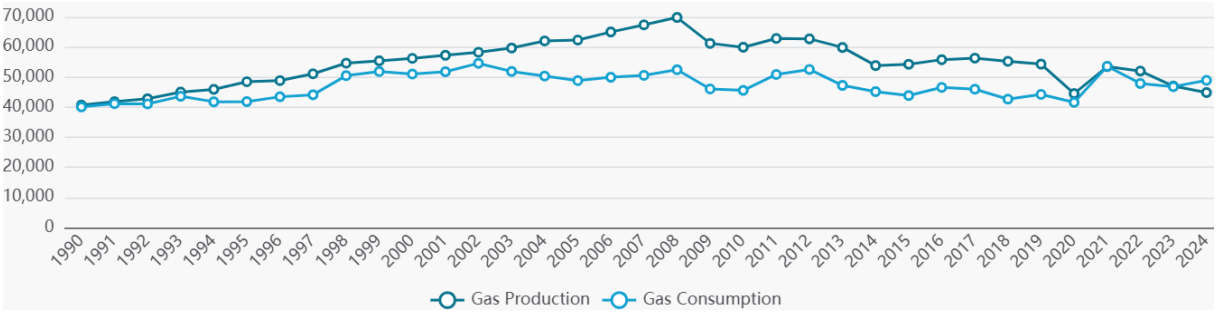
In 2024, Kazakhstan produced 3 million tonnes of liquefied petroleum gas (LPG)[66]. Rising associated petroleum gas production and the construction of new gas processing plants could boost LPG output to more than 4 million tonnes per year by 2030. The use of LPG as automotive fuel and in petrochemicals, encouraged by regulated prices, is driving growth in domestic demand. Domestic consumption stands at around 2.5 million tonnes per year. This is lower than national production, and the country usually exports more than 1 million tonnes per year[67]. Production is therefore insufficient to meet domestic demand while sustaining such levels of exports. As a result, the Kazakh government imposed a partial export ban in November 2023[68]. In May 2025, this partial ban was extended for another six months. Tajikistan was the largest importer of Kazakh LPG, accounting for 48% of exports in 2024[69]. However, taking advantage of the EU embargo on Russian LPG introduced in December 2024, Kazakhstan redirected most of its LPG exports towards Europe. This created a more favourable pricing environment for Russian LPG in Central Asia. In 2025, mirroring the trend observed in the oil sector, Tajikistan began substituting Kazakh LPG with Russian supplies. Retail LPG prices in Kazakhstan are about twice as low as in Russia, Uzbekistan or Kyrgyzstan[70], fuelling significant illegal exports to neighbouring countries. The authorities are working to curb these flows.

[65] Aiman Nakispekova, *op. cit.:* 55.
[66] Kazakh Prime Minister Cabinet, « Ministry of Energy of Kazakhstan: 2024 results and strategic plans for 2025 », *https://primeminister.kz/en/news/reviews/ministry-of-energy-of-kazakhstan-2024-results-and-strategic-plans-for-2025-29771* (accessed on September 22, 2025).
[67] « Kazakhstan plans LPG output expansion », *argus*, July 15, 2025.
[68] The ban does not apply to companies with production-sharing agreements or to those producing LPG from gas from the Karachaganak field, such as TCO, Zhaikmunai, and Kazrosgaz.
[69] Sabina Aliyeva, *op. cit.:* 29.
[70] Saniya Sakenova, « Kazakhstan to Introduce Four Gas Processing Plants by 2030 », *The Astana Times*, July 16, 2024.

Uzbekistan

Uzbekistan has proven gas reserves of around 1.86 trillion cubic metres[71]. Since 2021, Uzbek gas production has fallen by around 7% annually, reaching 44.8 bcm in 2024, while consumption that same year stood at 48.9 bcm[72].

Figure 2: Natural gas production and consumption in Uzbekistan (billion cubic metres)[73]



Existing fields are in decline. While Uzbek resources could support higher production, the gas sector suffers from chronic underinvestment. Wholesale gas prices, among the lowest in the world, cover only 20% of production costs[74]. They encourage consumption but deter investors. To support investment, in late 2021 Uzbekistan reduced tax rates on natural gas extraction threefold, and on oil and gas condensates twofold[75].

Despite the intention to develop new reserves, particularly in the underexplored Ustyurt region, no major new source is expected to be exploited in the coming years. Experts are therefore sceptical about the government's target of increasing production to 62 bcm by 2030. In 2019, the British company BP and Azerbaijan's SOCAR were commissioned to explore the Ustyurt region. BP withdrew in 2021, likely due to its then-strategy of shifting towards low-carbon projects. SOCAR renewed its interest in 2024 by signing a strategic partnership with Uzbekneftegaz, although both companies remain at the initial exploration stage[76].

Russian actors play a major role upstream in Uzbekistan's gas sector: Lukoil is the country's second-largest gas producer after the state-owned Uzbekneftegaz, which has established two joint ventures with Gazprom's subsidiary, Gas Project Development Central Asia AG. The first,

[71] « Uzbekistan plans $500M investment to boost Russian gas imports », *Eurasianet*, February 21, 2024.
[72] Enerdata, « Uzbekistan Energy Information », *https://www.enerdata.net/estore/energy-market/uzbekistan/* (accessed on September 22, 2025).
[73] *Ibid*.: 73.
[74] International Energy Agency, *op. cit.:* 18.
[75] « Who produces oil and gas in Uzbekistan? », *bne intellinews*, February 19, 2024.
[76] Joe Luc Barnes, « Gas Crunch in Uzbekistan: Industry Falters as Demand Surges », *The Times of Central Asia*, April 9, 2025.

Natural Gas Stream, was tasked with implementing the state programme to increase hydrocarbon production between 2017 and 2021[77]. The second, created in 2017 and originally named Jizzakh Petroleum, was renamed Saneg in November 2022, a little over a year after Belvor Holding Ltd. acquired 98% of its shares, following Uzbekneftegaz's withdrawal. Gas Project Development Central Asia AG retained a 2% stake in Saneg. Belvor Holding is owned by the Uzbek businessman Bakhtiyor Fozilov, who, through Saneg, has in just a few years[78] gained control of 80% of Uzbekistan's oil production and 22% of its gas reserves[79].

Bakhtiyor Fozilov acquired a central role in Uzbekistan's gas and oil sectors following the death of President Islam Karimov in September 2016, who had been a proponent of strong state control over these industries. Since Shavkat Mirziyoyev came to power, the role of Russian actors has expanded[80] alongside the rise of Fozilov, who acts as a link between Russian interests and Uzbek business circles tied to the intelligence services[81]. Another company controlled by Fozilov, Eriell, has gradually established a monopoly over the drilling of Uzbek oil and gas fields through agreements with Uzbekneftegaz. Eriell's ownership structure is complex due to the involvement of offshore companies. Through these entities, the company is reportedly jointly owned by Fozilov, Gazprombank, and a Russian firm named AMGA Consulting, which shares a Moscow address with companies belonging to Gennady Timchenko.

Uzbek gas production is insufficient to meet rising domestic demand, particularly as large volumes are lost through an ageing transport network. On top of this, Uzbekistan must also deliver gas exports to China under a contract dating back to the early 2010s. While this contract stipulated exports of around 10 bcm/year, in 2022 Uzbekistan exported only 3–4 bcm to China[82].

Heavy reliance on gas across multiple sectors (industry, transport, electricity[83] and heat generation) leads to conflicts of use. In winter, when residential heating demand rises, many filling stations are forced to close, creating chaotic situations in which drivers must jostle and queue for hours in the hope of obtaining fuel. In Uzbekistan, a large share of vehicles run on

[77] Resolution No. RP-2822 of the President of the Republic of Uzbekistan on the approval of the program to increase hydrocarbon production for 2017–2021, adopted on March 9, 2017.
[78] At the end of 2019, when Saneg was still called Jizzakh Petroleum, the company was tasked with implementing the program to increase oil production in Uzbekistan for the period 2020–2030, which involved the acquisition of 106 oil and gas fields owned by Uzbekneftegaz.
[79] SANEG, « About company », *https://www.saneg.com/en/page/2-about* (accessed on September 23, 2025).
[80] On 8 September 2016, the Uzbek parliament declared the then Prime Minister, Shavkat Mirziyoyev, as acting president. On 6 October 2016, Uzbekneftegaz and Gazprom's subsidiary, Gas Project Development Central Asia AG, created the joint venture Natural Gas Stream. On December 4, 2016, Mirziyoyev was formally elected President of Uzbekistan.
[81] « Enquête RFE/RL : des accords secrets ont privé les Ouzbeks de gaz », *RFE/RL*, September 23, 2025.
[82] Marcin Poplawski and Filip Rudnik, « Russian gas in Central Asia: a plan to deepen dependence », *OSW*, October 31,2023.
[83] In 2023, the share of natural gas in electricity generation was 82.8%.

methane, since a full tank costs around $15 compared to $40–50 for petrol vehicles. To contain gas demand, in May 2024 the government raised electricity and gas tariffs by 52.5% and 71% respectively[84].

In order to satisfy both domestic demand and export obligations to China, Uzbekistan signed a contract with Turkmenistan in December 2022 for the delivery of 1.5 bcm over three months. Following this pilot contract, the two countries agreed in August 2023 on a new short-term deal covering 2 bcm. In October 2023, Uzbekistan signed a contract with Gazprom to import 2.8 bcm/year from Russia.

2. Turkmenistan's struggles to diversify its exports

According to EI-BP and Cedigaz, Turkmenistan's proven gas reserves stand at between 13 and 14 trillion cubic metres. In 2023, Turkmenistan produced 80.6 bcm, a record since the country's independence. Roughly half of this volume is consumed domestically, while the remainder is exported. Turkmenistan hopes to raise production to 116 bcm/year by 2029. The main producers are the state-owned company Turkmengaz, China National Petroleum, and the Malaysian company Petronas[85]. In order to achieve its production objectives, Turkmenistan is opening the door to new players. In May 2025, XRG[86], the international investment branch of Abu Dhabi National Oil Company (ADNOC), acquired a 38% stake in Block I in the Caspian Sea[87]. Under the new agreement, Petronas retains a majority stake of 57%, while the Turkmen state-owned company Hazarnabit controls the remaining 5%.

Natural gas sales account for three-quarters of Turkmenistan's total exports[88]. Turkmenistan's gas exports peaked in 2008 when the country sent 45 bcm to Russia[89]. In 2023, Turkmenistan exported 39.5 bcm of natural gas[90], mainly to China. China has indeed gradually established itself as the primary market for Turkmen gas. In 2012, Turkmenistan exported 21.3 bcm to China, representing 52% of the country's total exports. By 2022, this figure had risen to 32.9 bcm, or 81% of its exports.

[84] Joe Luc Barnes, *op. cit* : 77.
[85] « Turkmenistan natural gas production: data and insights », *Offshore Technology*, July 11, 2024.
[86] Established at the end of 2024, XRG focuses on international investments in chemicals, natural gas, and renewable energies.
[87] Sadokat Jalolova, « Abu Dhabi Energy Giant Joins Offshore Gas Project in Turkmenistan », *The Times of Central Asia*, may 16, 2025.
[88] The Oxford Institute for Energy Studies, *Turkmenistan: the gas monetization challenge* (Oxford: OIES, September 2024).
[89] Bruce Pannier, « After Long Search, Turkmenistan Finally Finds a New Gas Customer – Iraq », *The Times of Central Asia*, November 14, 2024.
[90] « Turkmenistan aims to raise gas production from 80.6 bln bcm in 2023 to 116 bcm a year by 2029 », *interfax*, October 14, 2024.

However, Gazprom's pivot eastwards – accelerated by its retreat from the European market in the context of the war in Ukraine – places Turkmenistan in a situation of intensified competition. The Power of Siberia 1 pipeline, completed in 2019, carried 22.7 bcm in 2023 (13.7% of China's imports) and exceeded its full capacity of 38 bcm in 2024. Added to this is a Far Eastern pipeline project, with a capacity of 10 bcm, due to connect China to Sakhalin's resources by 2027 and potentially reach full capacity by 2030. Most significantly, the cornerstone of Gazprom's Chinese strategy is the Power of Siberia 2 project (50 bcm), intended to link Russia to China via Mongolia. The parties signed a legally binding agreement on 2 September 2025, although the issue of gas pricing has yet to be resolved [91]. In any case, Gazprom became China's largest pipeline supplier in February 2024, overtaking Turkmenistan for the first time. As a result, Gazprom's supply is already exerting downward pressure on the future price of Turkmen deliveries to China.

From the very first Gazprom deliveries to China in 2019, Russian gas was sold at a lower price than Turkmen gas. Having lost the European market, Gazprom may be inclined to offer even lower prices in the event of new contracts. This allows China to demand price reductions from Turkmenistan, particularly for additional volumes that could be delivered via Line D of the Central Asia–China gas pipeline. Line D is expected to add 30 bcm to the existing 55 bcm capacity already provided by the three existing lines, but construction is currently suspended due to difficulties between Chinese and Turkmen partners over gas pricing. Beyond Russian competition, CNPC, the parent company of PetroChina, is also demanding a discount on the Line D supply contract, arguing that it has already invested in Turkmen gas fields.

In order to break free from its extreme dependence on the Chinese market, Turkmenistan aims to increase and diversify its gas exports. However, the production increases this requires are constrained by underinvestment in the gas sector, resulting from significant restrictions on foreign investment. Moreover, Turkmenistan struggles to secure new outlets.

Gazprom's eastward pivot limits Turkmenistan's ability to diversify regionally. In the Uzbek market, Turkmengaz can offer very competitive gas due to the short distance between its main fields and Uzbekistan's major consumption centres. Yet despite short-term contracts signed between Turkmenistan and Uzbekistan in December 2022 and August 2023, prospects for a deeper Turkmengaz presence in Uzbekistan appear limited by an October 2023 contract providing for Gazprom to export at least 2.8 bcm to Uzbekistan (with Gazprom hoping to export 11 bcm by 2026).

[91] Anne-Sophie Corbeau, Tatiana Mitrova and Erica s. Downs, « Signed but Not Sealed: The Geopolitics Behind Power of Siberia 2 », *The National Interest*, September 9, 2025.

With Kazakhstan, following a strategic agreement signed between QazaqGaz and Turkmengaz at the end of 2024, Turkmenistan is exploring the possibility of joint exploration projects. QazaqGaz is particularly interested in participating in the new development phases of the Galkynysh field and is considering potential cooperation with ADNOC in this context[92]. A deepening of the relationship with QazaqGaz could enable Turkmenistan to export to Kazakhstan, but here too Gazprom's competition looms large (see following section).

On August 12, 2024, Turkmenistan's Ministry of Foreign Affairs issued a statement criticising gas cooperation between Russia, Uzbekistan and Kazakhstan. In the document, the vice-president of Turkmengaz denounced Russia's intention to use the Central Asia-China gas pipeline to export its own gas to China [93]. According to him, only Turkmen, Uzbek and Kazakh gas should be allowed to flow through this pipeline. This public declaration represents a strong stance for a country whose diplomacy is usually discreet and reflects Turkmen leaders' perception that Gazprom's strategy poses a threat.

Beyond Gazprom's quest for new Asian outlets, its withdrawal from the European market has also forced the company to fall back on the Russian domestic market to offload its production. As a consequence, the five-year contract that had allowed Turkmengaz to export to Russia was not renewed upon its expiry on 30 June 2024.

Since neither Russia nor neighbouring Central Asian states offer promising enough outlets to reduce its dependence on China, Turkmenistan must look further afield, whether westward (Caucasus, Turkey, Europe) or southward (Iraq, Pakistan, India).

In late July 2023, Turkmenistan's Ministry of Foreign Affairs issued a statement expressing its wish to see progress on the Trans-Caspian Pipeline project. This pipeline could carry 30 bcm/year. However, the project is impossible to implement without long-term commitments from European importers. Yet the EU's climate goals restrict its ability to make such commitments. This situation is already preventing the expansion of the Southern Gas Corridor, which is nonetheless necessary to double Azerbaijani exports by 2027 as provided for under the 2022 EU–Azerbaijan agreement. As such, European market conditions make the construction of a new subsea pipeline highly unlikely.

In the absence of a Trans-Caspian pipeline, Turkmenistan can diversify exports westward by accessing Azerbaijani, Turkish and European markets via the Iranian network. In November 2021, Azerbaijan, Iran and Turkmenistan signed a trilateral swap deal under which Turkmenistan would send between 1.5 and 2 bcm/year to north-eastern Iran, enabling Iran to

[92] Vladimir Afanasiev, « Kazakhstan gas player seeks partnership with Adnoc », *upstream*, January 14, 2025.
[93] Marcin Poplawski, « Turkmenistan: concerns over Russia's growing activity on the regional gas market », *OSW*, August 17, 2023.

send the same volume of its own gas to Azerbaijan. This swap deal allows Azerbaijan to export more of its own gas to Europe, where it sells at a much higher price than the price at which Azerbaijan purchases Turkmen gas[94].

The agreement entered into force in early 2022. After a few months, the smooth functioning of exchanges reportedly prompted the three partners to agree to double the exported volumes. For unknown reasons, this doubling never materialised. In 2023, Azerbaijan imported 1.51 bcm from Turkmenistan. In January 2024, exchanges were suspended. The press reported that Turkmenistan, encouraged by the deal's initial success, sought to raise gas prices beyond what Azerbaijan was willing to pay [95]. Azerbaijan then broke off negotiations, a decision facilitated by domestic production that allowed it to meet domestic demand while honouring its export commitments.

In July 2024, Turkmenistan's Ministry of Foreign Affairs announced that Ashgabat, Tehran and Baghdad had signed a swap deal to export 10 bcm/year from Turkmenistan to Iraq via Iran [96]. This agreement was meant to contribute to stabilising Iraq's electricity network. However, the United States is reportedly opposing its implementation as part of its strategy to economically stifle Iran[97].

In February 2025, Turkmengaz signed an agreement with Turkish company BOTAS to supply Turkey, via an Iranian swap deal, with 1.3 bcm of gas between March 1, 2025, and the end of the year, then 2 bcm/year in subsequent years[98]. This additional supply source bolsters Turkey's ambition to position itself as a European gas hub. Hungary has also expressed interest in importing Turkmen gas[99].

Nevertheless, the Iranian route remains a limited option. An ageing pipeline network, periodic declines in domestic gas production, and a constant electricity deficit causing massive blackouts all constrain Iran's ability to honour its contractual commitments[100]. In the past, Iran has regularly failed to present Turkey with the volumes stipulated under their bilateral agreement.

Beyond Iran, Turkmenistan would also like its gas to transit via Afghanistan through the Turkmenistan–Afghanistan–Pakistan–India Gas Pipeline (TAPI), with a planned capacity of 33

[94] The Oxford Institute for Energy Studies, *op. cit.:* 89.
[95] David O'Byrne, « Turkmenistan: Another wrong run taking Ashgabat into gas-export dead end », *eurasianet*, September 16, 2024.
[96] « Turkmenistan to supply Iraq with 20 million cubic meters of gas per day – Iraqi media », *interfax*, October 21, 2024.
[97] « US sanctions on Iran detail crucial Iraq Turkmenistan gas deal », *Kurdistan 24,* August 19, 2025.
[98] « Turkmenistan signs agreement to supply gas to Türkiye as of March 2025 », *Enerdata*, February 12, 2025.
[99] « Hungary, Turkmenistan conclude political agreement on gas supplies – Hungarian FM », *interfax*, August 21, 2023.
[100] Fuad Shahbazov, « Türkiye-Turkmenistan Gas Deal Opens Possibilities for New Routes », *Eurasia Daily Monitor*, n°22 (March 20, 2025).

bcm, of which 42% would be allocated respectively to India and Pakistan, and 16% to Afghanistan[101]. Turkmengaz holds a majority stake in the project with 85%. Afghan Gas Corporation, Pakistan's Inter State Gas Systems, and India's GAIL each hold 5%. Kazakhstan's Ministry of Energy has declared that Astana is negotiating a stake in the project[102]. In September 2024, construction of the Afghan section of TAPI began. However, India – without officially withdrawing from the project – appears to be losing interest, given the strategic leverage it would afford Pakistan, which would control inflows into India. An Indian withdrawal would likely prompt Pakistan to pull out as well, since the project would no longer be economically viable without India paying transit fees[103]. With the Indo-Pakistani conflict intensifying in April 2025, the project is very unlikely to make progress in the coming years, especially given persistent doubts about financing capacity.

The review of Turkmenistan's various gas export diversification options demonstrates just how heavily the country is constrained by geopolitical and economic factors.

Since gas sales to China alone account for more than two-thirds of the country's total exports, Turkmenistan's financial stability depends on them. According to Fitch, Turkmenistan could face a budget deficit as early as 2025 due to the expected decline in energy prices[104]. This would have strategic consequences, since the government accounts for 90% of national investment.

Turkmenistan must therefore find new ways to add value to its substantial gas resources. This could include the development of the petrochemical and fertiliser industries. Exporting gas in the form of processed products would allow Turkmenistan to overcome the challenges of developing new export pipelines while selling goods with greater added value. Multinational companies could be attracted by the opportunity to produce at particularly competitive costs, given the country's low gas production costs. In 2022, Hyundai and Daewoo signed memoranda of understanding with Turkmenistan to develop fertiliser plants.

3. What prospects for a gas union between Russia and the Central Asian States?

In recent years, Kazakhstan's and Uzbekistan's domestic gas production has been insufficient to meet their internal demand and has limited their export capacity to China. This situation

[101] « Afghanistan : le méga-projet de gazoduc TAPI démarre », *Connaissance des Énergies avec AFP*, September 12, 2024.
[102] « First kilometers of TAPI gas pipeline laid in Afghanistan – media », *interfax*, January 14, 2025.
[103] Syed Fazl-e-Haider, « TAPI Pipeline to ReMayn Failure Without India and Pakistan's Participation », *Eurasia Daily Monitor*, n°22 (February 25, 2025).
[104] The Oxford Institute for Energy Studies, *op. cit.:* 89.

represents an opportunity for Russia to secure new clients. In December 2022, Vladimir Putin proposed the establishment of a tripartite gas union with Uzbekistan and Kazakhstan, aimed at meeting domestic demand and coordinating gas transit to China through their territories.

During the first six months of 2023, the three states continued negotiations and prepared the infrastructure to enable Russian gas transit. In June 2023, Russia and Uzbekistan signed a two-year contract providing for the export of at least 2.8 bcm/year of Russian gas. In July 2023, Gazprom signed a contract allowing it to transport its gas via Kazakhstan to Uzbekistan. Deliveries to Uzbekistan began in October 2023, reached 5.6 bcm in 2024, are expected to be 7.3 bcm in 2025, and could rise to 11 bcm from 2026 onwards[105]. Uzbekistan's gas shortages thus allow Kazakhstan to increase transit through its territory.

For its part, Kazakhstan is assessing the potential demand for Russian gas on its domestic market. The national company QazaqGaz signed a contract with Gazprom stipulating that the latter would only export gas to Kazakhstan on an occasional basis, when required by domestic demand, particularly during winter peaks. Consequently, in the first quarter of 2024, Kazakhstan received a delivery of 500 million cubic metres of Russian gas[106]. Gazprom hopes to export far more in the future, notably by participating in the gasification of northern Kazakhstan. It intends to develop local gas infrastructure as part of the construction of a 45 bcm pipeline to China, of which 10 bcm would be allocated to Kazakhstan[107]. The realisation of this project, however, will depend on the Chinese side. In April 2025, China's ambassador to Russia declared that building a new pipeline across Kazakhstan would be economically less attractive than completing Power of Siberia 2 or importing LNG[108].

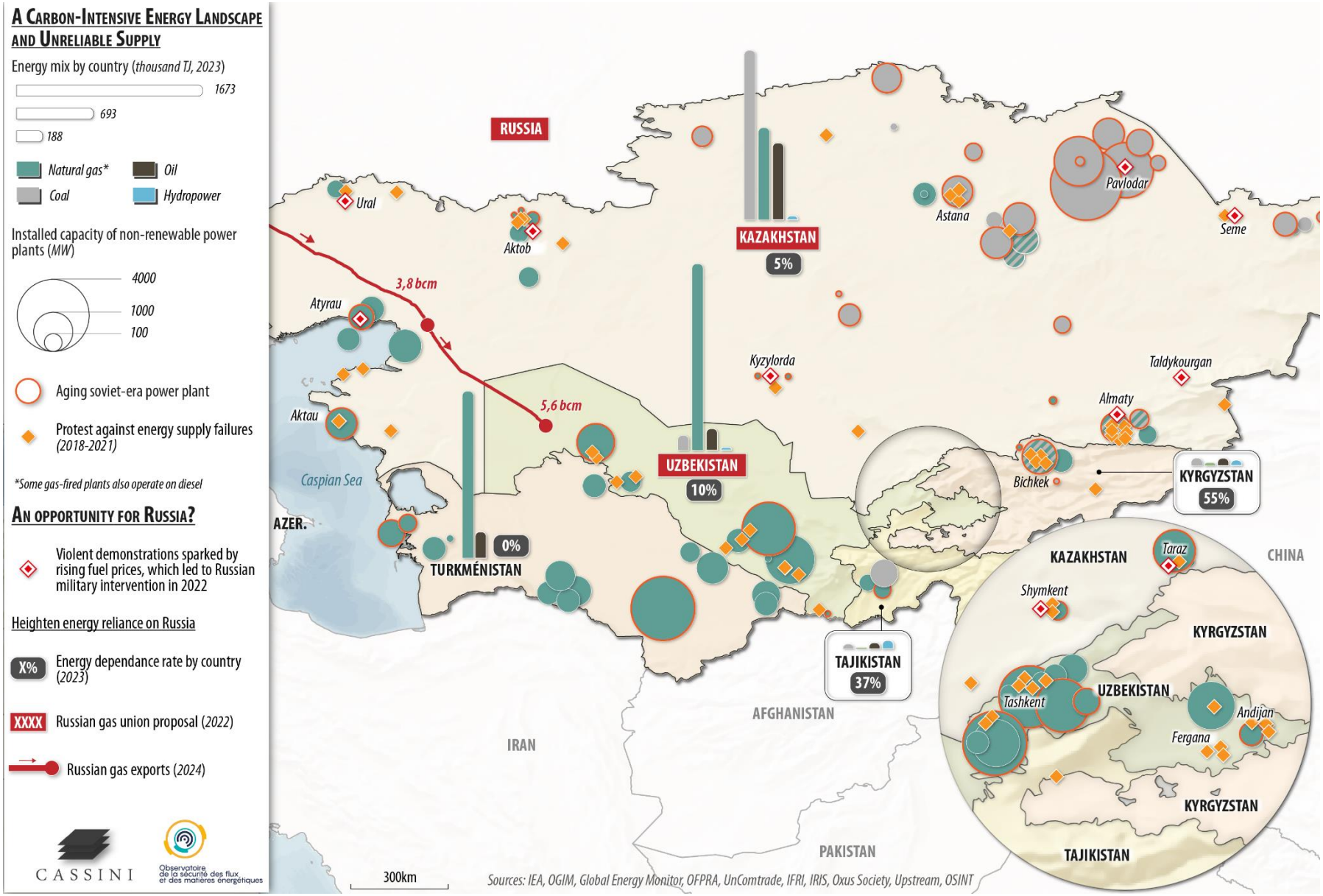
In November 2023, Alexey Miller, head of Gazprom, stated that the company was negotiating a long-term (15 year) cooperation agreement with Kazakhstan, Uzbekistan and Kyrgyzstan, hoping to conclude it by mid-2024. This has not happened and remains unresolved as of summer 2025. Central Asian countries are aware of the risks of deepening political and economic dependence on Russia but appear to view the social and environmental risks posed by their fragile energy systems as more urgent, particularly since the 2022 *Quandy Quantar* episode. Some experts estimate that Russia could increase its gas exports to Central Asia to as much as 20 bcm/year over the next decade, capitalising on the growing shortfall in local production[109].

[105] « Gas transit from Russia to Uzbekistan via Kazakhstan totals 5.6 bcm in 2024, 7.3 bcm planned for 2025 », *interfax*, April 11, 2025.
[106] « Kazakhstan Imported 500 million Cubic Meters of Russian Gas in First Quarter 2024 », *The Times of Central Asia*, April 22, 2024.
[107] « Gas pipeline project to China via Kazakhstan now underway – Novak », *interfax*, December 25, 2024.
[108] Vladimir Afanasiev, « Kazakhstan hopeful of reaching agreement on Russian gas deal », *upstream*, April 24, 2025.
[109] Tim Crawford, « Russia makes gas inroads in Central Asia », *PE Media Network*, April 17, 2024.

However, Gazprom's loss of the European market strengthens the negotiating position of Central Asian countries. As a result, Gazprom will need to offer relatively preferential prices if it wants to penetrate these markets. Uzbekistan and Kazakhstan currently find themselves in a fairly strong negotiating position, allowing them to insist that Russian gas imports be conducted strictly on commercial terms, without political concessions. Moreover, in order to limit Russian influence over their energy systems, both countries rejected Russia's initial proposal to transfer control of their gas networks to Gazprom[110].

[110] « La Russie a demandé à l'Ouzbékistan de transférer son système de transport de gaz à Gazprom – medias », *KUN.UZ*, January 14, 2023.

Map 1 – Fragile Energy Systems in Central Asia : An Opportunity for Russia



4. Key Takeaways

- Kazakhstan produced 59 bcm of natural gas in 2024 and aims to reach 74 bcm by 2030. This policy responds both to rising domestic demand and to the decline in exports: in 2023, the country met only 85.1% of its export commitments, directed mainly to China and Russia. Astana also plans to expand its gas processing capacity in order to reduce reliance on Russia, which currently processes nearly half of its production.
- Despite significant reserves, Uzbekistan's gas production fell by 7% between 2021 and 2024. This decline, symptomatic of chronic underinvestment due to heavy gas price subsidies and corruption within the sector, has made it difficult to meet domestic demand and export contracts. In 2022, Uzbekistan delivered only 3 bcm to China out of the 10 bcm contracted. Usage conflicts, compounded by the transport sector's dependence on gas, have forced the country to rely on sustained imports of Russian gas since 2023.
- Turkmenistan produced 80.6 bcm in 2023 and aims to reach 116 bcm by 2029, a growth supported in particular by the country's opening to new foreign investors such as ADNOC. However, Ashgabat faces difficulties in exporting its gas. Whereas nearly all exports went to Russia in 2008, 81% were directed to China by 2022. Gazprom's eastward pivot since the war in Ukraine, coupled with Uzbekistan's preference for Russian supplies, has left Turkmenistan increasingly isolated. The country has been forced to conduct swap deals with Iran, Azerbaijan, Iraq and Turkey, while turning to the production of processed goods such as fertilisers, in the absence of realistic prospects for the TAPI and TCP pipeline projects in the current economic and geopolitical climate.
- In December 2022, Vladimir Putin proposed the establishment of a tripartite gas union with Uzbekistan and Kazakhstan, aimed at meeting domestic demand and coordinating gas transit to China. Central Asian countries are aware of the risks of growing political and economic dependence on Russia but appear to regard the social and environmental risks created by their fragile energy systems as more urgent. Nevertheless, Gazprom's loss of the European market sets Uzbekistan and Kazakhstan in a relatively strong negotiating position, allowing them to insist that Russian gas imports take place strictly on commercial terms, without political concessions.

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

1. Regional ambitions in renewable energy

Kazakhstan

Kazakhstan aims to generate 15% of its total electricity from renewable energy (RE) by 2030, excluding large hydropower[111]. By the end of 2024, RE accounted for 6.4% of total electricity production[112]. Including large hydropower, RE represents roughly 15% of national electricity production[113]. The launch of a renewable energy auction system in 2018 marked the real start of sector development, with 260 companies from 13 countries participating in over 160 projects[114; 115]. Kazakhstan currently has 3 GW of wind, solar, and small hydropower capacity (<50 MW)[116]. From 2024 to 2027, auctions for an additional 6.7 GW of renewable capacity have been approved, with more than 3.1 GW already allocated[117].

While Kazakhstan produces and consumes some of the cheapest coal in the world, the growth of RE raises concerns about potential energy price increases, which could spark social unrest. Coal-fired power plants, which produced 66.7% of electricity in 2022, are not flexible enough to efficiently integrate intermittent renewables due to their age[118]. Hydropower and gas plants provide the flexibility needed for renewable integration. However, Kazakhstan's hydropower is underdeveloped and highly vulnerable to climate change[119]. Replacing old coal plants with more flexible gas plants would increase the need for gas imports from Russia or Turkmenistan.

Turkmenistan

Turkmenistan has expressed its commitment to RE development through the 2020 *National Strategy for the Development of Renewable Energy until 2030* and a 2022 *Development Cooperation Agreement* with the Emirati company Masdar to build 100 MW of solar capacity. However, national efforts appear to prioritize energy efficiency in decarbonizing the sector[120].

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[111] Aidyn Bakdolotov, « Energy sector for green transitioning », *Economic Research Institute*, n°23 (April 2025).
[112] Dana Omirgazy, « Kazakhstan Pans Major Boost in Renewable Energy by 2030 », *The Astana Times*, May 22, 2025.
[113] LowCarbonPower, "Electricity in Kazakhstan in 2024", https://lowcarbonpower.org/region/Kazakhstan (accessed on August 20, 2025).
[114] Kazakhstan, Russia, China, Turkey, France, Bulgaria, UAE, Italy, Netherlands, Germany, Singapore, Malaysia, and Spain.
[115] Aidyn Bakdolotov, *op. cit.:* 112.
[116] QazaqGreen, « RES map », https://qazaqgreen.com/en/map/, (accessed on August 18, 2025).
[117] Dana Omirgazy, *op. cit.:* 113.
[118] Kuanysh Beisengazin, « Coal Sector of Kazakhstan: Challenges and Opportunities for Decarbonizing the Economy », *CACF*, n°26 (April 2025).
[119] OSCE, *Advancing Energy Security in Central Asia* (Viena: OSCE, 2022).
[120] Ministry of Energy of Turkmenistan, « Energy Sector of Turkmenistan », https://energy.carecprogram.org/wp-content/uploads/2023/11/Ministry-of-Turkmenistan.pdf (accessed on August 20, 2025).

The National Strategy promotes energy savings in the oil and gas industry and electricity generation, noting that RE will initially focus on securing supply for remote regions[121].

Uzbekistan

In 2019, RE accounted for 10.2% of Uzbekistan's electricity generation[122], mostly from hydropower. By 2022, solar and wind accounted for only 253 MW, roughly 1% of total RE capacity[123]. By early 2025, Uzbekistan had 3.5 GW of combined solar and wind capacity[124]. In January 2024, Uzbek legislators set a target of 27 GW of RE capacity and 40% of electricity from RE by 2030. On 14 January 2025, during the Abu Dhabi Sustainable Development Week, President Mirziyoyev raised this target to 54% of electricity from RE by 2030, aiming to save 25 bcm of natural gas per year[125; 126]. In 2021, the government set goals of 7 GW of solar and 5 GW of wind capacity by 2030[127].

The UAE is a key partner in Uzbekistan's energy transition through Masdar and AMEA Power. Saudi Arabia's ACWA Power is also heavily involved, including the development of a second large-scale green hydrogen project in 2023. China participates through China Energy Overseas Investment, China Datang Overseas Investment, and Universal Energy, while France is present via Total Eren and Voltalia which operate solar power plants[128]. International financial institutions, including the World Bank Group, the Asian Development Bank, and the EBRD, support RE projects in Uzbekistan.

Kyrgyzstan

Kyrgyzstan benefits from abundant water resources, reflected in its energy mix. Hydropower accounted for 23.8% of primary energy supply in 2022, just behind oil (34.3%) and coal (33.2%)[129]. Electricity production relies 86% on hydropower. Seasonal water variations

[121] Government of Turkmenistan, *National Strategy of Turkmenistan on Climate Change (New Edition)* (Ashgabat: government of Turkmenistan, 2017).
[122] International Energy Agency, « Context of renewable energy in Uzbekistan », *https://www.iea.org/reports/solar-energy-policy-in-uzbekistan-a-roadmap/context-of-renewable-energy-in-uzbekistan* (accessed on September 24, 2025).
[123] Damon Embling, « Uzbekistan's renewable energy boom: How solar power is reshaping the country's economy », *euronews*, March 31, 2025.
[124] « Uzbekistan intends to boost share of renewable energy sources in balance to 54% by 2030 – president », *Interfax*, January 14, 2025.
[125] President of the Republic of Uzbekistan, « Address by the President of the Republic of Uzbekistan Shavkat Mirziyoyev at the summit of the Abu Dhabi Sustainability Week », *https://president.uz/en/lists/view/7814* (accessed on August 14, 2025).
[126] Enerdata, « Uzbekistan targets 27 GW of renewable capacity, 40% in power generation by 2030 », *https://www.enerdata.net/publications/daily-energy-news/uzbekistan-targets-27-gw-renewable-capacity-40-power-generation-2030.html* (accessed on September 24, 2025).
[127] EBRD, « Support for the Implementation of Wind Auctions in Uzbekistan », *https://www.ebrd.com/home/work-with-us/projects/tcpsd/11174.html* (accessed on September 24, 2025).
[128] « Informations sur les grands projets mis en oeuvre dans notre pays pour introduire des centrales solaires, éoliennes and thermiques », *Ministère de l'Énergie de la République d'Ouzbékistan*, December 6, 2024.
[129] International Energy Agency, *op. cit.*: 21.

constrain the national grid, which depends on increasing domestic coal production and fossil fuel imports.

The *National Development Strategy of the Kyrgyz Republic 2018–2040* sets a target of 10% RE (excluding large dams) by 2040[130]. Currently, RE infrastructure is limited. Notable developments include eight small hydropower plants in 2024[131], a 300 MW solar project with Chinese developer Shenzen Energy[132], and a 100 MW wind farm under construction since June 2025[133]. The strategy also aims to restructure energy costs to attract foreign investment, facilitate heating system transition, and begin gasification of the economy.

Although the 2020 RE law and Feed-in Tariff system provide a regulatory framework, the focus remains on large-scale hydropower projects[134]. Chinese companies are involved, but the sector offers opportunities to diversify partners, including French (GE Hydro)[135] and Turkish actors[136].

Tajikistan

Tajikistan, like Kyrgyzstan, has extensive hydropower potential and minimal fossil fuel resources. Hydropower accounted for 42.4% of energy supply and 92.7% of the electricity mix. The president aims for 100% electricity from hydropower by 2032. Current capacity is insufficient for domestic demand [137].

At the 2025 Third International Conference on Renewable Energy Development, the government emphasized energy efficiency, modernization of cooking appliances, and RE development to achieve carbon neutrality by 2050[138]. Despite RE announcements, strategy priorities include large hydropower projects, such as the Rogun mega-dam, which would add 3.6 GW of capacity to the national grid, providing low-cost electricity for domestic use and

[130] Kyrghyz Government, *National Development Strategy of the Kyrgyz Republic for 2018-2040* (Bishkek: Kyrghyz Government, 2018).
[131] Abdullo Janob, « Kyrgyzstan discloses number of small HPPs put into operation in 2024 », *30 trend*, March 2, 2025.
[132] « Shenzen Energy to build wind and solar plants in Kyrgyzstan », *Transformer magazine*, 12 February 2025.
[133] « La construction de la première centrale éolienne du Kirghizstan a commencé à Balykchy », *VESTI.KG*, June 4, 2025.
[134] Resolution No. 583 of the Cabinet of Ministers of the Kyrgyz Republic regarding the approval of regulations on the status and procedures for activities related to the development and delivery of electric power using renewable energy resources, amended on October 8, 2024.
[135] Sergey Kwan, « Kyrgyzstan Advances Hydropower Modernization Efforts », *The Times of Central Asia*, February 29, 2025.
[136] « Türkiye's Orta Asya Investment Holding's hydropower project in Kyrgyzstan to support regional energy transformation », *Energy Terminal*, August 14, 2025.
[137] International Energy Agency, « Energy system of Tajikistan », *https://www.iea.org/countries/tajikistan* (accessed on July 31, 2025).
[138] « Tajikistan unveils green energy roadmap at international conference in Dushanbe », *CAREC*, June 30, 2025.

exports[139]. The first phase is scheduled for 2029 (1.66 GW), with the second phase completing construction in 2035[140].

2. Chinese actors dominate the renewable energy sector

The concrete implementation of Kazakhstan's and Uzbekistan's RE ambitions since 2018–2019 has created significant opportunities for Chinese companies. These firms participate in various roles, from component suppliers or EPC (Engineering, Procurement, and Construction)[141] subcontractors to project developers. Between 2018 and 2022, Chinese companies contributed to the development of five wind and three solar projects under a Kazakhstan-China industrial and investment cooperation program. According to Rystad Energy, Kazakhstan has been among the top five countries to which China exported wind turbines in recent years[142]. To further support this dynamic, Uzbekistan signed an intergovernmental RE cooperation agreement with China in 2023.

Kazakhstan's and Uzbekistan's ambitions also align with China's push to emphasize environmental considerations in projects developed since the 2nd Belt and Road Forum for International Cooperation in 2019[143]. In 2021, a Chinese government directive signalled a redirection of investments from large infrastructure and fossil fuel projects toward smaller, more sustainable projects, particularly in solar and wind energy.

From the 1990s until 2018, alongside fossil fuel projects, China focused mainly on large hydropower projects in Central Asia, particularly in Kazakhstan and Uzbekistan, with financing from Chinese banks such as China Exim Bank and China Development Bank. The shift toward solar and wind has been accompanied by a change in financing methods, now primarily relying on the equity of Chinese companies and closer collaboration with local and multilateral development banks. This evolution responds to growing regional dissatisfaction with debt-based financing from Chinese banks and the adoption of more conservative lending policies by banks.

To meet requirements of host countries while generating profits, Chinese actors have also sought to localise production of RE infrastructure components. In 2023, Liaoning Lide Investment Holdings and the Republic of Karakalpakstan (an autonomous Uzbek region)

[139] World Bank, *Sustainable Financing for Rogun Hydropower Project (P181029)* (Washington D.C.: WB, October 2024).
[140] *Ibid*.: 140.
[141] The EPC contract is a construction contract that covers everything related to the design, required supplies, construction, and ancillary services.
[142] Zheng Xin, « China powers region's renewable energy », *CHINA DAILY*, July 4, 2024.
[143] Yunis Sharifli, « Green New Wave: How China Adapts to Central Asia's Renewable Energy Landscape », *CARNEGIE*, April 19, 2024.

signed preliminary agreements for local RE equipment production. At the end of 2024, the Kazakh sovereign fund Samruk-Kazyna and the Chinese company SANY Renewable Energy agreed to develop a factory producing various wind turbine components, scheduled to start production by the end of 2025[144].

Renewables offer Central Asian countries an opportunity to diversify its partnerships. For instance, virtually all investments by Gulf states in Central Asia are in RE[145]. However, Chinese actors are predominant in the sector. They are often involved in projects led by other countries, whether as EPC contractors, financers, or component suppliers. In 2019, the Emirati company Masdar was selected to build Uzbekistan's first large solar plant, with EPC subcontracting by PowerChina's SEPCOIII. The Zarafshan wind farm, completed by Masdar in 2025, used turbines supplied by Chinese company Goldwind. Regarding the Uzbek wind projects in Bash and Dzhankeldy, developed by the Saudi company ACWA Power, the EPC subcontractor is the state-owned China Energy Engineering Corporation, and the turbine supplier is the Chinese company Envision Energy. ACWA Power's solar project in Tashkent is supplied with modules by the Chinese company JA Solar. In 2022, ACWA Power signed agreements with Chinese entities concerning the financing and construction of ACWA Power projects in Belt and Road Initiative countries. As a consequence, in 2024, China Southern Power Grid acquired a 35% stake in two of ACWA Power's Uzbek wind projects[146]. That same year, Masdar and the Silk Road Fund signed a memorandum of understanding to explore co-investment opportunities in RE projects across Belt and Road Initiative countries.

Through their omnipresence, Chinese companies could impose their standards in Central Asia's RE sector, potentially limiting competition from other actors. In doing so, China could strengthen its influence over regional energy systems, creating dependence on its technologies and materials.

3. Energy needs drive regional cooperation in the management of hydraulic reserves

The gradual abandonment of the Central Asian Power System (CAPS) since 1991 has fuelled regional tensions. Although Central Asia as a region is not affected by water stress, the fragmentation of the shared energy network following independence has raised concerns.

[144] « Kazakhstan, China's SANY Group begin construction of $114 mln wind power components plant », *Interfax*, November 29, 2024.
[145] E. Vinokurov *et al.*, *Mutual Investments on the Eurasian Continent: New and Traditional Partners* (Almaty: Eurasian Development Bank, February 2025).
[146] « China Southern Power Grid to become co-investor in ACWA power's central Asia project », *Acwa Power*, July 17, 2024.

Aforementioned summer water retention and exceptional releases by Kyrgyzstan and Tajikistan worry downstream countries that require water during the summer to supply their industry and agricultural sectors. Tensions are particularly acute in Uzbekistan, which is 77% reliant on transboundary water sources[147] and, unlike its neighbours, does not border the Caspian Sea and therefore cannot rely on substantial desalination. These tensions are exacerbated by plans to expand the Tajik and Kyrgyz hydropower parks, as well as by the high demand from Turkmen and Uzbek cotton, rice, and wheat industries.

Under Islam Karimov's presidency, Uzbekistan conducted military exercises simulating the seizure of the Toktogul reservoir – the largest Kyrgyz dam – in 2000[148], threatened Kyrgyzstan with war in 2012, and cut gas supplies to the city of Osh in 2014 to pressure Kyrgyzstan into suspending construction of the Kambar-Ata 1 dam[149]. The arrival of Shavkat Mirziyoyev to power in Uzbekistan in 2016, and the diplomatic rapprochement attempts on water issues promoted by Kazakhstan in 2021, eased these tensions[150].

In a turnaround, as early as 2017, Mirziyoyev declared that his country now supported the Kambar-Ata 1 project. In 2023, Kyrgyzstan, Uzbekistan, and Kazakhstan signed a roadmap to jointly develop the dam. The project, which is intended to allow Kyrgyzstan to meet its domestic demand and export electricity, is expected to reach its full capacity of 1.9 GW in 2032. In 2018, Mirziyoyev also stated that his country now supported the Rogun dam project, mentioned earlier, which had previously been a source of tension between Tajikistan and Uzbekistan[151]. Tajikistan and Uzbekistan have since agreed that the latter will purchase electricity from Rogun[152]. Closer cooperation between the two countries could reduce the dam's impact on downstream irrigation.

It appears that the difficulties of Uzbekistan's gas industry prompted the Mirziyoyev administration to reassess Uzbekistan's position regarding its neighbours' dam projects. Historically, Kyrgyzstan and Tajikistan have been dependent on Uzbekistan for their gas imports. Uzbekistan's difficulties in meeting domestic gas demand while fulfilling export obligations weaken the country's bargaining power. Since the 2010s, Kyrgyzstan has gradually replaced Uzbek gas imports with Russian gas. Above all, in view of the recurrent energy crises

[147] Murodbek Laldjebaev, Ruslan Isaev and Almaz Saukhimov, « Renewable energy in Central Asia: An overview of potentials, deployment, outlook, and barriers », *Energy Reports*, n°7 (2021).
[148] Renaud François, *Central Asia: The Battle Over Water* (Brussels: ESISC, May 2009).
[149] Thomas Minot, « The Quiet Instability of Central Asian Water Politics », *The Governance Post*, May 19, 2022.
[150] Wilder Alejandro Sanchez, « Kazakhstan Moves to Ease Water Conflict in Central Asia », *Geopolitical Monitor*, September 3, 2021.
[151] Eurasian Research Institute, « Rogun Hydropower Plant in Action: The First Unit is Commissioned », *https://www.eurasian-research.org/publication/rogun-hydropower-plant-in-action-the-first-unit-is-commissioned/* (accessed on September 25, 2025).
[152] « Tajikistan to supply power from Rogun dam to Uzbekistan », *The Tashkent Times*, September 25, 2025.

in Uzbekistan, its leaders have apparently concluded that neighbouring dam projects would strengthen their country's energy security[153].

The expansion of Kyrgyz and Tajik hydropower parks provides these countries with an opportunity to jointly develop CASA-1000, an electricity transmission line that, by 2027, is intended to allow them to export surplus electricity to Pakistan via Afghanistan. Thus, the overall dynamic clearly points to strengthened regional cooperation. However, the Afghan Quosh Tepa canal project, which threatens to divert 20% of the Amu Darya, along with the forthcoming impacts of climate change, raises concerns about the potential reemergence of tensions[154].

4. Regional integration of electricity networks, a prerequisite for exports to Europe

In December 2022, Azerbaijan, Georgia, Romania, and Hungary signed an agreement to construct a high-voltage electricity cable from Azerbaijan, passing through Georgia and the Black Sea, reaching Romania, with Hungary as the destination. This project could be classified as a European Mutual Interest Project and thereby benefit from EU financial support if it is considered advantageous for its efforts to diversify energy supplies and decarbonise. The project could be completed by 2029 and transmit 4 GW a year. Kazakhstan and Uzbekistan wish to connect to the project by constructing a second undersea electricity cable linking them to Azerbaijan via the Caspian Sea. In this context, on November 14, 2023, the relevant ministries of these three countries signed a joint statement to establish a joint venture for exporting energy to Europe[155]. On May 1, 2024, during the Tashkent International Investment Forum, Kazakhstan, Uzbekistan, and Azerbaijan signed a memorandum of cooperation providing for the integration of their energy systems, notably through the construction of an undersea cable in the Caspian Sea. According to Yevgeniy Zhukov, Director General of the Asian Development Bank for Central and Western Asia: "Although the prospect of exporting green electricity to Europe is part of the long-term vision, the primary goal of the initiative is to accelerate green growth within the region itself."[156]

[153] Nodir Ataev, « Hydro-hegemony and transboundary conflict resolution: the case of Kyrgyzstan and Uzbekistan », *CIPS*, n°14 (2023).
[154] Syed Fazl-e-Haider, « Central Asia Faces Potential Water Shortage as Afghanistan's Canal Project Nears Completion », *The Jameston Foundation*, February 10, 2025.
[155] Ibrahim Mammadov, « Azerbaijani and Uzbek Green Energy to Be Exported to Europe through Hungary », *Hungarian Conservative*, August 27, 2024.
[156] Nikola Mikovic, « Central Asia's Green Energy Dream: Too Big to Achieve? », *The Times of Central Asia*, May 7, 2025.

Indeed, despite the potential of Kazakhstan and Uzbekistan for renewable energy development, it seems unlikely that these countries will become electricity exporters to the EU in the near future given the internal challenges to be overcome. Strengthening national energy systems through deeper regional integration of electricity networks is a necessary preliminary step before considering macro-regional integration with the EU. Central Asian countries all face problems arising from the obsolescence of their energy systems and possess complementary resources. In this context, the remnants of the Soviet-era network that connected them can be an asset, serving as a foundation for reconstructing a modern and efficient regional electricity network that allows optimal use of each country's resources.

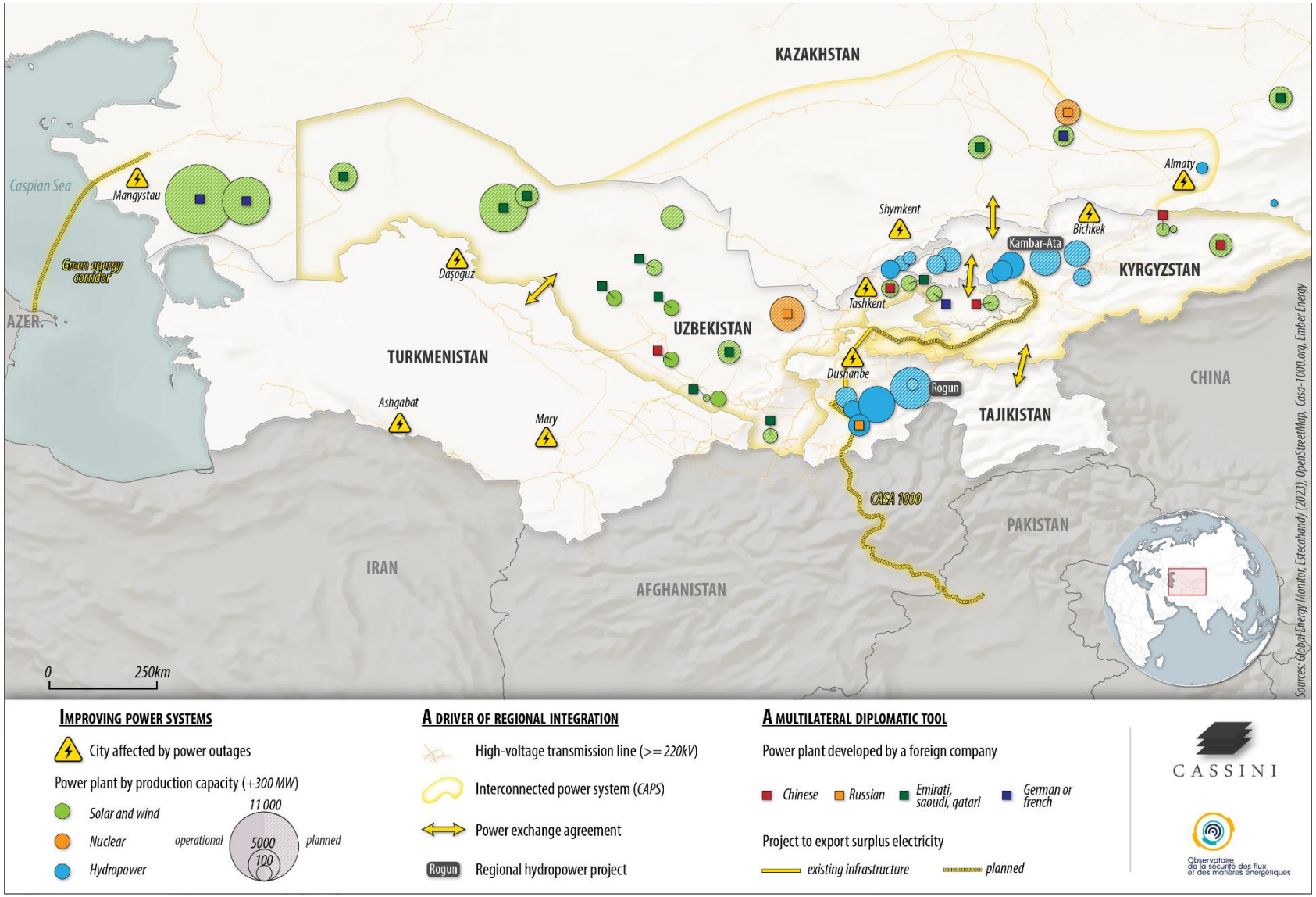
As the hub of the regional electricity network, Uzbekistan plays a crucial role in restoring cooperative dynamics. The country resumed electricity imports from Kyrgyzstan and Tajikistan in 2018, from Kazakhstan in 2019, and from Turkmenistan in 2020. In January 2025, at the Abu Dhabi Sustainability Week, Shavkat Mirziyoyev emphasised the importance of increasing regional cooperation to make Central Asia one of the centres for developing a "green economy" and "clean energy"[157]. The Uzbek authorities aim to "revive the Great Silk Road through energy interconnectivity." Following the agreement with Kazakhstan and Azerbaijan, Uzbekistan hopes to be able to export electricity to Europe as early as 2030[158].

Uzbekistan's stated ambitions reflect a strategic vision of the country which, thanks to its geography, seeks to position itself at the heart of an energy integration process across Eurasia. This objective aligns with China's strategic vision of interconnecting Eurasian electricity networks. By investing in Central Asian electricity systems, China is paving the way for an integration of Eurasian electricity networks that could allow its surplus electricity production to supply markets along an "energy Silk Road" extending to Europe.

A 2022 OSCE report recommends that Central Asian countries develop a common energy security strategy and establish a regional energy governance mechanism, such as the CAPS[159]. Some voices in the region advocate for this approach. Noting that Kazakhstan is "completely dependent" on Russia to balance its energy needs, Nurlan Kapenov, President of the Qazaq Green Association, calls for the creation of a transnational electricity network in Central Asia, modelled on the EU system, and even proposes establishing "a system operator for Central Asia"[160].

[157] « New Uzbekistan open for wide practical cooperation in sustainable and "green" development », President of the Republic of Uzbekistan, January 14, 2025.
[158] Sadokat Jalolova, « Uzbekistan Plans to Export Electricity to Europe by 2030 », *The Times of Central Asia*, August 8, 2024.
[159] OSCE, *op. cit.:* 120.
[160] Georgi Gotev, « Kazakh expert: Central Asia needs a transitional electricity grid », *EURACTIV*, July 4, 2023.

Map 2 – Renewable Energy in Central Asia: From Power Modernization to Energy Diplomacy



5. Key takeaways

- Only Kazakhstan and Uzbekistan have ambitious targets for the development of solar and wind power. Tajikistan and Kyrgyzstan are primarily focused on expanding their hydroelectric capacity, while Turkmenistan prioritises energy efficiency. In Kazakhstan, coal-fired power plants generated 66.7% of electricity in 2022. Their ageing infrastructure makes them inflexible, hindering the integration of intermittent renewables into the grid. Introducing much more flexible gas-fired plants would increase dependence on gas imports from Russia or Turkmenistan. In Uzbekistan, the UAE has positioned itself as a key partner in the country's energy transition.
- Kazakh and Uzbek renewable ambitions present China with an opportunity. While Central Asian countries aim to diversify their partners through the deployment of renewables, Chinese actors are nearly ubiquitous. They are often involved in projects led by other countries, whether as EPC contractors, financers, or component suppliers. Their omnipresence could enable Chinese companies to impose their standards on the Central Asian renewable sector, limiting competition from other players and increasing China's influence over regional energy systems by creating technological and material dependence.
- Summer water retention and exceptional releases by Kyrgyzstan and Tajikistan make downstream countries concerned that resources would be insufficient to meet the summer water needs of their industrial and agricultural sectors. Tensions are particularly acute in Uzbekistan, which depends on transboundary water for 77% of its supply. These tensions are exacerbated by plans to expand Tajik and Kyrgyz hydroelectric capacity. However, difficulties in Uzbekistan's gas industry have prompted the Mirziyoyev administration to reassess the country's stance on neighbouring dam projects, now considered necessary for national energy security. Consequently, the trend is towards strengthening regional cooperation.
- In line with China's desire to export its surplus electricity along energy Silk Roads reaching the EU, Kazakhstan and Uzbekistan aim to export low-carbon electricity to Europe. Despite the potential of these territories for renewable development and Chinese investment, domestic energy challenges make this prospect difficult. Strengthening regional electricity integration is therefore a necessary preliminary step before considering wider Eurasian integration.

NUCLEAR POWER: REGIONAL AMBITIONS AND THE SINO-RUSSIAN COMPETITION FOR INTEGRATION INTO THE LOCAL ENERGY MIX

Central Asia's position on nuclear energy is paradoxical. While the region produced 50% of the world's primary uranium in 2022[161], it does not operate any commercial reactors[162]. However, the fragility of its energy system and growing environmental concerns are pushing Kazakhstan, Uzbekistan, and Kyrgyzstan to integrate nuclear power into their energy mixes. Beyond economic and security considerations, there is also a question of regional leadership, influenced by external actors, notably Russia and China.

1. Towards the nuclearisation of Kazakhstan, Uzbekistan, and Kyrgyzstan

Kazakhstan: The ambition to become an integrated and independent player

Kazakhstan's history is closely tied to the nuclear industry. From the 1950s, the Kazakh Soviet Republic gradually became a key site for Soviet uranium extraction and the primary testing ground for military experiments in the USSR[163]. After gaining independence, the new Republic of Kazakhstan, aware of the economic potential of its uranium reserves, embarked on restructuring its nuclear sector while also pursuing a proactive disarmament policy in collaboration with the IAEA[164]. This strategy provided Kazakhstan with moral authority and a position in international nuclear governance, enabling it to negotiate the acquisition of technology, expertise, and investment necessary to revive its uranium sector[165]. The strategy proved successful: Kazakhstan became the world's leading uranium producer from 2009[166].

Nevertheless, the country only possesses partial domestic mastery of the nuclear fuel cycle[167] and has no operational power reactor since the closure of the Soviet-era Aktau plant (BN-350) in 1999[168]. Still, domestic valorisation of uranium reserves has been a longstanding goal of Astana to ensure energy independence and move towards exporting higher value-added products[169]. On 6 October 2024, the country officially committed via referendum to the

[161] World Nuclear Association, « World uranium mining production », *https://world-nuclear.org/information-library/nuclear-fuel-cycle/mining-of-uranium/world-uranium-mining-production* (accessed on September 19, 2025).
[162] International Energy Agency atomique, « Power Reactor Information System (PRIS) », *https://pris.iaea.org/PRIS/home.aspx* (accessed on September 19, 2025).
[163] Maribeth Hunt and Kenji Murakami, « Renforcer les garanties nucléaires au Kazakhstan », *IAEA Bulletin* 46, n°2 (March 2005).
[164] International Atomic Energy Agency.
[165] Emmanuelle Maytre, « Kazakhstan's nuclear policy: an efficient niche diplomacy ? », *Note de la FRS* n°10/2018 (Paris: Fondation pour la Recherche stratégique, July 1, 2018).
[166] Nuclear Energy Agency, *Uranium 2024: Resources, Production and Demand* (Paris: NEA, 2025).
[167] Teva Meyer and Frédéric Jeannin, *L'approvisionnement en uranium naturel : enjeux de la relance nucléaire* (Paris: IRIS, January 2025).
[168] In 2025, Kazakhstan has only four research reactors, none of which serve a commercial purpose.
[169] World Nuclear Association, « Uranium and Nuclear Power in Kazakhstan », *https://world-nuclear.org/information-library/country-profiles/countries-g-n/kazakhstan* (accessed on September 19, 2025).

construction of a new nuclear power plant at Ülken on the shores of Lake Balkhash[170]. This project is not merely about building a single plant but about establishing a fully autonomous industry – a "nuclear cluster" – encompassing fissile material extraction, fuel fabrication, electricity production, waste management, and reactor development, including SMRs (see Appendix 1)[171]. This ambition was outlined by President Kassym-Jomart Tokayev in a speech on January 28, 2025. He also announced the construction of three plants, rather than one, as well as the creation of the Republic of Kazakhstan Atomic Energy Agency (ARKEA). This agency will oversee the cluster's development and regulation under direct presidential supervision[172].

Astana's objectives for the project are several: firstly, to reduce the gap between energy material reserves and domestic electricity production capabilities; secondly, to attract foreign partners and expertise to become an integrated nuclear industry player comparable to Russia, France, the United States, and China [173]; thirdly, to leverage nuclear mastery strategically in emerging sectors such as artificial intelligence, where massive localised electricity needs make nuclear a competitiveness factor[174]; and fourthly, to establish Kazakhstan as a strategic actor in regional grid stability and, by extension, a driver of Central Asian energy and economic integration, imposing its own standards and differentiating itself from Russian, Chinese, US, or European technologies[175].

However, these aspirations are contingent upon forming partnerships open to technology transfer without creating technological dependence. For this reason, ARKEA did not issue a tender for plant construction but instead issued a consortium call, with participation conditioned on technology and skill transfer, while ensuring that infrastructure use remains reserved for Kazakhstan, particularly regarding the fuel cycle[176].

Kazakhstan's capacities in the nuclear fuel cycle

The transformation of natural uranium into nuclear fuel involves three main stages: conversion, enrichment, and assembly.

[170] « Kazakhstan : le référendum pour construire une première centrale nucléaire largement adopté », *Connaissance des Énergies (AFP)*, October 7, 2024.
[171] Arman Aisultan, « Why Kazakhstan needs a nuclear cluster: Key benefits, risks and more details », *Kazinform*, February 5, 2025.
[172] « Kazakhstan selects Rosatom for first nuclear power plant », *World Nuclear News*, June 16, 2025.
[173] Arman Aisultan, *op. cit.:* 172.
[174] « Kazakhstan launches agency to oversee country's nuclear sector », *Nuclear Engineering International*, September 12, 2025.
[175] Sarah Bibal, « La renaissance de l'Asie centrale : une quête d'intégration and de coopération », *CEDIRE*, February 13, 2025.
[176] « Kazakhstan's Debut Nuclear Power Plant Project: A Test of Transparency, Legality, and Geopolitical Realities », Press release, Almaty, March 11, 2025.

In 2025, Kazakhstan has only one assembly plant on its territory, Ulba-FA[177], operated as a joint venture since 2021 by the state company Kazatomprom and China General Nuclear[178]. This plant partially relies on French technology transfers, signed with Areva-NP, now Framatome[179]. Assemblies are currently destined for Chinese nuclear installations[180].

In 2008, Kazatomprom and the Canadian firm Cameco agreed to install 12,000 tonnes of annual conversion capacity at the same Ulba site, but the project was abandoned in 2016 due to lack of profitability. Kazatomprom retained a five-year option to acquire a license and build a conversion plant based on Cameco's process. Although this option expired in 2021, both companies remain engaged in a joint venture at the Inkai mine, one of Kazakhstan's most productive, and the option could be reactivated as part of cooperation at Inkai[181], which is under strong administrative pressure from Kazakh authorities and could serve as a negotiation lever[182].

Regarding enrichment, Astana has no domestic capacity but holds a 10% stake in the Angarsk International Uranium Enrichment Centre (IUEC) and 25% in the Novouralsk enrichment facility in Russia[183]. These partnerships guarantee Kazakhstan access to enriched material within the Russian industrial ecosystem.

In June 2025, Russian company Rosatom was selected as the lead of the consortium. Three other candidates were retained: CNNC (China), EDF (France), and KHNP (South Korea), with participation terms not yet defined as of September 2025. Ultimately, the Ülken plant will include two Russian-designed VVER-1200 reactors, with ownership and management of the facilities and associated technologies expected to remain with Kazakhstan, according to ARKEA[184]. China, as the second-ranked partner, is expected to construct the next two plants, reflecting Astana's intent not to rely solely on Russia for nuclearisation and capacity-building.

[177] Ulba-FA is affiliated with Ulba JSC, operated by Kazatomprom, which manufactures the fuel pellets that will be inserted into the assembly rods.
[178] « Une nouvelle usine de production située au Kazakhstan qualifiée pour la fabrication de combustible Framatome », Press release, Paris, December 1, 2021.
[179] « Kazakhstan launches production of fuel for nuclear power plants », Press release, Astana, 5 June 2025.
[180] Yerlan Iskakov and Zhanbolat Mamyshev, « Kazatomprom is about to start supplying its new nuclear fuel to China », *Kursiv Media*, January 3, 2024.
[181] The Inkai mine is owned 40% by Cameco and 60% by Kazatomprom.
[182] David Dalton, « Operations Resume At Inkai Uranium Mine in Kazakhstan », *NucNet*, January 27, 2025.
[183] Tina Dolbaia and Amanda Southfield, *Kazakhstan's emerging civilian nuclear energy industry: Implications for U.S. strategic interests* (Washington D.C.: CSIS, September 4, 2025).
[184] « Kazakhstan selects NPP contractor », *Nuclear Engineering International*, June 17, 2025.

The agreement between CNNC and Kazakh authorities is not yet formalised, with details still being established [185].

Uzbekistan: A programme parallel to Kazakhstan but on a smaller scale

Like its Kazakh neighbour, Uzbekistan was a major uranium supplier for the USSR and maintained extraction activities post-independence[186]. However, its ambition long focused on exporting raw material, without using uranium domestically. Only in 2017 did Uzbekistan begin developing a "nuclear cluster" in response to declining natural gas production and growing energy insecurity (see Part I)[187]. Although both Kazakhstan and Uzbekistan use the term "cluster," implying some rivalry, their strategies diverge[188].

While Astana aims to build an integrated, autonomous nuclear industry[189], Tashkent focuses solely on energy production, delegating upstream and downstream stages to Russia[190]. In December 2017, both countries laid the groundwork for close cooperation in nuclear energy, including training, capacity deployment, and modernisation of Uzbekistan's uranium industry[191]. Three months later, they agreed to build two 1.2 GW Russian reactors (VVER-1200) at Forish in Jizzakh region. The project was later downsized in May 2024 to a six-unit SMR plant using Russian RITM-200N reactors[192], lower in power but expected to become Central Asia's first operational nuclear plant and the world's first SMR export contract (see Appendix 1)[193].

Regarding diversification, only conventional non-nuclear equipment provision will be open to actors other than Rosatom, still within a consortium led by the company. By September 2025, only Hungary and China's participation seemed confirmed. Hungarian engineering firm MVM EGI[194] is expected to provide the secondary cooling system for Jizzakh[195], while Shanghai

[185] « Kazakhstan selects Rosatom and CNNC to build country's first nuclear plants », *Enerdata – Daily Energy News*, October 28, 2024.
[186] World Nuclear Association, « Uranium in Uzbekistan », *https://world-nuclear.org/information-library/country-profiles/countries-t-z/uzbekistan* (accessed on September 26, 2025).
[187] Dauren Aben, « Will Uzbekistan Outpace Kazakhstan in NPP Construction? », *Eurasian Research Institute*, *https://www.eurasian-research.org/publication/will-uzbekistan-outpace-kazakhstan-in-npp-construction/* (accessed on September 19, 2025).
[188] Gulnoza Saidazimova, « Would Uzbekistan be the first nuclear power and technological leader in Central Asia? — An interview with Margarita Kalinina-Pohl », *Voices on Central Asia*, August 13, 2019.
[189] « Nuclear fuel from Uzbekistan to be processed in Russia and returned after use », *KUN.UZ*, October 17, 2024.
[190] Kamila Fayzieva, « Nuclear Energy in Central Asia: Pros and Cons for Uzbekistan », *CABAR.asia*, November 20, 2024.
[191] « Russia approves agreement on nuclear plant construction in Uzbekistan », *Nuclear Engineering International*, May 1, 2025.
[192] Farkhod Tolipov, *Nuclear Power Plant in Uzbekistan: Energy and Geopolitics*, (Washington D.C. / Stockholm: CSCIS, August 21, 2024).
[193] « Russia set to build SMR nuclear power plant in Uzbekistan », *World Nuclear News*, May 28, 2024.
[194] MVM EGI is internationally recognized for its expertise in dry cooling systems, suitable for areas with water scarcity.
[195] « Uzbekistan discusses Hungarian dry cooling system for nuclear project », *World Nuclear News*, July 15, 2025.

Electric is slated to supply turbines[196]. Tashkent has not closed the door to further diversification: since 2024, Uzbek authorities have engaged with Beijing to develop an alternative path to Rosatom. In November 2024, a cooperation agreement, resembling that with Russia in December 2017, was signed with Beijing for potential Chinese technology acquisition and enhanced local uranium exploitation[197]. For financing, Uzbekistan may turn to China's Eximbank, in alignment with Chinese interests[198]. Nevertheless, Moscow remains Uzbekistan's main partner in 2025 and is expected to remain the sole supplier of nuclear technologies in the near term, with Chinese participation still uncertain.

For Tashkent, the goal is not to become an autonomous nuclear actor but to secure its precarious energy system without bearing the full burden of acquiring all skills for a "nuclear cluster", as defined by Kazakhstan[199]. Still, President Shavkat Mirziyoyev openly seeks prestige by making Uzbekistan the first post-Soviet Central Asian country to operate a nuclear plant, ahead of Kazakhstan[200], leveraging this for local economic attractiveness.

Kyrgyzstan: The newcomer in Central Asian nuclearisation

Following Kazakhstan and Uzbekistan, Kyrgyzstan is the third country in the region to partially nuclearise its energy mix. However, it differs from its neighbours, as Bishkek has much more limited engineering and nuclear research capabilities[201]. The country ceased uranium extraction in 1997 due to unprofitability and banned it between 2019 and 2024 over environmental concerns. Nonetheless, energy system failures and increased variability in hydroelectric capacity have pushed Bishkek to follow Astana and Tashkent (see Part I). Further, its mountainous geography, seismicity, and underdeveloped grid preclude conventional nuclear plants over most of the country, making SMRs the only viable option (see Appendix 1)[202].

As in Kazakhstan and Uzbekistan, Russian company Rosatom is leading the Kyrgyz programme, signing a memorandum of understanding in January 2022 for SMR construction. By September 2025, the project remains in preliminary stages, with a construction site yet to be chosen, likely in Chui Oblast in the north, less prone to seismic activity[203]. Following the Kazakh and

[196] « Chinese Firm to Supply Turbines for Uzbekistan's Nuclear Power Plant », *CaspianPost*, April 23, 2024.
[197] « Uzbekistan may involve China's China Nuclear Uranium in the development of black shale uranium mines », *Mining.uz*, August 28, 2025.
[198] « UzAtom and China Eximbank discuss financial support for nuclear power plant construction in Uzbekistan », *UzDaily*, April 25, 2025.
[199] Farkhod Tolipov, *op. cit.:* 193.
[200] « Uzbekistan to build a 330 MW small nuclear power plant », *UzDaily*, March 24, 2025.
[201] World Nuclear Association, « Uranium in Kyrgyzstan », *https://world-nuclear.org/information-library/country-profiles/countries-g-n/kyrgyzstan* (accessed on September 26, 2025).
[202] « Russia's Rosatom to Build Wind Farm, Nuclear Plant in Kyrgyzstan », *The Times of Central Asia*, June 28, 2024.
[203] David Dalton, « Kyrgyzstan / Russia Signs Agreement to Help Develop SMRs », *NucNet*, January 24, 2022.

Uzbek examples, Bishkek also seeks to diversify partners via China. In January 2024, a meeting between Kyrgyz Energy Minister Taalaibek Ibraev and the president of China National Nuclear Corporation (CNNC) confirmed the intention of both countries to cooperate, though no further announcements followed[204].

2. Rosatom's entrenchment in Central Asia

Whether in Kazakhstan, Uzbekistan, or Kyrgyzstan, all three countries have chosen Rosatom to acquire the foundational elements of their nuclear energy programmes. Even though their governments commit to limiting Russian influence by diversifying partners, Rosatom clearly appears to be establishing a lasting presence in the future Central Asian nuclear sector.

This influence is first explained by the cooperation Moscow has maintained with these former Soviet republics, particularly in the nuclear sphere. For example, the Kremlin intervened to maintain Soviet WWR research reactors in Kazakhstan and Uzbekistan[205], preserving institutions, standards, and a shared technical and industrial language inherited from the USSR. This approach allows Russia to position itself as a "natural" partner while insulating the region from foreign alternatives[206; 207]. Furthermore, Rosatom benefits from being a one-stop-shop capable of providing a complete range of services, from initial design to decommissioning, including training, fuel management, and maintenance.

However, Rosatom's main strength lies in its financing model, backed by guarantees from the Russian state. Since the 2010s, Rosatom has offered to provide the initial investment, either as a loan or guaranteed equity, while assuming all financial and operational risks. The company only recovers its investment once the plant is operational through the sale of electricity at a pre-negotiated price, potentially supplemented by maintenance services and fuel supply[208]. This system allows countries lacking the resources or capacity to undertake such complex and capital-intensive projects to acquire a nuclear fleet with reduced risk[209]. Conversely, it allows Moscow to facilitate the export of its expertise and to build lasting relationships, which act as means of influence[210].

[204] Zhou Yingwen, « Chairman Yu Jianfeng's Nuclear Energy Cooperation with Kyrgyzstan », *Seetao*, January 8, 2024.
[205] « Rosatom to provide research reactor in Uzbekistan with innovative nuclear fuel », *UzDaily*, September 14, 2022.
[206] Lowy Institute, « Nuclear waste & nuclear reactor: The case of Russia-Kazakhstan », *The Interpreter*, February 13, 2020.
[207] « Russia and Central Asia in 'nuclear diplomacy' », *Asianews*, October 29, 2017.
[208] Névine Schepers, *Russia's Nuclear Energy Exports: Status, Prospects and Implications* (Stockholm: Stockholm International Peace Research Institute, February 2019).
[209] Ibrahim Ababou, « Africa's Nuclear Dream: Who'll Fund 700M Souls and $200B Energy Goals by 2030? », *Nuclear Business Platform – Insights*, March 5, 2025.
[210] Alexandra Prokopenko, *Rosatom: A Difficult Target* (Washington D.C.: Energy Innovation Reform Project, May 2023).

In Kazakhstan, Rosatom and ARKEA agreed on an EPC contract, financed through Russian state export credits, with repayment terms to be negotiated after the completion of technical studies[211]. Rosatom will be responsible for the design, supply, and construction of the Ülken plant, but ownership and operational control will be transferred to the Kazakh operator KNPP[212]. However, the issue of fuel remains unresolved, as EPC contracts generally do not cover fuel supply. On this point, Astana intends to source fuel locally to maximise autonomy[213], but its mastery of the fuel cycle is limited. Currently, only the Ulba metallurgical plant can perform certain downstream stages of the production chain, subject to adaptation to the VVER reactor standards deployed at Ülken. It is therefore likely that fuel management will remain largely located in Russia.

In Uzbekistan, the parties have agreed that Rosatom will handle the design and construction of the Jizzakh SMR plant before transferring ownership to the Republic of Uzbekistan[214]. Fuel supply and waste management will be the responsibility of Rosatom's subsidiary TVEL, which will handle conversion, enrichment, and assembly, using Uzbek uranium[215]. Tashkent justifies this agreement as a means of valorising national resources, but it also embeds Russia within Uzbekistan's energy mix. Conversely, the agreement strengthens Russia's uranium supply security, as in 2024 nearly one-third of Rosatom's needs relied on imports, mostly from Kazakhstan, while Uzbek exports merely transited through Russia before reaching international markets[216]. Thus, by entering the Uzbek market, Russia diversifies its supply sources under the pretext of supplying the Jizzakh plant. Notably, in 2022, Uzbekistan accounted for 13% of France's uranium imports[217]. The content of the agreement remains opaque, particularly regarding construction costs. No figures have yet been released, while Uzbek authorities stated in 2024 that they intended to fully finance the project without Russian aid, without specifying whether Chinese financial support might be considered[218].

In Kyrgyzstan, the terms of cooperation remain to be defined, but Bishkek's limited manoeuvring capacity does not preclude extensive Russian control[219]. Moscow could propose

[211] « Kazakhstan's Nuclear Future », Press release, Moscou, July 28, 2025.
[212] « When will the first nuclear power plant in Kazakhstan be built? », *PetroCouncil.kz*, July 11, 2025.
[213] International Atomic Energy Agency, *Contracting and Ownership Approaches for New Nuclear Power Plants* (Vienna: IAEA, 2024).
[214] « The small nuclear power plant will be owned by Uzbekistan; nuclear waste will be taken to Russia », *Central Asia Climate Portal*, October 18, 2024.
[215] « Nuclear fuel from Uzbekistan to be processed in Russia and returned after use », *KUN.UZ*, October 17, 2024.
[216] Sami Ramdani, Teva Meyer and David Amsellem, *L'approvisionnement en enrichissement de l'uranium : dynamiques and enjeux après l'invasion russe de l'Ukraine* (Paris : IRIS, July 2023).
[217] OEC World, « Uzbekistan — Natural uranium & its compounds & mixtures », *https://oec.world/en/profile/bilateral-product/natural-uranium-its-compounds-mixtures/reporter/uzb?selector1654id=percentage* (accessed on September 19, 2025).
[218] « Nuclear power plant », *Gazeta.uz*, June 27, 2024.
[219] « NPP in Kyrgyzstan: Serious Benefits and Substantial Risks », *CABAR.asia*, June 4, 2024.

a BOO (Build, Own, Operate) contract, granting it construction, ownership, and management of the site in exchange for a fixed-price power purchase agreement, ensuring stable revenue over several decades[220]. De facto, this type of agreement would allow Moscow to exercise long-term influence over Kyrgyzstan's energy system[221], as well as maintain a physical and logistical presence that could serve purposes beyond the plant's operation[222].

Each of these agreements represents a potential lever of influence for Moscow, as well as a demonstration of Rosatom's technical and commercial expertise, particularly to promote its SMRs – a technology whose economic performance remains to be confirmed but whose strategic potential is significant (see Appendix 1)[223].

3. China as an alternative to Rosatom's vulnerabilities amid international sanctions

While Russia holds the leading position in the nuclearisation of Central Asia, China is positioning itself as a challenger. Beijing sees the export of nuclear technologies as a means to gain influence in global nuclear governance while creating long-term strategic dependencies[224]. Nuclear power is, moreover, a pillar of China's Belt and Road Initiative (BRI), with the 2019 stated goal of exporting 30 reactors by 2030, in direct competition with Moscow[225]. This is a competition in which China holds several advantages, particularly in Central Asia.

Although Kazakhstan, Uzbekistan, and Kyrgyzstan have opted for Rosatom, this choice could be challenged by the current geopolitical context. Since the Russian invasion of Ukraine, international sanctions against Moscow have affected the sustainability of Rosatom's projects[226]. Even though the company remains relatively insulated from direct sanctions due to its role in supplying fuel to the European Union and the United States, this is not the case for all its subsidiaries and certain subcontractors[227]. Furthermore, Rosatom's close ties to the Russian state tend to dissuade partners from maintaining their relationships, by fear of being

[220] Zaf Coelho, « Türkiye's Nuclear Power Revolution: Maximizing Returns with BOO, BTO, and EPC Models », *Nuclear Business Platform – Insights*, September 12, 2025.
[221] Levent Kenez, « Turkey pays more for energy while Russia holds keys to nuclear plant », *Nordic Monitor*, May 20, 2025.
[222] Elisabeth Gosselin-Malo, « Turkey's Russian-built nuclear plant could amplify Moscow's regional influence – Al-Monitor », *Observatoire de la Turquie contemporaine*, November 23, 2022.
[223] Sami Ramdani, Esther Bourgeois and Frédéric Jeannin, *Les petits réacteurs modulaires (SMR) : les stratégies des puissances nucléaires* (Paris: IRIS, July 2024).
[224] Zaf Coelho, « China's Nuclear Power Program: A Blueprint for Global Competitiveness », *Nuclear Business Platform – Insights*, August 18, 2025.
[225] Information Technology & Innovation Foundation, *How Innovative Is China in Nuclear Power?* (Washington D.C.: ITIF, June 17, 2024).
[226] « US imposes sweeping sanctions on Russia's energy sector », *Nuclear Engineering International*, September 19, 2025.
[227]« Sanctions to degrade Russia's energy sector », Press release, Washington D.C., January 30, 2025.

affected by sanctions or potential extensions of restrictions[228]. The construction of the Akkuyu plant in Turkey, for instance, has faced delayed payments, staff reductions, and cancelled supply contracts, forcing Rosatom to negotiate compromises with Ankara and turn to replacement partners, notably Chinese ones[229]. It is therefore out of concern that their respective nuclear programmes could be indirectly affected by international sanctions that Central Asian actors are turning to China.

Moreover, Beijing is already playing a role in increasing both capacity and expertise in the uranium industries of Central Asia. In Kazakhstan, it is already involved in the Ulba fuel assembly plant, which represents Kazakhstan's main advancement in mastering the fuel cycle. It also contributes to diversifying Kazakhstan's export routes, opening the Alashankou border corridor and the port of Shanghai to uranium transport, enabling access to international markets without passing through Russia[230]. In Uzbekistan, the 2024 nuclear cooperation agreement paved the way for greater Chinese involvement in the mining sector[231], with potential technology transfers that would allow Tashkent to export higher value-added products – potentially assembled fuel – following the model of the Ulba plant in Kazakhstan[232]. In Kyrgyzstan, where nuclear cooperation with China is still emerging, Beijing could also consider localising part of the fuel cycle in negotiations to assert its presence.

China also distinguishes itself through the competitiveness of its offer. Whereas the construction of the VVER plant at Ülken is estimated at $14 billion[233], a comparable Chinese proposal with similar capacity is valued at under $5.6 billion[234]. Moreover, considering China's proven operational efficiency, speed of execution, and financial robustness in deploying the Chashma and Islamabad plants in Pakistan[235], it increasingly appears as a reliable alternative to Rosatom.

However, the main obstacle to Beijing overtaking Moscow lies in its limited mastery of the downstream fuel cycle. Except for the Pakistani plants, China does not seem capable of offering long-term management of spent fuel – a potentially prohibitive gap for countries

[228] Engin Eroğlu and Petras Auštrevičius, « Sanctions against Rosatom and its subsidiary Atomflot », *Question parlementaire E-002927/2025*, Parlement européen, July 16, 2025.
[229] Nuclear Engineering International, *op. cit.:* 227.
[230] Sami Ramdani, Teva Meyer and David Amsellem, *op. cit.:* 217.
[231] « Uzbekistan and China agree on 13 mining projects worth US$5 billion », *UzDaily.com*, September 3, 2025.
[232] Sadokat Jalolova, « Uzbekistan and China Strengthen Partnership in Nuclear Energy Development », *The Times of Central Asia*, November 5, 2024.
[233] Nikolai Marchenko, Zhanbolat Mamyshev and Zhanel Zhazetova, « Kazakhstan discloses indicative timeline and construction cost for first NPP », *Kursiv Media*, June 27, 2025.
[234] « China proposes $5.47B nuclear power project in Kazakhstan, halving estimated cost », *MINEX Forum*, June 2, 2025.
[235] Juzel Lloyd and Seaver Wang, *China's Impressive Rate of Nuclear Construction* (Berkeley: The Breakthrough Institute, March 5, 2024).

lacking the technical and financial capacity to handle this essential stage[236]. This shortcoming explains why Rosatom remains the preferred partner for Central Asian countries.

4. Limited western presence in the Central Asian nuclear sphere

In the emerging Russo-Chinese competition, the role of Western actors appears marginal. Yet the United States, the European Union, and more particularly France, have a long history of nuclear collaboration in the region.

In Kazakhstan, the United States signed a cooperation agreement on the peaceful use of nuclear energy as early as November 1997, providing for the transfer of information, components, and materials, without explicitly encouraging or prohibiting local fuel cycle capabilities[237]. From the European Union's side, a cooperation agreement focused on nuclear material trade has existed since 2006 and includes a research and development component for the peaceful use of nuclear energy[238]. Since then, Western companies – primarily the French firm Orano and the Canadian Cameco – have collaborated on the exploitation of Kazakhstan's uranium deposits and the localisation of certain fuel fabrication stages. However, outside the mining sector and limited contributions to the local fuel cycle, Western presence has remained restricted in the deployment of nuclear infrastructure.

More recently, the most notable development is Astana's integration into the FIRST programme in 2022, an initiative by the U.S. Department of State aimed at promoting the export of American SMRs[239]. For now, this cooperation remains embryonic and is mainly focused on establishing a training centre in Almaty for U.S. technologies[240]. On the European, and particularly French side, EDF was selected in June 2025 to join the consortium for building the Ülken nuclear plant. However, Rosatom's leadership of the project exposes the French company to the direct or indirect effects of international sanctions against Rosatom, its subsidiaries, and its suppliers. The continuation of French involvement will therefore depend

[236] Akankshya Ray, *How Civilian Nuclear Energy Is Powering China's Global Strategy* (New Delhi: Vivekananda International Foundation, August 8, 2025).
[237] U.S. Department of State / Republic of Kazakhstan, *Agreement for Cooperation between the United States of America and the Republic of Kazakhstan concerning Peaceful Uses of Nuclear Energy* (Washington, November 18, 1997).
[238] European Atomic Energy Community, *Agreement for Cooperation in the Peaceful Uses of Nuclear Energy between the European Atomic Energy Community and the Government of the Republic of Kazakhstan* (Brussels, December 5, 2006).
[239] U.S. Department of State, « Civil Nuclear Energy Initiatives », *https://www.state.gov/civil-nuclear-energy-initiatives* (accessed on September 22, 2025).
[240] International Science and Technology Center, *FIRST SMR Simulator Application (Request for Proposal)* (Astana: ISTC, July 10, 2024).

on its role within the consortium, the modalities of collaboration with Rosatom, and the level of risk tolerance determined by EDF and French authorities[241].

5. Key takeaways

- As of September 2025, Kazakhstan, Uzbekistan, and Kyrgyzstan are actively pursuing nuclear programmes. All three have chosen the Russian company Rosatom as their primary partner to initiate their nuclear development (see Appendix 2).
- In Kazakhstan, EDF was designated in June 2025 by Astana as a partner in the consortium for the construction of the future Ülken nuclear plant. However, since Rosatom leads the project, French participation will depend on the terms of cooperation with Rosatom and the risks of exposure to international sanctions against Russia.
- In Uzbekistan, Rosatom is on track to deliver the first commercial SMR in history. While these projects demonstrate Russian expertise in this emerging and strategically significant market, Uzbekistan could become a vehicle for promoting and accelerating Russian nuclear exports worldwide.
- In response to the repercussions of sanctions on Rosatom, China is positioning itself as an alternative. Fearing that their nuclear programmes could be affected by Russian failures, Kazakhstan, Uzbekistan, and Kyrgyzstan have all engaged with Beijing to varying degrees.
- The role of the United States and the European Union, apart from the potential French participation in the Ülken project, remains limited. Only the United States has recently established partnerships with Astana to promote its innovative nuclear technology, but these prospects are confined primarily to skills and knowledge exchanges.

[241] Temur Dżanzakov, « Что обсуждали Марко Рубио и Бахтиёр Саидов », *Kursiv*, February 24, 2025.

THE MINERAL WEALTH OF CENTRAL ASIA

1. A rich and underexploited subsoil at the centre of attention

Covering an area of 4 million km², Central Asia has a landmass comparable to that of the European Union, although its population is six times smaller.

During the Soviet era, this territory was a major producer of mineral resources for the USSR. This mining past has left a significant legacy, notably in terms of infrastructure and economic development. Between 2017 and 2023, mineral resource exports accounted for between 20 and 33% of the region's total goods exports (excluding services)[242]. In 2024, 70% of critical metal production in Central Asian countries was imported by China.

Representing two-thirds of Central Asia's territory, Kazakhstan is the region's main mining country, followed by Uzbekistan. While both extract substantial quantities of ores, they also refine part of their production domestically and host major state-owned mining companies such as Kazatomprom and Tau-Ken Samruk in Kazakhstan, or Technological Metals Company (TMK), Almalyk Mining and Metallurgical Combine (AMMC), and Navoi Mining and Metallurgical Combine (NMMC) in Uzbekistan. Together, these two neighbouring countries produce roughly half of the world's uranium. Tajikistan and Kyrgyzstan also have significant mining sectors, although the volumes are smaller than those of Kazakhstan and Uzbekistan. Extracted ores in these countries are also less extensively processed domestically. In 2020, around 13% of Kyrgyzstan's GDP came from mining, with 90% originating from the Kumtor gold mine alone[243]. Tajikistan has a more diversified mining industry and is notably the world's second-largest producer of antimony – a metal classified as strategic by China, the EU, and the United States – behind neighbouring China, which imports a significant portion of Tajik production. Turkmenistan, relying mainly on its gas resources, currently exploits relatively little of its mining potential beyond iodine production.

Since the start of the war in Ukraine, international interest in the region, particularly for its mineral resources, has surged. Central Asian governments have increased announcements regarding exploration and extraction of their subsoil, resulting in state-supported mining investment plans, summits, and partnerships with various foreign powers. This surge is also driven by political rhetoric and gestures: in 2023, the Kazakh president referred to critical materials as the "new oil"; summits between the five Central Asian countries and external powers such as China, the United States, or the EU are multiplying; and announcements of new critical material deposits are frequent. This trend notably affects rare earth exploitation and, more broadly, strategic materials needed for the energy transition. Regarding rare earths,

[242] Yuliy Yusupov, *Foreign Trade of Central Asian Countries: Trends, Barriers and Prospects* (Almaty: CAPS Unlock, 2025).
[243] World Bank, *Mining Sector Diagnostic – Kyrgyz Republic* (Washington D.C.: March 2023).

the frenzy is amplified by China's dominance in the sector (60% of mining and 90% of refining in 2024) and fears arising from recent export quotas on certain elements. Since 2020, Kazakhstan has begun producing rare earths in unrefined or semi-refined form. However, production remains modest, and all exports go to China, which completes the refining[244]. At the end of 2023, Astana announced a plan for critical metal and rare earth production for 2024–2028, and the discovery of the Zhana Kazakhstan rare earth deposit could make the country the third-best endowed globally. Uzbekistan's massive mining investment plan also prioritises rare earths, aiming to invest $500 million in rare earth production projects. In 2025, Tajikistan announced significant reserves of these metals, while Kyrgyzstan announced a partnership with a Chinese company for the exploitation of the Kutessay II deposit. Turkmenistan also claims to have rare earth deposits[245]. Despite this enthusiasm, Kazakhstan remained the only producer of rare earths in the region in 2024.

Beyond rare earths, the entire critical metals sector is heating up. Kazakhstan is restarting exploration of its subsoil[246]. In 2024, Uzbekistan – assisted by the EBRD – implemented a new law regulating its subsoil to simplify licensing, set higher standards, and clarify rules for exploitation, signalling an investor-friendly environment[247]. In recent months, Kyrgyzstan has also begun issuing permits for critical materials exploitation, a development that seemed impossible five years ago before President Japarov came to power[248]. The country lifted a moratorium on uranium and thorium extraction, imposed four years earlier, paving the way for the exploitation of the Kyzyl-Ompol titanium deposit, which also contains uranium and thorium. In 2024, Turkmenistan similarly streamlined procedures for granting mining permits to attract investors[249].

Historically, the region has been an important mining basin. Today, it produces nearly half of the world's uranium, as well as significant quantities of other metals such as chromium, copper, antimony, rhenium, and titanium (see Table 2).

[244] Ainur Issabayeva, « The reserves of critical raw materials allow Kazakhstan to become a leading supplier in the energy transition », *AIFC*, July 9, 2024.
[245] Mekan Bashimov and Kerim Balkanov, *GILS Mining: Turkmenistan* (Ashgabat: GRATA International, June 26, 2025).
[246] Assel Satubaldina, « Kazakhstan Boasts 15 Rare Earth Deposits, Eyes for Deeper Exploration », *The Astana Times*, January 19, 2024.
[247] « New Subsoil Law Signed in Uzbekistan », Press release, Tachkent, November 20, 2024.
[248] « Kyrgyzstan to Boost Mining Sector Growth with New Licensing Opportunities », *Global Flow Control*, November 8, 2024.
[249] *Ibid.:* 249.

Table 2: Production of main critical raw materials by country in Central Asia (2023)

	Kazakhstan	Kyrgyzstan	Uzbekistan (2022)	Tajikistan	Turkmenistan
Share of world production in 2023	Uranium: 43% Chromium: 14% Barium: 8% Sulfur: 5.9% Titanium (sponge): 4.4% Cadmium: 4.1% Gold: 4% Silver: 3.9% Copper: 3.3% Zinc: 2.5% Molybdenum: 1.5% Rhenium: 0.8% Manganese: 0.7%	Gold: 1% Mercury: 0.5% Antimony: 0.05% Copper: 0.03%	Rhenium: 8% Uranium: 6% Gold: 3.7% Silver: 0.9% Cadmium: 0.9% Copper: 0.7% Molybdenum: 0.7%	Antimony: 15% Mercury: 5% Zinc: 0.5% Gold: 0.4%	Iodine: 2.4%

Source: https://pubs.usgs.gov/periodicals/mcs2025/mcs2025.pdf

Given the dynamics in play and the region's significant potential, mining production in these countries is expected to increase substantially in the coming decades. In 2021, Central Asia held 39% of global manganese reserves, 30% of chromium reserves, 20% of lead reserves, and 13% of zinc reserves (see Table 3)[250]. While some metal reserves are already considerable, a large part of these territories' subsoils remains unexplored, leaving substantial uncertainty regarding the region's true potential.

[250] Indra Overland and Roman Vakulchuk, « Central Asia is a missing link in analyses of critical materials for the global clean energy transition », *One Earth* 4, n°12 (November 2021).

Table 3: Critical metal reserves in Central Asia (2021)

Table 2. Proven reserves of critical materials by country (metric tons) and total share of global reserves (%)

Critical material	Kazakhstan	Kyrgyzstan	Tajikistan	Uzbekistan	Proven reserves in Central Asia	Central Asia's share of global reserves (%)
Manganese	681,342,741	48,816	270,000,000	173,000	951,564,557	38.6
Chromium (ore and concentrate)	230,000,000	390,000	0	0	230,390,000	30.07
Lead	15,473,215	41,000	10,000,000	413,000	25,927,215	20
Zinc	31,436,736	24,000	10,000,000	4,549,000	46,009,736	12.6
Titanium	45,608,070	0	0	350,000,000	395,608,070	8.7
Aluminum/bauxite	309,885,594	42,101,000	1,000,000,000	12,700	1,351,999,294	5.8
Copper	38,582,964	640,000	150,000	741,200	40,114,164	5.3
Cobalt	208,121	373	0	645	20,9139	5.3
Molybdenum	713,827	2,523	0	139,000	855,350	5.2
Iron ore	19,885,503,100	549,000	500,000,000	22,000,000	20,408,052,100	4.8
Nickel	118,000	0	0	3,700	121,700	1.2
Silver (kg)	48,153	672	60,000	37,700	146,525	1.2
Tin	192,375	186,761	45,000	9,500	433,636	0.9
Lithium	50,000	13,923	0	8,334	72,257	0.4
Graphite	488,400	272,215	0	7,600,000	8,360,615	0.3
Silicon	5,090,000	0	0	12,000	5,102,000	0.01
Tellurium	0	1,524.5	0	1,098	2,622.5	0.01
Selenium (refined)	–	2.7	–	–	2.7	[a]
Cadmium	85,233	353.6	–	–	85,586.6	[a]
Gallium	–	–	–	–	–	[a]
Germanium	4,372	–	–	180	4,552	[a]
Indium	–	2,617	–	–	2,617	[a]

Source: Vakulchuk and Overland.[59]
[a]As data are missing for these minerals in these countries, shares of global reserves cannot be calculated.

Source: https://www.cell.com/one-earth/fulltext/S2590-3322(21)00660-6

Current mining reserves largely stem from exploration during the Soviet period. For example, investments in Kazakhstan's subsoil exploration between 2003 and 2023 were equivalent to the expenditure of 1990 alone, demonstrating the outstanding efforts provided during this period. The USSR also left a strong legacy of state control over mineral resources in Central Asian countries, where subsoil exploitation is subject to strict regulations and state-owned mining companies often play a major role. Moreover, many identified deposits remain unexploited. In 2024, Uzbekistan was exploiting only 16 of the 71 identified resource deposits, with only 40% of its territory's subsoil explored[251].

[251] « Uzbekistan: The next critical minerals hub? », *Global Trade Review*, January 17, 2025.

2. Foreign investments – a competition benefiting Central Asian governments

Central Asian countries possess significant mineral reserves but lack the investment capacity to fully exploit this potential themselves. As a result, various foreign powers compete to invest in the region, notably China, the United States, Russia, and the European Union.

Historically, the inclusion of Central Asian countries in the USSR gave Russia a dominant presence in the region's mining sector. Following the collapse of the Soviet bloc, from the 2000s/2010s onwards, Russia gradually withdrew, leaving room for China, which invested heavily in the region's mining sector. Today, China is the primary investor and mining partner in Central Asia, importing around 70% of the region's critical metal exports in 2024[252].

In recent years, the EU and the US have also turned their attention to Central Asia for several reasons. Since 2023, China has accelerated its control over exports of certain critical materials, first restricting licenses for germanium and gallium, then extending these restrictions to other critical materials it dominates, such as graphite, antimony, and some rare earths elements[253]. This trend intensified in late 2024, particularly affecting the US, whose imports of certain raw materials from China ceased entirely[254]. This sequence gradually raised Western awareness of their vulnerability to China regarding critical metal supplies.

The significant uranium production of Kazakhstan and Uzbekistan – accounting for half of global mineral production – also makes the region strategically indispensable at a time when Western countries seek to counter Russia and secure uranium supplies, especially as France's military presence in West Africa diminishes, with 20% of its uranium imports previously coming from Niger[255].

These investment dynamics create a terrain of influence competition between major powers. In this context, the regional mining sector has become highly strategic, offering Central Asian countries an opportunity to attract massive investment flows and leverage competition between powers.

Currently, China holds the upper hand, having had control of the industry over the past twenty years, reinforced by the launch of the Belt and Road Initiative in 2013 and the C5+1 platform, which brings together China and the five Central Asian countries biennially, first convened in 2023. In Kyrgyzstan, recent Chinese presence includes the 2024 establishment of a gold co-

[252] Roman Vakulchuk, *Start Slow to Go Fast? Unlocking EU–Central Asia Cooperation on Critical Materials* (Brussels: Friedrich-Ebert-Stiftung, May 2025).
[253] Abhisri Nath and Jeffrey D. Bean, *China's Critical Mineral Export Controls: Background & Chokepoints* (Washington D.C.: ORF America, April 22, 2025).
[254] « China bans exports of critical minerals to US as trade tensions escalate », *Reuters*, December 3, 2024.
[255] Teva Meyer and Frédéric Jeannin, *op. cit.*: 168.

venture to exploit the Solton-Sary deposit, a 2025 agreement to develop rare earths at the Kutessay-II deposit, and ongoing discussions on lithium extraction with Zhicun Lithium Industry Group Company[256]. In early 2025, Xi Jinping and Kyrgyz President Sadyr Japarov signed a Memorandum of Understanding to deepen collaboration in critical metals. The Sino-Kyrgyz relationship primarily focuses on upstream resource extraction, with exports of relatively raw materials to China for refining. China holds the majority of critical material permits in Kyrgyzstan and Tajikistan[257], where it controls three-quarters of gold production and three-quarters of antimony exports, also holding a share of domestic antimony production[258; 259]. Chinese investment also aims to develop a lithium extraction and refining site at Ishkashim on the Afghan border and a $119 million project to build a copper production facility with lead, silver, and iron refining capacity[260]. Unlike in Kyrgyzstan, Chinese investments in Tajikistan include some downstream refining activities. In Uzbekistan, Chinese investors have contributed $50 million to the Syurenata mining complex for iron concentrate production, $200 million in Namangan for refined copper production, and proposed $2.7 billion to develop the Bobotog copper and silver deposit. These investments align with Uzbekistan's desire to move up the value chain and reduce reliance on raw material exports. Kazakhstan is fully engaged in this dynamic, with plans for a copper production plant co-producing gold, silver, sulfuric acid, and cathodes, as well as a tungsten production facility in partnership with Jiaxing International Resources Investment[261]. Another proposed $12 billion green aluminium complex, including renewable hydrogen and electricity production, is under discussion with East Hope Group[262]. Furthermore, Chinese investments often flow through foreign subsidiaries, including in the Netherlands, making them harder to quantify[263], while European investment estimates are likely overstated.

In recent years, the EU and US have tried to catch up with China, a development viewed positively by Central Asian governments, which appreciate attracting more investment and balancing Sino-Russian influence.

Despite declarations of intent and initiatives like the C5+1 summit, bilateral agreements with Astana and Tashkent, and investment promises, the US has done relatively little to follow

[256] Yunis Sharifli, *Differentiated Engagement: China's Adaptive Strategy for Critical Minerals in Central Asia* (Abu Dhabi: TRENDS Research & Advisory, July 25, 2025).
[257] Indra Overland and Roman Vakulchuk, *op. cit.:* 251.
[258] Indra Overland and Roman Vakulchuk, *op. cit.:* 251.
[259] TRENDS Research & Advisory, *op. cit*.: 257.
[260] *Ibid.:* 258.
[261] *Ibid.:* 258.
[262] « China's East Hope Group investment to fuel green aluminium boom in Kazakhstan », *AL Circle*, June 9, 2025.
[263] Eldaniz Gusseinov and Rymgali Abykayev, *The Belt and Road and Global Gateway Initiatives: Prospects and Opportunities for Central Asian Countries* (Istanbul: CABAR.asia, November 30, 2023).

through on its announcements[264]. Exports to the US are complicated due to the distance between the two regions and because neighbouring countries are subject to US sanctions or pressure: Russia to the north, China to the east, Afghanistan and Iran to the south, while the Caspian Sea and the development of the Middle Corridor (TITR) make exportations costly on the west front[265]. Furthermore, some Central Asian companies have been sanctioned by Washington due to economic links with Russia, further complicating collaboration. This hostile and unstable climate discourages US companies from investing, a situation exacerbated by the tariffs imposed by the Trump administration.

The EU first published a strategy for Central Asia in 2019 and updated it in 2023 alongside the Global Gateway program and the European Green Deal. This document focuses on partnerships aimed at developing mining capacity in the region. In 2025, the first EU-Central Asia summit produced a joint declaration on critical raw materials and a roadmap for collaboration with Kazakhstan for 2025-2026, building on previous statements[266]. 2024 cooperation agreement with Uzbekistan also addressed critical materials. Although less present than China, the EU invests more actively than the US, despite similar logistical challenges[267]. Through Global Gateway, the European Investment Bank (EIB)[268] and the European Bank for Reconstruction and Development (EBRD)[269], the EU signals support for private investors. In April 2025, the EU announced €12 billion of investment in Central Asia, €2.5 billion of which will focus on mining, alongside a €1.6 billion investment by European companies in a copper complex in Uzbekistan.

To secure trade with Central Asia, the EU focuses on developing the Middle Corridor, a commercial route linking Europe to Central Asia via the Caspian Sea, the Caucasus, and Turkey, avoiding countries under Western sanctions. An EBRD study estimates €18.5 billion needed to make the route viable. A January 2024 forum raised €10 billion in pledges from financial institutions, the EIB, and EBRD, complemented by €3 billion from the €12 billion Global Gateway package announced in April 2025[270]. However, certain challenges remain, including administrative hurdles, infrastructure incompatibilities, geopolitical instability (especially in

[264] « US losing ground to China in competition over Central Asia's critical minerals », *Eurasianet*, August 7, 2025.
[265] Haley Nelson and Natalia Storz, « Central Asia's geography inhibits a US critical minerals partnership », *Atlantic Council – EnergySource*, April 15, 2025.
[266] European Council, *First EU-Central Asia Summit, 4 April 2025* (Samarkand: Council of the European Union / European Council, April 4, 2025).
[267] Mamuka Tsereteli, « Is the EU Beating the U.S. in Central Asia? », *The National Interest*, May 1, 2025.
[268] « The EIB and the European Commission announce a more flexible guarantee of €5 billion to boost global investments », Press release, Luxembourg, June 30, 2025.
[269] « EBRD sets an investment record in Central Asia », Press release, London, January 16, 2025.
[270] Giulia Cretti and Louise van Schaik, *Resource Curse or Darling: Rethinking EU Energy Interests in Kazakhstan* (The Hague: Clingendael Institute, March 2024).

the Caucasus), and environmental impacts such as the falling level of the Caspian Sea, which is affecting ports.

China is widely seen as a more efficient and less bureaucratic partner than Western competitors, thanks to its geographical proximity and easier mobility for Central Asian business executives[271]. European companies, however, enjoy a better image due to stricter environmental standards and support for local enterprises and labour. Central Asian states, particularly Kazakhstan and Uzbekistan, remain wary of excessive Chinese influence and welcome Western investment as a counterbalance – a "multi vector" strategy officially endorsed by Kazakhstan. Anti-Chinese sentiment has emerged in Kazakhstan and Kyrgyzstan due to environmental concerns, treatment of Uyghurs, land acquisition by Chinese companies, and corruption accusations[272]. Since 2024, China has begun implementing environmental standards, increasing competition with Europe and benefiting Central Asian countries, which may become more demanding on ESG criteria and technology transfers.

Russia is also present in the mining sector in Central Asia, particularly in uranium mining, but its main interest remains hydrocarbons[273]. Russia's stance toward China's growing presence is ambivalent: while Beijing helps counter Western investment, it is also perceived as a rival. Therefore, China tries to accommodate Moscow by selecting Russian companies as commercial partners and forming joint ventures.

Emergence of multiple foreign actors in Central Asian mining

Other countries are seeking ties with Central Asia to diversify access to strategic metals and reduce dependence on China. Some countries that are geographically close from Central Asia have been active. India has strengthened mining collaboration with Central Asian states through its fourth summit and upcoming Rare Earth Forum[274]. Iran develops mining partnerships with Tajikistan. Pakistan seeks access to the sea, offering Central Asia alternative export routes[275]. Turkey has signed strategic agreements with Kazakhstan, including in mining, and aims to develop the Middle Corridor[276].

[271] Roman Vakulchuk, *Start Slow to Go Fast? Unlocking EU–Central Asia Cooperation on Critical Materials* (Brussels: Friedrich-Ebert-Stiftung, May 2025).
[272] Bradley Jardine, Akbota Karibayeva and Edward Lemon, « Bumps Along the Belt and Road: Unpacking Sinophobic Sentiments in Central Asia (2002-2023) », *Europe-Asia Studies* 77, n°4 (April 2025).
[273] Paul Goble, « Rare-Earth Reserves in Central Asia Sparking Intense Geopolitical Competition », *Eurasia Daily Monitor*, June 13, 2024.
[274] « India, central Asian countries express interest in joint rare earths exploration », *Reuters*, June 6, 2025.
[275] IsMayl Dilawar, « Pakistan, Kazakhstan discuss joint ventures to increase trade via Karachi, Gwadar ports », *Arab News*, September 2, 2025.
[276] Abhishek G Bhaya, « 2 leaders, 20 signatures: Türkiye and Kazakhstan sign landmark agreements to reach shared vision », *TRT World*, August 4, 2025.

The third Gulf–Central Asia summit also highlighted cooperation prospects[277]. Japan, a historic partner and a pioneer of the C5+, holds stakes in Kazakh uranium mines and plans to expand mining collaboration[278]. South Korea, partly reliant on Kazakh uranium, has signed recent mining agreements. Mining giants like Australia and Canada also intensify exploration investments, while Switzerland and the UK – countries hosting major metal trading hubs – also invest directly in the region.

3. Persistent structural challenges

The region's energy infrastructure is largely inherited from the Soviet era (see Part I). Much of it has not received consistent maintenance and is now in poor condition—often undersized, inefficient, and prone to failures. Most operational mines were commissioned before the 1990s and have not always been modernised, reducing their efficiency and profitability while generating higher pollution than modern mines[279]. In Kazakhstan, around 70% of industrial energy consumption serves the mining sector, while the Tajikistan's Talco consumes 40% of the country's energy, in a context where a large portion of the population regularly experiences power cuts in winter[280]. Consequently, expanding the mining sector could necessitate the construction of new energy infrastructure, estimated to cost between $25 and $50 billion, to meet the production targets set for Central Asia[281].

Historically, transport infrastructure in the five Central Asian states has been oriented along a north–south axis due to regional ties. China's Belt and Road Initiative seeks to shift some of this traffic along an east–west axis, with the flagship China-Kyrgyzstan-Uzbekistan railway project potentially increasing trade capacity between China and Kazakhstan by about 50%[282]. Meanwhile, trade routesconnecting Central Asia and Europe are regularly congested, with frequent delays and repeated transshipment bottlenecks.

The lack of investment, infrastructure, and advanced technology have hindered the exploration of Central Asia's subsoil. In Kazakhstan, exploration investments made between

[277] « Central Asia, Gulf countries deepen strategic partnership at Kuwait meeting », *The Astana Times*, April 16, 2025.
[278] « Memorandum of Cooperation signed by JOGMEC and the Minister of Industry and Construction of Kazakhstan — Further cooperation in the metals sector », Press release, Tokyo, September 8, 2024.
[279] Indra Overland and Roman Vakulchuk, *op. cit.* : 251.
[280] *Study shows TALCO's potential to save energy* (Dushanbe: The World Bank, 2013).
[281] Haley Nelson and Natalia Storz, *op. cit.* : 265.
[282] Caspian Policy Center, *A New Link in Global Trade: The China-Kyrgyzstan-Uzbekistan Railway and Its Role in the Middle Corridor* (Washington D.C.: Caspian Policy Center, June 6, 2024).

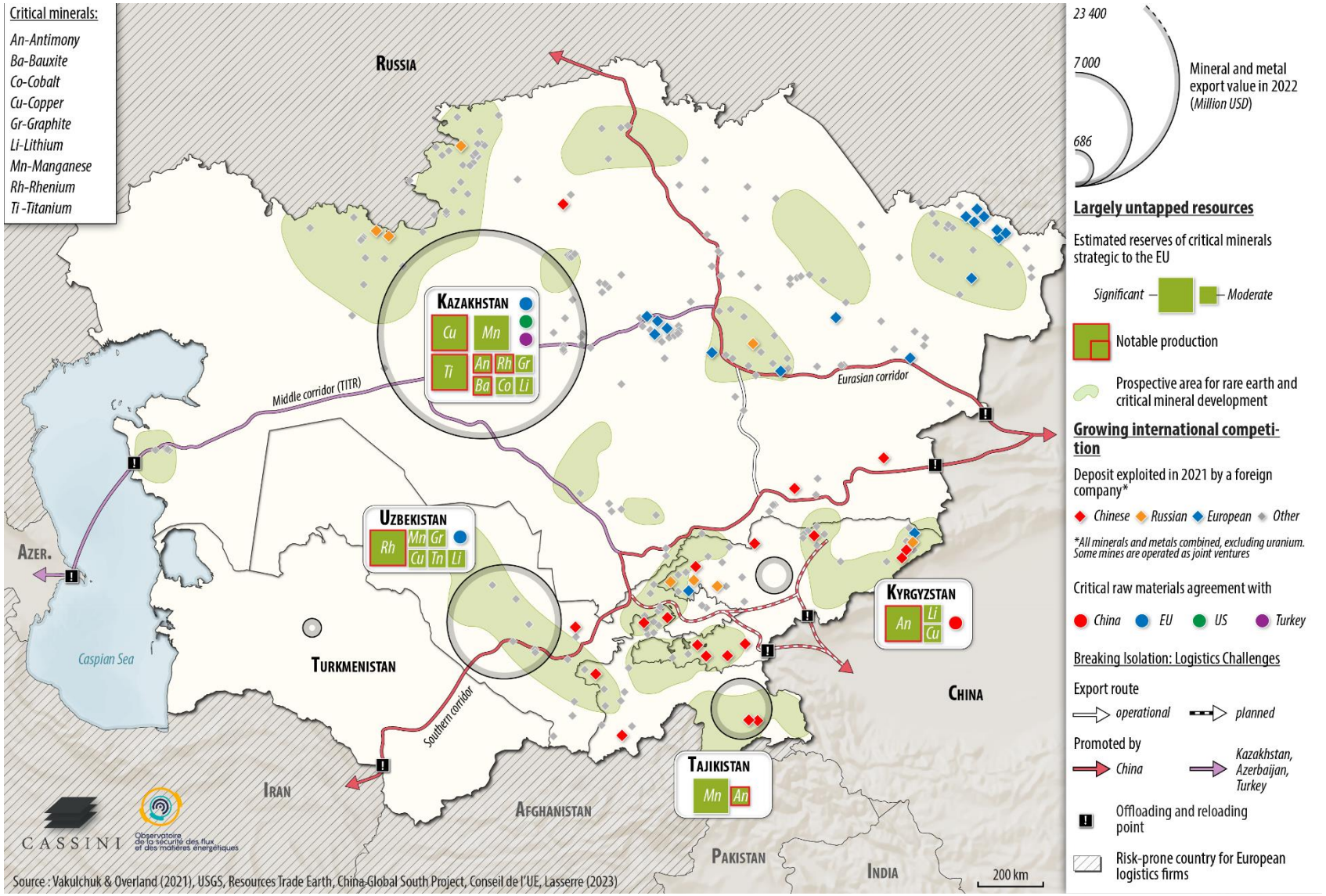
2003 and 2023 are equivalent to those of 1990[283], and almost no new deposits were discovered in the three decades following the Soviet Union collapse. As a result, mineral reserves are dwindling, and high-quality deposits are becoming rarer, reducing the competitiveness of the sector. Although investments seem to be increasing, the mining sector remains a long-term industry, as it typically takes between eight and twenty years from the inception of the exploration phase to the production of minerals. This lack of investment is therefore expected to constitute a constraint on the sector's growth in the coming years.

Governance challenges and regional instability can also deter potential investors. Significant variations in energy prices have led to uprisings, such as the *Quandy* Quantar uprising in Kazakhstan in 2022. Anti-Chinese demonstrations regularly take place in different Central Asian countries, while other protests stem from poor mine and waste management, which contaminates local water, soil, and air, creating serious public health risks. If these issues persist – or worsen with the development of new mines – they could provoke further resistance to new mining projects[284]. In addition, the energy used in the mining sector often comes from fossil fuels, particularly coal, exacerbating health pressures on local populations. Public discontent is further fueled by widespread distrust of elites, who are frequently accused of corruption.

Finally, economic dependence and excessive debt to Beijing also constitute a risk for some countries in the region. China is the main partner for the mining sector in the region, both from an industrial, commercial, and financial perspective. Through the Belt and Road Initiative, Beijing has lent substantial sums of money since 2013 to Central Asian countries – particularly Tajikistan and Kyrgyzstan – which now find themselves burdened with debt that could partly be repaid in the form of mining resources or even through the transfer of ownership of certain mining lands.

[283] Carnegie Endowment for International Peace, *Can Central Asia Secure Growth with Rising Critical Mineral Wealth?* (Washington, D.C.: Carnegie Endowment for International Peace, January 27, 2025).
[284] Indra Overland and Roman Vakulchuk, *op. cit.* : 251.

Map 3 – Central Asia: A New Frontier for Strategic Critical Raw Materials



4. Key takeaways

- Central Asia is a key mining hub, whose potential has in recent years sparked a surge of announcements and a competitive race around the future production of critical metals. The mining and metallurgical sectors in this region could experience significant growth in the coming years, particularly in Kazakhstan and Uzbekistan, but not exclusively.
- The Central Asian states are engaged in a competitive race, with governments regularly announcing new partnerships, national investment plans, and discoveries of critical raw material deposits, particularly in rare earths. This frenzy is driven by the risk posed by the concentration of the supply chains of those metals to the hands of China. These prospects motivate numerous foreign powers to invest in Central Asia, which benefits regional economic development.
- Having strengthened its presence in the region over the past twenty years, China has a considerable lead over its competitors, while the European Union has been particularly active since 2022, developing significant partnerships, notably with Kazakhstan and Uzbekistan, and investing in the Middle Corridor.
- Despite a proactive discourse, the United States have relatively little success in concretely fulfilling its investment promises in the region due to logistical difficulties, as well as a relatively hostile and unstable political climate between the two regions. Russia, for its part, remains a secondary actor in the region's mining sector, outside of uranium production.
- Despite this dynamism, many challenges persist, notably the lack of investment in infrastructure and exploration of the Central Asian subsoil, as well as governance issues and an overreliance on China from an economic perspective.

CONCLUSION

Perceiving an opportunity in the insufficient gas production in Kazakhstan and Uzbekistan, Vladimir Putin proposed in December 2022 to establish a tripartite gas union with these countries, aiming to meet domestic demand and coordinate gas transit to China. Central Asian countries are aware of the risks of increasing political and economic dependence on Russia, but they seem to consider the social and environmental risks generated by their precarious energy systems as more urgent. However, Gazprom's loss of the European market places Uzbekistan and Kazakhstan in a relatively comfortable negotiating position, allowing them to demand that Russian gas imports occur solely on commercial terms and without political conditions. In Turkmenistan, gas sales represent three-quarters of total exports. China has gradually established itself as the main outlet for Turkmen gas. However, Gazprom's pivot to the east places Turkmenistan in a situation of intensified competition, both on the Chinese market and on the Central Asian and Russian markets. Turkmenistan must therefore seek markets further afield, whether to the west (Caucasus, Turkey, Europe) or south (Iraq, Pakistan, India). However, the development of the infrastructure necessary to reach these markets faces economic and geopolitical obstacles.

In response to their energy needs, Kazakhstan and Uzbekistan have set ambitious targets for the development of wind and solar energy. However, increasing renewable generation capacities requires an increase in balancing capacities. Thus, the energy transition in Central Asia does not necessarily imply growing autonomy from Russian hydrocarbons. On the contrary, this transition can create a pull effect favouring the penetration of Russian gas into regional markets. To limit the growth of Russian influence in Central Asia, the countries of the region could strengthen the integration of their electricity grids to encourage synergies between their energy systems. To reinforce their strategic positioning in a region that can provide them with critical minerals and potentially low-carbon energy, Europeans could support this process of regional grid integration at technical, economic, and technological levels. Within the framework of its Global Gateway initiative, the EU has launched the Sustainable Energy Connectivity in Central Asia project (2022-2026), which aims to promote the development of a sustainable energy mix in Central Asia. With a budget of €6.8 million, the initiative is, however, insufficient for the EU to assert itself as a major geopolitical actor in the region.

While the renewable energy sector appears to Central Asian countries as an opportunity to diversify their partners, Chinese actors are almost omnipresent in this sector. Consequently, Chinese companies could impose Chinese standards in the Central Asian renewable energy sector, which would limit competition from other actors. In doing so, China could strengthen its influence over the region's energy systems by creating dependence on its technologies and

materials. Kazakhstan and Uzbekistan plan to export low-carbon electricity to Europe in the coming years. Despite the potential these territories offer for renewable energy development, it seems difficult to envision these countries becoming electricity exporters to the EU in the near future, given the internal challenges they face. Strengthening national energy systems through deeper regional grid integration is a necessary preliminary step before considering macro-regional integration with the EU. Kazakh and Uzbek ambitions align with China's strategic vision of Eurasian electricity network interconnection. By investing in Central Asian electrical systems, China paves the way for its excess electricity production capacity to supply markets along an "energy Silk Road" extending to Europe.

Faced with their respective energy constraints, Kazakhstan, Uzbekistan, and Kyrgyzstan have initiated nuclear programs. Russia establishes itself in each of these countries as the main supplier of nuclear technologies and services. In Kazakhstan, EDF was designated in June 2025 by Astana as a partner in the consortium constructing the future Ülken nuclear plant. However, since Rosatom was designated as the project lead, French participation will depend on the terms of cooperation with the Russian company, defined by the risk of exposure to international sanctions against Russia. In response to the impact of sanctions on Rosatom, China positions itself as an alternative. Fearing that their nuclear programs could be affected by Russian failures, Kazakhstan, Uzbekistan, and Kyrgyzstan have all turned toward Beijing to varying degrees. The role of the United States and the European Union, apart from France's potential involvement in the Ülken project, remains limited.

While the energy transition of the Central Asian powers generates economic and strategic opportunities for external powers seeking to supply the region with gas or develop low-carbon or nuclear generation capacities, Central Asia, due to its significant mining potential, can in turn contribute significantly to the energy transition of these powers. The region's mining and metallurgical sectors thus attract strong interest and could experience significant growth in the coming years, particularly in Kazakhstan and Uzbekistan, but not exclusively. Following the collapse of the USSR and from the 2000s/2010s, the gradual withdrawal of Russia opened the way for China. Today, China is the main investor and mining partner in Central Asia, importing approximately 70% of the region's critical metal exports in 2024[285]. To meet the aspirations of its Central Asian partners, Chinese actors also invest in local refining capacities.

Due to growing awareness among Western countries of their vulnerability to China regarding supplies of certain critical metals, the EU and the United States are attempting to catch up with China by establishing themselves in Central Asia's mining sector. This dynamic aligns with the multi vector diplomacy of the countries in the region. However, Western ambitions will

[285] *Ibid.:* 284.

be difficult to implement, mainly for logistical reasons. Indeed, Central Asian countries are surrounded by countries under U.S. and/or European sanctions or pressure: Russia to the north, China to the east, Afghanistan and Iran to the south. Moreover, to the west, the development of the Middle Corridor (TITR) via the Caspian Sea makes exports along this route costly[286].

[286] Haley Nelson and Natalia Storz, *op. cit. :* 265.

APPENDIX

Appendix 1: Small Modular Reactors (SMRs)

According to the International Atomic Energy Agency (IAEA), an SMR is a nuclear fission reactor, factory-manufactured, with a power output of 300 MWe or less, designed to be modular and mobile. This limited capacity is intended to reduce technical constraints and land footprint, allowing for a simplified, mobile, and lower-cost design without the need to adapt the electrical grid.

With lower capital investment and modular power output, SMRs could enable states unable to support the construction of a large-capacity plant to develop nuclear energy in line with their financing capacity and the size of their electrical network. Additionally, their mobile design could provide energy to isolated territories not connected to the grid, helping to reduce the isolation of populations far from central authorities. Finally, SMRs could decarbonize energy-intensive industries through local production of electricity, heat, and potentially low-carbon hydrogen, while also compensating for the intermittency of renewable energies.

This still-emerging market is currently dominated by the United States, China, and Russia, which are the only countries with advanced SMR designs or operational SMRs. However, their economic profitability remains uncertain. While the goal is to reduce the unit cost of reactors, they remain too expensive, and operational costs are still difficult to assess.

Source: https://www.iris-france.org/wp-content/uploads/2024/08/OSFME_2024_07_R18_SMR_synthese.pdf

Appendix 2: Civil Nuclear Projects in Central Asia

Country	Project	Status	Technologies	Expected power	Main provider	Expected deployment
Kazakhstan	Ülken nuclear power plant	Works began in August 2025	Russian reactor VVER-1200	2,400 Mwe	Rosatom (Russia)	2035 - 2036
	Kurchatov nuclear power plant	Preparation phase (site assessment)	Not specified	Not specified	CNNC (China)	Not specified
	Aktau nuclear power plant	Preparation phase (site assessment)	Not specified	Not specified	CNNC (China)	Not specified
Uzbekistan	Jizzakh SMR	Works began in August 2024	Russian SMR RITM-200N	33 MWe	Rosatom (Russia)	2029
	Jizzakh nuclear power plant	Feasibility study	Russian reactor VVER-1200	2 400 Mwe	Rosatom (Russia)	Not specified
Kyrgyzstan	Chui SMR	Feasibility study	Russian SMR RITM-200N	Not specified	Rosatom (Russia)	Not specified
Tajikistan	No confirmed project					
Turkmenistan	No confirmed project					

Appendix 3: Components of the Central Asian Mining Sector

	Kazakhstan	Kyrgyzstan	Uzbekistan	Tajikistan	Turkmenistan
Mining sector share in economy	12.1% in 2024[287]	13% in 2020[288]	14.8% in 2022[289]	20% of industrial activity in 2022[290]	5-10%[291]
Mining plan	Complex Plan on Rare Metals and REM for 2024-2028	Draft Concept of Development of the Geological and Mining	$2.6 billion over three years to develop rare minerals sector, targeting 28	In December 2023, the president requested the government to implement a program for	/

[287] Astana International Financial Centre, *AIFC Mining Report 2025* (Astana: AIFC, September 2025).
[288] Banque Mondiale, *Mining Sector Diagnostic – Kyrgyz Republic* (Washington D.C.: BM, March 2023).
[289] Elena Safirova, *The Mineral Industry of Uzbekistan in 2022 (Advance Release)* (Reston: U.S. Geological Survey, April 2025).
[290] U.S. International Trade Administration, « Tajikistan – Mining and Refining, and Heavy Equipment », *https://www.trade.gov/country-commercial-guides/tajikistan-mining-and-refining-and-heavy-equipment* (accessed on September 19, 2025).
[291] GRATA International, *op. cit.*: 246.

		Industry of the Kyrgyz Republic for 2023-2035	critical metals through 76 projects to improve exploration, processing, and high-tech manufacturing.	the extraction and refining of metals.[292]	
Main state-owned mining companies	Kazatomprom, Tau-Ken Samruk	Kyrgyzaltyn, Kumtor Gold Company, Kyrgyzgeology	Navoi Mining & Metallurgy Company (6,4 % du PIB), Uzbekistan Technological Metals Combine (filiale de AMMC)	Tajik Aluminum Company (TALCO)	Turkmenhimiya, Turkmendovlet-geologiya
Key mining legislation	September 2025: a law on exploration and exploitation of Kazakh subsoil was approved by the government.[293] 2024: certain raw materials must be refined in Kazakhstan before export; a digital platform providing access to geological data was created.[294]	2024: moratorium on uranium and thorium extraction lifted; subsoil becomes state property.	New law in 2025 makes Uzbek subsoil state property and simplifies permit acquisition.	2022: State asks for 30% shares of all mining projects; at least 90% of Tadjik nationals in mining projects.[295]	

[292] « Rare metals of Tajikistan: sources of wealth and the struggle for influence », *Asia-Plus Tajikistan*, June 4, 2024.
[293] « Kazakhstan prepares new subsoil use reform bill for parliamentary review », *MINEX Forum*, September 15, 2025.
[294] Yerbolat Yerkebulanov, Assel Ilyassova and Leila Makhmetova, *GILS Mining: Kazakhstan* (Almaty: GRATA International, June 26, 2025).
[295] Banque Mondiale, *op. cit.:* 288.

Appendix 4: Environmental issues: A Local Obstacle to the Development of the Nuclear Industry

In Central Asia, nuclear energy development is closely linked to environmental issues. Soviet-era misinformation about the dangers of nuclear power until the Chernobyl disaster in 1986, and the radioactive contamination of uranium extraction sites and nuclear test sites after independence, have fuelled public distrust.

In Kazakhstan, opposition to nuclear energy is particularly strong due to rising cancer rates and the uninhabitability of 18,000 km² of territory, resulting from 456 nuclear tests conducted in Semipalatinsk between 1949 and 1989[296]. In response to this distrust, President Kassym-Jomart Tokayev chose to submit the question of new nuclear plant development to a referendum to legitimise the return of nuclear energy to Kazakhstan—a vote nonetheless marred by information control and lack of pluralism, raising questions about the legitimacy of the result[297; 298].

Kyrgyzstan and Uzbekistan, meanwhile, struggle with the disposal of radioactive mining waste and processing residues left by the USSR. The risk of radioactive contamination is particularly high in the geologically unstable Mailuu-Suu region in Kyrgyzstan. Dams preventing contaminated water from spilling into the Ferghana Valley, weakened by a landslide in 2017, are aging and could fail in the event of an earthquake or another landslide[299]. The IAEA, the Commonwealth of Independent States, and the European Commission are working to assist Kyrgyzstan, but relocating radioactive materials to secure storage facilities requires more funding and technical collaboration[300].

The Soviet nuclear legacy continues to have a real impact on the lives of Central Asian populations and weighs heavily on public opinion. This is why it is important for Kazakhstan, Uzbekistan, Kyrgyzstan, and their international partners to work on reducing the radioactive footprint of the Soviet past and to inform local populations about transparency and nuclear safety measures in place.

[296] International Campaign to Abolish Nuclear Weapons, « Kazakhstan », https://www.icanw.org/kazakhstan (accessed on September 19, 2025).
[297] Beimbet Mussin *et al.*, « Sociological analysis of public opinion on the construction of a nuclear power plant in Kazakhstan », *Polityka Energetyczna – Energy Policy Journal*, n°1 (2025).
[298] International Partnership for Human Rights (IPHR) and Kazakhstan International Bureau for Human Rights and Rule of Law (KIBHR), *Crackdown on dissent over nuclear power plant, controversial media accreditation rules, and anti-"LGBTQI+" propaganda measures* (Kazakhstan: Civicus Monitor, December 19, 2024).
[299] « Unstable nuclear waste dams threaten fertile Central Asia heartland », *Reuters*, April 23, 2024.
[300] « Cleaning up a toxic legacy: environmental remediation of former uranium production sites », Press release, Vienna, September 27, 2016.

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

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