



CRITICAL MINERALS IN THE OSCE AREA

A Preliminary Analysis of the Case of Central Asia from
the Perspective of Supply Potential, Workforce,
Infrastructure Readiness and Environmental Standards

Preamble

As many OSCE participating States (pS) prioritize strengthening energy security and advancing the energy transition, access to critical minerals is increasingly recognized as a strategic priority. These materials are essential for national security, economic competitiveness, clean energy technologies and resilient industrial supply chains. Yet global production and processing remain highly concentrated and exposed to geopolitical, logistical, market and environmental risks, among others. Against this backdrop, Central Asia, alongside other regions, given its resource base, and access to key transit routes, has recently strengthened its engagement on critical minerals with both traditional and non-traditional partners.

The present analysis provides, first, an initial, non-exhaustive overview of Central Asia's current role in supplying critical minerals. Second, the report explores a number of potential opportunities for the region to further expand its role in an environmentally responsible and socially inclusive manner, which prioritizes local value addition and regional stability, with the aim to mitigate and overcome existing risks. In this connection, the report identifies key barriers, including infrastructure, investments, governance, environmental and social standards, and considers workforce capacity as a critical enabling factor. In particular, it underlines the importance of developing skills and ensuring a more inclusive sector by increasing women's participation across the critical minerals value chain.

Developments related to critical minerals are intrinsically linked to several mandated areas of work of the Office of the Co-ordinator of OSCE Economic and Environmental Activities (OCEEA), including energy security, energy sustainability, connectivity, natural resource management, and good economic and environmental governance. As such, this analysis is meant to serve as an input for dialogue among all 57 participating States, subject to their guidance, including in relevant formats such as the Permanent Council and/or the Economic and Environmental Committee, on how to advance shared commitments in the economic and environmental dimension in light of developments related to critical minerals.

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EXECUTIVE SUMMARY

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Geopolitical, military, economic and technological developments, including artificial intelligence (AI), together with accelerating electrification and the energy transition are reshaping demand for critical minerals, making the sector increasingly strategic for energy security, industrial competitiveness, and national security. Minerals such as uranium, lithium, nickel, copper, cobalt, antimony, and rare earth elements (REEs) are increasingly recognized not only as export commodities, but as key inputs underpinning energy security, clean technologies deployment and industrial competitiveness. At the same time, supply constraints are emerging for several of these key minerals. The International Energy Agency (IEA) projects a potential copper supply shortfall by up to 30% by 2035, while warning of heightened market tightness risks for lithium, nickel, cobalt and magnet rare earth elements, among others.¹

These risks have raised concerns regarding supply security, economic resilience and the pace of the energy transition. A key factor of such concerns is the high degree of concentration across the value chain. For several minerals, the top three producing countries account for more than 70% of global mining output, and in some cases over 80%.² Refining and midstream processing are often even more geographically concentrated than extraction, with China accounting for more than 60% of global capacity in minerals such as lithium, cobalt and rare earth elements.³ This concentration creates structural dependencies that extend beyond extraction and heighten exposure to geopolitical and market disruptions.

Beyond supply diversification, energy security increasingly depends on the ability of countries to prevent and manage disruptions in critical mineral markets. In response, countries are exploring strategic preparedness tools, including stockpiling and co-ordinated

risk management approaches, alongside diversification efforts and expanded partnership with resource-rich countries and regions to reduce concentration risks and strengthen economic and national security.⁴

The five Central Asian participating States (pS) hold great critical mineral potential, ranging from Kazakhstan as one of the world's leading producers of uranium and supplier of rare metals,⁵ to Uzbekistan's copper and uranium reserves, Tajikistan's deposits of zinc and antimony,⁶ Kyrgyzstan's antimony and gold production,⁷ and Turkmenistan's reserves of lithium, copper ores and REEs.⁸ In particular, Kazakhstan and Uzbekistan act as anchor suppliers due to their substantial geological endowments, long-established mining industries and export-oriented production models.

Several countries, including many from the OSCE area, are already active in the sector across the Central Asian region, and new partnerships have continued to emerge in recent years.

In this context, Russia remains a major actor in Central Asia's critical minerals sector reflecting deep historical, infrastructural and industrial linkages, reinforced through ongoing economic co-operation frameworks like the Eurasian Economic Union. A significant share of regional mineral output continues to rely on Russian processing capacity and transport routes while approximately 90% of Central Asia's critical raw materials are refined in China, which also plays a central role in mid-stream value chains.⁹

In addition, Central Asian pS have recently entered new strategic initiatives and partnership frameworks. For instance, engagement with the United States of America (U.S.) has been strengthened through the C5+1 Critical Minerals Dialogue (CMD), inaugurated on 8

February 2024, and aimed at advancing economic co-operation with Central Asia while increasing its involvement in critical mineral supply chains.¹⁰ Similarly, co-operation with the European Union (EU) as a group has been elevated under the framework of the EU–Central Asia strategic partnership with the signing of a joint declaration of intent on critical raw materials at the first EU-Central Asian summit on 4 April 2025, aimed at ensuring secure, sustainable and diversified supply chains.¹¹

Co-operation between Central Asia and individual European countries on critical raw materials has also intensified in recent years. Germany has strengthened its engagement with the region through the *Zentralasien +1* (Z5+1), inaugurated on 17 September 2024, focusing on energy transition, raw materials and supply-chain resilience.¹² Italy has expanded its co-operation with Central Asian partners, placing emphasis on natural resources and critical raw materials within broader economic and industrial relations.¹³ The United Kingdom has also deepened its engagement with the region through the launch of the Central Asia 5+United Kingdom (CA5+UK) ministerial on 26 February 2026 focused on investment, transport and trade diversification and expansion of partnerships on critical minerals.¹⁴

Engagement on critical minerals is also expanding with Türkiye, both through regional frameworks such as the Organization of Turkic States and through new bilateral Memoranda of Understanding (MoUs) signed with Kazakhstan, Uzbekistan, and Kyrgyzstan.¹⁵

Central Asia, with its strong resource endowment potential, represents a strategic region for enhancing critical minerals diversification and supply security, and it has shown keen interest in and taken concrete steps to ensure production, processing and workforce capacities are developed in a sustainable, resilient, and inclusive manner. The region's potential

in the critical minerals space remains largely untapped: further progress in expanding value-chain capacity, strengthening infrastructure and logistics, advancing the adoption of internationally recognized standards and best environmental practices, deepening human-capital development (skills pipelines, retention, and workforce availability), and prioritizing local value-addition would support the region in moving beyond an upstream supplier role and positioning itself more prominently in resilient, higher-value critical-mineral supply chains.

As the sector expands globally and modernizes, a number of structural workforce-related challenges are becoming more visible. These include constraints related to workforce availability, skills development, access to specialized training, and difficulties in attracting and retaining qualified personnel, particularly in remote mining locations. Together these factors are emerging as material risks to competitiveness and supply chain resilience.

Disparities in workforce participation can further exacerbate existing labour shortages and limit the sector's ability to build a resilient and sustainable talent base. This challenge extends beyond Central Asia, as women remain significantly under-represented in mining and extractive industries globally. In Central Asia, despite strengthened legal frameworks, women, who could play a key role in addressing existing workforce gaps, account for between approximately 7% and 18% of the workforce, and are primarily concentrated in administrative rather than operational and senior technical roles. Evidence reviewed for this analysis indicates that this imbalance is driven predominantly by structural and operational barriers rather than by lack of skills. Best practices demonstrate that progress in the mining sector is most durable when sustainability, transparency, innovation, and gender considerations are embedded into mainstream mining, labour and industrial

policy frameworks, rather than addressed through isolated initiatives.

As the critical minerals sector is among the most resource-intensive industries and a significant source of environmental pressure, the region will need to further strengthen its alignment with environmental, social, and governance standards (ESG) and promote the effective implementation and monitoring of environmental impact assessment (EIA) procedures. This also implies reinforcing anticipatory risk assessments and addressing the broader environmental consequences associated with this sector. The social dimensions and implications of the sector would also need to be carefully managed. Ensuring that the sector's development is in line with value-addition principles and generates inclusive benefits for local populations will be crucial. Potential competition over land, energy, water and other resources, as well as trade-offs and risks of exacerbating tensions across sectors and between neighbouring communities, require proactive co-ordination, transparent governance and sustained dialogue and co-operation.

Given the growing international role of Central Asia in the critical minerals industry and the implications and opportunities this entails for energy security, natural resource management, economic and environmental good governance, digitalization, human capital development, con-

nectivity and gender equality*,¹⁶ areas within OSCE mandate, this analysis provides an overview of the region's current position and related developments involving participating States. It further explores potential opportunities for Central Asia to strengthen its role through policy dialogue, regional co-operation, and capacity-building in three key areas. *First*, supporting know-how and capacity-building around the development of enabling and predictable policy and regulatory frameworks, including improved governance, transparency, value addition, ESG alignment, reinforced environmental impact assessments regulations, and the integration of sustainable energy-water-resource management and climate-risk considerations into extractive-sector planning to minimize environmental impacts of mining. *Second*, strengthening human capital development, workforce sustainability and diversity by promoting alignment between education systems and industry needs, advancing women's participation in technical and leadership roles, and addressing digital skill gaps in emerging energy and minerals sectors. *Third*, promoting regional and cross-regional co-operation and exchange of best practices to enhance connectivity, sustainable infrastructure and improved technologies to reduce environmental externalities and promote cleaner processes, and strengthen the resilience of critical-mineral value chains, including along key transit corridors.

*In line with the consensual 2004 OSCE Action Plan for the Promotion of Gender Equality, the OSCE works to promote equality between men and women, boys and girls.

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2

CRITICAL MINERALS IN THE GLOBAL ENERGY TRANSITION



CRITICAL MINERALS IN THE GLOBAL ENERGY TRANSITION

2.1 Why critical minerals matter

Energy systems worldwide are undergoing a rapid transformation driven by digitalization, artificial intelligence, electrification, and the expansion of low-carbon technologies. These trends are significantly increasing demand for electricity and accelerating investment in power generation capacity, grid infrastructure, and energy storage systems. As a result, demand for critical minerals has increased rapidly, positioning mining and mineral processing as foundational components of the energy transition. According to the World Bank, the demand for critical minerals could double by 2040,¹⁷ while the IEA projects that the demand for some minerals may double or even triple by 2030 under accelerated-transition scenarios.¹⁸

Minerals such as uranium, copper, gold, cobalt, nickel, lithium, REEs, and antimony play distinct but interlinked roles in modern energy systems and digital infrastructure. Uranium underpins nuclear power generation as a source of low-carbon baseload electricity. Copper is indispensable for electrification, power grids, electric vehicles, and renewable energy installations. Gold and antimony are used in electronics and specialized industrial applications, while REEs are critical inputs for wind turbines, electric motors, batteries and digital technologies. As governments and companies strive, and at times compete, to secure and diversify supply chains, critical minerals are increasingly framed as strategic assets linked to energy security, technological sovereignty and economic stability.

International assessments further indicate that global production and processing of many critical minerals remain highly concentrated, with a small number of economies accounting for dominant shares of refining and mid-

stream capacity. In particular, the People's Republic of China (hereafter "China"), has the world's largest share of critical minerals being the top refiner of 19 out of 20 key strategic minerals,¹⁹ shaping global supply dynamics. This concentration has prompted intensified efforts by many countries both within and outside the OSCE to diversify supply sources and incentivize domestic and allied production capacities. Relatedly, export controls and other supply-side measures have become more widespread in recent years, including restrictions affecting rare earths, with implications for the functioning and resilience of global value chains.²⁰ These developments have increased exposure to market volatility and supply risks across critical mineral value chains, as concentration - like in any market - tends to increase vulnerability, with potentially far-reaching security implications extending beyond the energy sector.

Additionally, even diversified supply chains remain vulnerable to disruptions due to the structural characteristics of critical-mineral markets. Limited substitutability, concentrated processing capacity and long project development cycles constrain the ability of markets to respond quickly to shocks. In response, governments worldwide are increasingly looking into initiatives to diversify supply sources, expand domestic capacity, strengthen international partnerships, promote recycling, and establish strategic stockpiles to enhance resilience and mitigate risks. Such approaches are generally intended to ensure business continuity and provide temporary buffers during supply disruptions, rather than to manage price volatility or influence market dynamics.²¹

It is worth noting that these materials are framed through slightly different conceptual lenses across regions. For instance, some countries adopt a broader security-oriented approach by identifying critical materials as those essential to their economic or national

security with vulnerable supply chains and essential manufacturing functions.²² Others apply a more selective industry-focused methodology, highlighting their economic importance and supply risks, often linked to a high concentration of supply from a limited number of countries;²³ or stress the importance of critical materials for the energy transition or digital economies.²⁴ Others consider these materials as those particularly important to the national economy, defense and security, and for meeting the needs of high-tech industries, and whose consumption is substantially dependent on imports.²⁵ This analysis does not adopt any specific definition; instead, it uses the term “critical minerals” in a simplified functional manner.

2.2 Central Asia’s current and potential roles in critical minerals

Central Asia, as a resource-endowed region, holds great potential in critical minerals, and can further contribute to global critical mineral supply chains, particularly for uranium, gold, copper, antimony and REEs.

The expansion of critical mineral production and related supply-chain capabilities in the region is closely linked to the availability and governance of water resources. Mining and mineral processing are water-intensive activities, therefore contributing to further increase water demand. Among minerals, copper and lithium are particularly vulnerable to water stress.²⁶ Climate change is expected to exacerbate these pressures through rising temperatures, increased frequency of droughts, and growing variability in river flows, affecting both surface and groundwater availability. Water will therefore be needed not only to ramp up the production of rare metals and critical minerals, but also to manage increasingly competing demands

across agriculture, water and energy systems.²⁷ In a region like Central Asia, with shared river basins and transboundary waters, effective water management governance will be key for the sustainable development of mineral supply chains and the energy transition.

The region has emerged as an increasingly important contributor to global critical mineral supply, particularly through Kazakhstan and Uzbekistan, which together account for the vast majority of industrial-scale mining in the region. China remains the region’s main processor of critical minerals and has intensified investment and co-operation agreements in recent years. Approximately 90% of Central Asia’s critical raw materials are refined in China, which highlights the country’s fundamental role in midstream value chains.²⁸

At the same time, Russia continues to play a significant role in Central Asia’s critical minerals landscape, especially in mining, energy and transport sectors. Several export routes rely on Russian rail and maritime infrastructure for shipping minerals, reflecting long-standing historical, infrastructural and trade linkages.²⁹ As a result, a significant share of Central Asian mineral output continues to be exported for downstream processing in Russia.³⁰ Russia also maintains institutional engagement through the Federal Agency for Mineral Resources/Rosnedra, which has concluded co-operation agreements with Central Asian governments on geological exploration.³¹ Kazakhstan’s uranium reserves remain particularly strategic for Russia, which retains ownership stakes in several uranium joint ventures in Kazakhstan. Russia is also engaged in industrial and trade co-operation with Uzbekistan, including on nuclear, copper, and geological exploration, and with Kyrgyzstan, notably in gold mining through major mining companies.³² More broadly, Russia has signaled interest in further developing co-operation with Central Asian countries in the field of rare earth metals.³³

More recently, besides these longstanding partnerships that continue to remain key, the region has strengthened co-operation with other international partners, including the U.S.,³⁴ the EU³⁵ and some of its Members States, as well as the United Kingdom (UK)³⁶, Canada, and Türkiye. Frameworks of co-operation with these partners are examined in greater depth because, among the OSCE participating States, they have demonstrably intensified engagement with Central Asia's critical minerals sector in recent years through new bilateral or regional agreements, investment frameworks, and policy instruments explicitly targeting critical minerals access and value-chain development in the region.

U.S. efforts to diversify and secure critical mineral supply chains reflect the growing importance of critical minerals in its foreign, economic and national security policy. Washington has prioritized diversifying supply sources, strengthening domestic processing capacity and deepening international partnerships to enhance supply chain resilience. Central Asia has gained increased relevance in U.S. foreign policy, given its significant untapped mineral potential and its position within emerging transregional trade and connectivity corridors. The U.S. Geological Survey (USGS) inventory identifies 384 occurrences of rare and critical earth minerals in Central Asia (160 located in Kazakhstan, 87 in Uzbekistan, 75 in Kyrgyzstan, 60 in Tajikistan, and 2 in Turkmenistan), representing 11% of known global rare earth sites.³⁷ Against this backdrop, the U.S. reinforced its engagement with the region through initiatives like the C5+1 Critical Minerals Dialogue and the innovative platform for public-private dialogue "B5+1 Forum", the private sector counterpart of the C5+1, to enhance economic co-operation and integration into critical mineral supply chains.³⁸ In addition, several bilateral agreements and Memoranda of Understanding (MoUs) on critical minerals have been signed with Kazakhstan,³⁹ Uzbekistan,⁴⁰ which also participated in the Critical Minerals Ministerial held on 4 February 2026 in Washington, D.C. Engagement has also advanced with Tajikistan, which hosted the U.S. Special Envoy to South and

Central Asia in Dushanbe on 28 April 2026, with discussions focused on critical minerals and the strengthening of economic ties.⁴¹

Canada has been expanding its engagement with Central Asia. Canadian companies have long been active in uranium, oil and gas, copper, and gold projects across the region, while Ottawa has sought to deepen trade and investment ties, especially in the extractive sector.⁴² Under its 2025 G7 Presidency, Canada announced plans to fast-track critical minerals projects under the Critical Minerals Production Alliance,⁴³ reinforcing its focus on energy security and resilient critical mineral supply chains through global partnerships, including with Central Asia.⁴⁴ Canadian companies have also expanded their operational footprint in the region, including through lithium exploration projects in Kazakhstan, and gold development projects in Kyrgyzstan, further underscoring Canada's growing strategic and commercial interest in Central Asia's mineral sector.

Türkiye, home to significant REE deposits, is also a key player in global supply chains and is emerging as a high-value-added supply hub for critical minerals.⁴⁵ In 2025, the country published its first comprehensive Critical and Strategic Minerals List through the Critical and Strategic Minerals Report, which highlights Türkiye's commitment to securing mineral supply chains for its energy transition, industrial development and national security.⁴⁶ Co-operation with Central Asia on this topic is also gaining momentum, particularly as current export patterns indicate Türkiye is among the top three export destinations for Central Asia's critical minerals, after China and Russia.⁴⁷ Several agreements have been signed with Central Asian pS to boost bilateral trade relations and enhance co-operation in mining and energy, including an MoU and joint projects in mineral development with Kazakhstan,⁴⁸ an MoU with Uzbekistan⁴⁹ and a Joint Economic Commission Protocol with Kyrgyzstan.⁵⁰

For the EU, critical raw materials have been elevated to a strategic priority,⁵¹ and Central Asia

has emerged as a region of growing interest for the EU's efforts to diversify critical raw material supply chains, particularly through strategic partnerships and investment co-operation. At the first EU-Central Asia Summit on 4 April 2025, the EU and Central Asian leaders endorsed a Joint Declaration of Intent on Critical Raw Materials for a deeper co-operation on this matter,⁵² complementing the MoUs signed with both Kazakhstan⁵³ and Uzbekistan.⁵⁴

Similarly, several EU Member States have reinforced bilateral co-operation with the region on energy security, raw materials and industrial value chains through high-level political dialogue and strategic partnership frameworks. Germany has strengthened its partnership at both bilateral level, particularly with Uzbekistan and Kazakhstan,⁵⁵ and at the regional level, with the Ministerial Meeting of the Central Asian countries and Germany (Z5+1) on 11 February 2026 in Berlin, which addressed co-operation on critical raw materials and broader economic partnerships.⁵⁶ Italy has likewise expanded its engagement, placing greater emphasis on co-operation in natural resources and critical raw materials, as exemplified by the first Central Asia-Italy Summit on 30 May 2025, and further reflected in several bilateral agreements concluded over the last years.⁵⁷ Overall, these engagements have highlighted mutual interest in developing more

resilient and diversified supply chains, including through co-operation on exploration, processing and downstream value-added activities.

The United Kingdom has also deepened its engagement with Central Asia through the Central Asia-UK (CA5+UK) ministerial meeting on 26 February 2026 focused on investment, transport and trade diversification and partnerships on critical minerals.⁵⁸ At bilateral level, there's also a growing interest from London, as reflected in the signing of an MoU with Kyrgyzstan⁵⁹ and Kazakhstan.⁶⁰

Beyond interest from external partners, Central Asia's growing relevance in global supply chains is rooted in the region's own resource endowment. The five Central Asian pS possess a diverse mineral base, including uranium, copper, gold, REEs and other minerals of strategic importance. While Kazakhstan plays a central role as one of the leading uranium producers and a significant supplier of copper and gold, Uzbekistan has expanded its position as a major gold producer and is steadily increasing copper and uranium output. These two countries are therefore treated as the main analytical focus of this analysis, as they currently account for the bulk of Central Asia's production capacity, export volumes and international engagement in critical minerals.

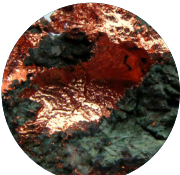
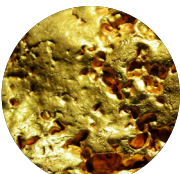
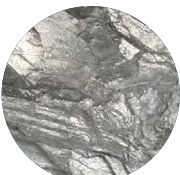


Kazakhstan

Kazakhstan occupies a pivotal position within this landscape as the world's second-largest holder of uranium reserves and the leading global producer. According to data from the World Nuclear Association, Kazakhstan holds approximately 813,900 t. of uranium reserves,⁶¹ and produced 23,270 t. of uranium in 2024.⁶² Apart from uranium, Kazakhstan is also a significant supplier of copper and gold, with the country producing approx. 614,416 t. of copper and 131,204 kg of gold in 2023.⁶³ It also hosts REE-bearing deposits and produces limited quantities of antimony; however, these segments remain at an early stage. Nevertheless, recent developments point to growing international interest in Kazakhstan's critical mineral potential. As noted by one mining industry expert interviewed for this analysis, critical minerals are increasingly perceived as Kazakhstan's "new oil" in terms of their strategic importance for economic development, energy security, and the energy transition. While REE production has not yet reached commercial scale, and antimony exports remain marginal, these minerals are increasingly recognized as strategically important for Kazakhstan's future industrial diversification and participation in clean-technology value chains, as reflected in national plans to develop the rare earth metals industry for 2024–2028.⁶⁴

Uzbekistan

Uzbekistan is a major global gold producer and has significantly expanded its copper output in recent years. Interviews of experts working in Uzbekistan's mineral sector emphasized that critical minerals including uranium, gold, copper, rare earth elements and antimony play an increasingly important role in the country's economy, contributing to export revenues, industrial development and the functioning of energy and technology-related sectors. Recent investments in mining modernization, processing capacity, and geological exploration have further strengthened Uzbekistan's position in international mineral markets, particularly as demand grows for transition-related metals. Uzbekistan has likewise expanded its role as a major mining economy through ongoing sector reforms and investment in large state-owned enterprises. The country holds approximately 40,200 t. of reasonably assured uranium resources and 49,220 t. of inferred uranium resources. Uranium production reached around 4,000 t. in 2024⁶⁵. Uzbekistan is also among the world's leading gold producers. Total gold production in 2024 reached approximately 129,1 t.⁶⁶ with exports valued at around USD 11,2 billion⁶⁷. Copper production reached 148,500 t. in 2023,⁶⁸ generating export revenues of approximately USD 521 million.⁶⁹ Although Uzbekistan has identified REE potential, no commercial-scale production has yet been reported, and antimony exports remain negligible. Nevertheless, national development strategies, including the Uzbekistan-2030 Strategy, set long-term targets for sustainable economic growth and include specific objectives for minerals sector, such as increasing copper output by 3,5 times, gold mining by 1,5 times, and uranium mining by 3 times by 2030. These measurable targets demonstrate the government's emphasis on expanding mineral production as a basis for industrial diversification and higher value-added participation in global value chains.⁷⁰

MINERAL	LEADING PRODUCERS ⁷¹	KAZAKHSTAN	UZBEKISTAN	STATUS
 Uranium	Kazakhstan 39% of world supply	23,270 (2024)	4,000 (2024)	commercial production
 Copper	Chile 5 300 (2024)	614,416 (2023)	148,500 (2023)	commercial production
 Gold	China 380 (2024)	131,2 (2023)	129,1 (2024)	commercial production
 Rare Earth Elements (REEs)	China 270 000 (2024)	Identified	Identified	pre-commercial/ exploratory stage
 Antimony	China 60 000 (2024)	Marginal	Negligible	limited share; data availability is low

Note: Data reflect the most recent publicly available sources and may not be fully comparable across countries due to differences in reporting standards and statistical coverage. REEs and antimony are included as strategic minerals with future potential; current production remains limited and is not systematically reported in official statistics.



Additionally, Tajikistan, Kyrgyzstan and Turkmenistan also contribute to the region's overall critical minerals potential, including through deposits of antimony and REE-bearing ores.

Tajikistan

Tajikistan is a leading producer of antimony, an element crucial for both the energy and military sectors, with production reaching 17,000 t. in 2024,⁷² ranking second globally and accounting for 54% of EU's antimony imports in 2023.⁷³ In 2023, the country also produced 9,220 kg of gold, 4,500 t. of copper. However, production potential is significantly higher, as more than 800 deposits of minerals and precious metals, including copper, silver, gold, lead and lithium, have been identified across the country, as highlighted by Prime Minister Kokhir Rasulzoda during the Second International Mining and Metallurgical Forum of Tajikistan,⁷⁴ and by President Emomali Rahmon at multiple fora.⁷⁵ Tajikistan is also expanding its potential in the sector by strengthening international partnerships, including with the U.S. as mentioned above.

Kyrgyzstan

In parallel, Kyrgyzstan's gold production reached 26 tonnes in 2024, and copper ore production reached 8,935 tonnes, a 43.3 percent increase compared to the same period in 2023.⁷⁶ Although production volumes remain more limited and projects are often constrained by infrastructure, financing, and regulatory challenges, these minerals are increasingly recognized for their strategic importance in advanced manufacturing, energy storage, and defense-related technologies. In response, the government of Kyrgyzstan recently launched a Development Program for Critical Minerals aimed at developing the sector until 2030 to ensure sustainable and diversified growth, improve investment conditions and strengthen the country's resource security.⁷⁷ In fact, while gold accounts for 40% of the country's exports, 22 critical minerals have already been identified, offering an opportunity for the country to strengthen its position in the sector while contributing to global energy transition efforts.⁷⁸

Turkmenistan

Turkmenistan's critical mineral potential also remains largely untapped. The country is among the top five global leaders in natural gas reserves,⁷⁹ and its extractive sector is primarily oriented towards hydrocarbons. Despite limited publicly internationally available data, some studies indicate the country may have reserves of lithium, copper ores and rare earth elements.⁸⁰ Under the C5+1 framework, the country has engaged with the U.S. through high-level dialogue aimed at advancing collaboration and investment opportunities in the industrial and extractive sectors, including critical minerals development, and supply chain diversification.⁸¹

3

BARRIERS AND OPPORTUNITIES



BARRIERS AND OPPORTUNITIES

Despite a strong resource base, Central Asia's critical mineral potential remains only partially realized. While the region holds significant reserves, translating resource endowment into competitive and sustainable participation in global critical mineral supply chains requires addressing a number of structural and cross-cutting factors. These include infrastructure and logistics constraints, energy security, sustainability and connectivity challenges, uneven alignment with international ESG and traceability standards, limited monitoring and enforcement of environmental performance, as well as workforce, educational and digitalization gaps — including the need to secure local value addition, and to broaden participation of and attract more women into the sector.

A collaborative regional approach can help further strengthen the region's collective positioning. Initial steps are starting to emerge among Central Asian pS in terms of potential for structured co-operation, not least with the objective to avoid competition over resources that could generate tensions within and between States. Kazakhstan and Uzbekistan have established bilateral co-operation mechanisms and a working group to advance joint exploration and development efforts on rare earth metals,⁸² while Kazakhstan has also proposed initiatives to strengthen regional research and scientific co-operation on rare earth metals, including the potential establishment of a regional research centre in Astana.⁸³ Overall, the region is increasingly engaging in regional dialogue formats and consultative mechanisms with international partners on economic co-operation, connectivity and industrial development, which can provide a foundation for enhanced regional co-ordination on critical minerals and related value chains. The issues outlined in this chapter are not exhaustive but reflect some of the key areas where both challenges and opportunities are emerging, and where greater regional co-operation can be a key enabler.

3.1 Infrastructure, logistics, energy and connectivity considerations

Among other factors, infrastructure gaps, limited transport connectivity, and energy constraints hinder Central Asia's critical minerals potential and export capacity, especially towards western markets.⁸⁴ For instance, much of the region's rail and logistics network was historically designed along north-south axes, and while efforts to develop alternative east-west routes have accelerated, including with major investment in the Trans-Caspian International Transport Route, capacity remains limited.⁸⁵ Kazakhstan's ports of Aktau and Kuryk already operate at maximum capacity during peak periods,⁸⁶ and also the rest of the regional trade and transport network continues to require upgrades, including to enhance environmental safeguards and climate resilience in the development of new transport links.

Beyond transport, energy represents an additional structural challenge. Mining and mineral processing are energy-intensive activities, and addressing ageing infrastructure, together with rising demand and climate-related pressures, will be necessary for the region to fully tap into its potential, while ensuring that future expansion is consistent with national renewable energy targets. Given the significant environmental footprint associated with this sector, including greenhouse gas emissions, biodiversity loss, water depletion and soil contamination,⁸⁷ ensuring access to reliable and efficient low-carbon technology will be key to prevent further environmental pressures as production scales up. This is also consistent with UN guidance calling for the development of critical raw materials to be in line with sustainable development, transparent environmental reporting and responsible resource management standards, as per the United Nations Framework Classification (UNFC) and

United Nations Resource Management System (UNRMS).⁸⁸

At the same time, limited domestic processing capacity remains a major obstacle. Most critical minerals extracted in Central Asia are exported for processing, primarily to China.⁸⁹ The situation is further exacerbated by the need to invest in modern extraction, processing and refining technologies. Although both Kazakhstan and Uzbekistan have announced plans for modernizing processing facilities,⁹⁰ and this is also increasingly prioritized by other Central Asian countries, developing competitive refining and processing industries will require sustained investment, infrastructure upgrades and technical expertise. In line with UN Trade and Development (UNCTAD) recommendations, strengthening domestic value chains should not only focus on expanding extraction and processing capacity, but also on improving resource efficiency and value retention.⁹¹ International experience shows that greater emphasis on recycling and circular-economy can contribute to reducing long-term dependence on primary extraction and mitigating environmental risks.⁹² These would also require targeted policy frameworks, infrastructure and processing capacity to be further strengthened in the region.

3.2 ESG Standards and Sustainable Mining Practices

The mining and critical minerals sector has historically been associated with significant environmental and social impacts,⁹³ which has increased attention on improving sustainability practices and ESG performance across value chains. The rapid growth in demand for critical minerals has further intensified scrutiny and led to the introduction of stricter regulatory and due diligence requirements. Minimizing environmental and social harm is

now increasingly recognized as essential not only from a sustainability, climate, and human perspective, but also for economic viability, supply chain resilience and long-term investment. In the mining sector, ESG requirements cover environmental performance (including emissions management, water use, waste and rehabilitation), occupational health and safety, labour standards, workforce diversity and women's empowerment, community engagement, and corporate governance practices. Beyond formal ESG alignment, growing attention is being placed on strengthening the effective implementation and monitoring of EIA procedures, improving anticipatory risk assessment, and addressing the cumulative environmental impacts of expanded extraction and processing activities.

In a response to align with evolving international standards, some mining companies in Central Asia are increasingly prioritizing environmental issues, including through improved environmental and social practices and ESG reports. Others also participate in the United Nations Global Compact (UNGC), a voluntary initiative that encourages companies to align their operations with environmental principles and to report on their ESG actions.⁹⁴ This important shift has been driven in part by growing expectations from international investors, lenders and trading partners, as well as access to global capital markets, which increasingly require transparency on environmental and social performance alongside financial results. While regulatory frameworks and implementation practices are gradually improving, additional efforts are needed to ensure consistent harmonization with evolving international environmental expectations, labour standards, women's empowerment, community engagement and corporate governance.

In parallel, increasing attention should be placed on principles of value addition and equitable resource development, with countries seeking to ensure that the exploitation of

critical mineral resources generates broader economic and social benefits at national and community level.⁹⁵ Without such an integrated approach, efforts to maximize economic returns may be undermined by long-term social and ecological costs, which in certain contexts have also contributed to heightened social tensions and, in some cases, even armed conflict, as illustrated by experiences in parts of Africa and Latin America,⁹⁶ as well as Oceania.⁹⁷

When assessing the environmental impacts of the extractive sector in Central Asia, the legacy of Soviet-era uranium mining remains a salient and instructive example. Several sites across Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan still contain long-lived radioactive and chemically hazardous residues that require careful and sustained management. Governments in the region have taken important steps to address these risks through structured remediation programs, often supported by international partners. In this regard, the OSCE provides support to pS threatened by hazardous waste management and has been supporting the engagement of stakeholders in uranium legacy remediation by raising awareness about the dangers of such radioactive waste and by building capacities to ensure reinforced implementation of the legal and regulatory framework in Kyrgyzstan, Uzbekistan and Tajikistan.⁹⁸

These efforts have reduced immediate dangers and strengthened technical capacity. However, the long-term management of uranium legacy sites remains an ongoing responsibility, requiring continuous monitoring, maintenance, secure containment and robust institutional oversight. This experience underscores the importance of applying stringent environmental governance, risk assessment and long-term liability planning to the further development of Central Asia's critical mineral potential.

In addition, the further development of the critical minerals sector in the region entails sub-

stantial energy and water demands. Given that Central Asia is already significantly affected by climate change, the expansion of resource-intensive activities would require careful consideration of resource trade-offs across sectors and countries, as well as the cross-border interdependencies of energy and water systems to prevent pressures from undermining stability and exacerbating competition over scarce resources. In this context, international frameworks such as the UNFC and UNRMS provide guidance on managing natural resources in an inclusive, transparent and sustainable manner.⁹⁹ UNFC offers a standardized approach to classify critical minerals in line with sustainability goals while UNRMS builds on the former and provides a comprehensive system for sustainable resource management highlighting social responsibility and environmental stewardship.¹⁰⁰

3.3 Workforce Development, Skills Gaps and Digitalization Opportunities

Across the global mining and minerals sector, workforce-related challenges are increasingly recognized as a key constraint on growth. According to the International Labour Organization (ILO), the mining sector employs approximately 19,5 million people globally of whom only around 2,8 million are women¹⁰¹, yet faces persistent shortages of skilled technical and engineering personnel, compounded by ageing workforces and limited alignment between vocational training systems and evolving industry needs. The Organisation for Economic Co-operation and Development (OECD) analysis further indicates that rapid technological change, rising demand for critical minerals and the green transition are reshaping job requirements and regional

economies in the mining sector and contributing to significant workforce gaps related to the availability of workers and skills.¹⁰² These challenges are also reflected in World Bank labour market assessments, which note that regions like Central Asia are experiencing shrinking and ageing labour forces, adding to pressures on labour supply and skills availability.¹⁰³

International evidence indicates that demand is rising for technical and mid-level skills related to mining engineering, geology, automation, digital systems, environmental management and occupational safety. At the same time, education and vocational training systems in many countries, including in Central Asia, remain only partially aligned with evolving industry needs. International Organizations, including the ILO and the World Bank,¹⁰⁴ highlight the need for strengthened technical and vocational education and training, industry-education partnerships, and continuous upskilling to support the sector's transformation and long-term workforce sustainability.

The digitalization and technological modernization of mining operations, including auto-

mation, digital monitoring and data-driven processes, are reshaping labour demand towards technical, analytical and digital skills, while reducing reliance on physically intensive work.¹⁰⁵ Digital systems also contribute to resource efficiency and cleaner mining processes. At the same time, as environmental governance frameworks become more stringent, ensuring that these standards and related requirements are accessible and that knowledge on their practical application is effectively transferred to companies and workers at multiple levels remains essential. In Central Asia, despite the still limited diffusion of digital technologies and uneven access to relevant skills, digital transformation is beginning to create new opportunities. Preliminary evidence from stakeholder interviews in Kazakhstan and Uzbekistan highlights the growing relevance of digital mining, data analytics, remote monitoring and ESG-related functions, many of which reduce the need for on-site presence. This shift can expand access to higher value-added roles, lower entry barriers and improve workforce diversity and retention.

Digitalization is especially transformative, as it reduces the need for physical labour and opens up roles more suited to women's skills and interests.

SOURCE

Mining industry expert interview conducted for this policy analysis

The availability of a qualified workforce for the mining and minerals sector is closely linked to the broader performance of national education and skills systems. In Central Asia, tertiary education attainment has increased steadily

over the past decade. However, similarly as in other regions, education systems continue to face challenges in aligning curricula with evolving industry needs, particularly in technical and applied fields relevant to modernization, digitalization and environmental management. Strengthening labour market governance, training systems, and industry-education partnerships is therefore key for expanding the mining sector in the region, while supporting job creation, youth retention, and gender equality.

There is a need for stories of women that present not idealized, but achievable career paths.

Such examples help shift mindsets from this is not possible to this is possible.

SOURCE

Mining industry expert interview conducted for this policy analysis



4

WOMEN'S PARTICIPATION IN THE CRITICAL MINERAL SECTOR IN CENTRAL ASIA



WOMEN'S PARTICIPATION IN THE CRITICAL MINERAL SECTOR IN CENTRAL ASIA

Women's participation in the mining sector worldwide remains among the lowest across industries, with estimates generally ranging between 8% and 17% of the workforce.¹⁰⁶ Participation continues to be constrained by a range of structural barriers, including social norms, workplace culture, working conditions, safety, and legal or financial limitations. At the same time, the issue is receiving increasing attention globally, as the sector faces labour and skills shortages, seeks to attract a broader talent pool to support innovation and profitability, and responds to growing ESG expectations.¹⁰⁷ Expanding women's participation and leadership has been associated with higher levels of innovation, stronger financial and operational performance, improved safety, enhanced sustainability, and stronger community engagement.¹⁰⁸ As a result, advancing women's participation in the sector is increasingly viewed not only as an equality objective, but also as a strategic tool for strengthening critical mineral security and supporting the sector's development. This approach is gaining increasing policy attention worldwide, including in Central Asia.

In the region, gender-disaggregated data for mineral-specific occupations remain limited and uneven, with most publicly available information reported at aggregate sector level.

Available data, while incomplete, reveal gender imbalances across mining sector, particularly in operational and senior technical roles. In Kazakhstan, women represent approximately 18,4% of the mining workforce,¹⁰⁹ while in Uzbekistan female participation is estimated at 13%¹¹⁰ – 26,5%¹¹¹ of total mining employment. Comparable harmonized employment figures were found for Kyrgyzstan (7,8%),¹¹² and Tajikistan (around 1,400 women or 10-11%),¹¹³ while for Turkmenistan data were not found for the scope of this research; however, national labour statistics and sectoral assessments consistently indicate similarly low levels of female participation in mining and extractive industries.

Across the region, women are predominantly employed in administrative, analytical, laboratory, environmental, health, safety, and support functions. Operational, field-based, or underground roles remain overwhelmingly male-dominated, reflecting structural constraints rather than mineral-specific factors. Women's representation in leadership and decision-making positions remains limited. In Kazakhstan, some large companies report higher shares of women at mid-management level. In Uzbekistan, publicly available leadership data remain fragmented, limiting systematic monitoring and comparison.

Women actively participate in the preparation of analytical, financial, and investment materials and make a significant contribution to decision-making processes. The corporate environment within the company provides equal conditions and opportunities for professional development. However, the advancement of women to board-level and senior management positions remains constrained by external factors, primarily social and cultural in nature.

SOURCE

Mining industry expert interview conducted for this policy analysis

The education pipeline presents a mixed picture. Women constitute a majority of overall university graduates in some Central Asian countries,¹¹⁴ yet remain under-represented in Science, Technology, Engineering, and Mathematics (STEM), engineering, geology, and mining-related fields. In 2024 the number of female graduates in STEM in Kazakhstan was roughly 31,1%, Kyrgyzstan 34,2% and Uzbekistan 30,5%.¹¹⁵ Female participation in STEM education across Central Asia has increased, creating a stronger basis for women to enter technical and operational roles required by modern mining operations. Building on this progress would further expand women's access to career pathways that serve as gateways to senior technical and managerial positions.

According to the ILO, the adoption of non-discrimination and equal-opportunity legislation is a necessary precondition for ensuring equality.¹¹⁶ At the regulatory level, Kazakhstan, Uzbekistan, and Kyrgyzstan have undertaken reforms to remove or substantially reduce gender-specific bans on women's employment in mining and heavy industry.

In Kazakhstan, all restrictions on women's employment, including underground and night work, were eliminated by 2022, with access to such work now regulated exclusively through general occupational safety and health requirements applicable to all workers, following the abolition of the List of Jobs Prohibited for Women.¹¹⁷ The country's concept of family and gender policies sets a target of at least 30% representation of women in decision-making positions by 2030, including state-owned enterprises.¹¹⁸ Major mining and metallurgical companies have responded by integrating gender indicators into ESG and sustainability frameworks, although implementation remains uneven.¹¹⁹ Female workforce participation in the industry is generally around one quarter, with a gradual increase



Girls tend to perform better academically and achieve higher admission rates; however, leadership positions are predominantly occupied by men. This disparity is driven by social expectations, differences in family support, and the unequal distribution of responsibilities.

SOURCE

Mining industry expert interview conducted for this policy analysis

in representation at senior levels, supported by emerging corporate targets aligned with national policy objectives.

In recent years, Uzbekistan has advanced gender equality through key legal and policy reforms.¹²⁰ The Law “On Equal Rights and Equal Opportunities for Women and Men” (2019),¹²¹ supported by the Labour Code of the Republic of Uzbekistan,¹²² which explicitly provides for equality of opportunity, non-discrimination and equal remuneration for work of equal value. At the strategic level, the Strategy on Achieving Gender Equality in the Republic of Uzbekistan until 2030,¹²³ sets objectives to expand women’s economic participation and improve enforcement of gender-equality norms across public and private sectors. Recognized by the World Bank as a leading reformer, Uzbekistan has lifted job restrictions for women and introduced mandatory equal-pay provisions, expanding access to sectors such as mining and metallurgy and operation of heavy vehicles.¹²⁴ Several large mining enterprises have begun to integrate gender equality into ESG and sustainability frameworks, and adopting principles of gender equality and promotion of women.

In 2025, Kyrgyzstan adopted a new Labour Code that abolished most gender-based prohibitions on employment, including in industrial and heavy sectors.¹²⁵ This reform represents a significant shift toward gender-neutral regulation of employment, including in mining and related industries. Tajikistan has reduced, but not eliminated, its list of prohibited occupations, while information on current practice in Turkmenistan could only be marginally accessed. Despite these reforms, indi-

rect constraints persist. Occupational safety rules, night-work provisions, infrastructure conditions at mine sites, and shift arrangements continue to restrict women’s access to underground and field experience that is often a prerequisite for promotion into senior technical and managerial roles. At company level, gender and diversity commitments are increasingly reflected in ESG and sustainability reporting, particularly among large mining enterprises active in uranium, copper, and gold. However, these initiatives remain uneven and fragmented, frequently driven by individual corporate leadership or external ESG requirements rather than embedded in sector-wide workforce strategies. As a result, progress in increasing women’s participation and leadership remains incremental and uneven across minerals and companies.

Overall, Central Asian participating States have established gender equality frameworks that provide an important basis for advancing women’s participation in the critical minerals value chains. Building on these frameworks, further efforts to address structural and institutional barriers would help expand women’s access to opportunities across the sector and support a more inclusive and resilient workforce. As international best practices show, progress in this area is more sustainable when gender is embedded into mainstream labour, skills and industrial policies, supported by strong data and mandatory reporting. Industry frameworks, mentoring and regulatory oversight help translate policy into practice and drive change, while flexible work, remote operations and digitalization improve access, retention and career advancement for women.

5

CONCLUSIONS



CONCLUSIONS

Evidence reviewed for this analysis, reinforced by international experience, shows that Central Asia holds great potential in the critical minerals sectors, underpinned by substantial geological endowments and a growing role in global supply chains. However, much of this potential remains untapped. The current geopolitical context, rising global demand for critical minerals, and ongoing technological changes are generating renewed international attention and investment interest in the region. Central Asian countries are increasingly seeking to capitalize on this momentum through enhanced co-operation with international partners, efforts to strengthen domestic value addition, and initiatives aimed at improving regulatory frameworks and advancing sustainable mining practices.

Realizing this potential will require progress across several inter-related areas. Strengthening infrastructure, advancing the adoption and implementation of environmental and social standards, prioritizing local value addition principles, and reinforcing human capital development – including through women’s empowerment – will be key to unlocking sustainable opportunities in the sector. Doing so effectively will require not only national-level reforms but also stronger regional co-ordination and co-operation to support sustainable growth and strengthen the region’s position in the global critical mineral value chains.

Building on these observations, the following section outlines three areas for further consideration. These are not intended to constitute an exhaustive set of recommendations, but rather to highlight selected priority areas where regional co-operation can generate tangible added value, and where the OSCE’s mandate and experience in dialogue facilitation, capacity-building and the exchange of best practices may potentially be considered as particularly relevant by participating States.

5.1 Supporting an enabling policy, regulatory and capacity-building framework for the sustainable and climate-resilient development of critical minerals

As highlighted by international practice, another key factor that can contribute to Central Asia’s competitive participation in global critical minerals value chains is an enabling and predictable regulatory framework. Uneven and fragmented governance frameworks, and partial alignment with international ESG and traceability standards constrain investment and market integration. Greater alignment with international standards, including strengthened monitoring and environmental practices, effective implementation of EIA procedures, and improved anticipatory management of environmental and social risks associated with mining, would facilitate access to sustainable finance and improve positioning in increasingly regulated global supply chains.

In addition, strengthening governance frameworks should also include more systematic integration of gender considerations within ESG, reporting and workforce regulations. International experience shows that gender-disaggregated data, transparency in career progression and attention to work culture are increasingly recognized as components of responsible and sustainable mining governance. Embedding such measures within regulatory and reporting frameworks can enhance investor confidence, workforce resilience and long-term sector sustainability. These efforts demonstrate growing recognition of the need to align domestic regulatory frameworks with evolving global standards and supply-chain requirements.

Given the energy- and water-intensive nature of several critical minerals, integrating sustainable and efficient energy and water management practices, together with climate-risk considerations, into mining governance is another key factor to support long-term sector resilience, resource security and environmental sustainability. This requires co-ordinated planning across institutions and stakeholders to optimize resource use, prevent environmental degradation and minimize negative externalities, including on communities. Advancing the implementation of clean technologies can also enhance resource efficiency and strengthen environmental performance as well as competitiveness.

Moreover, further development of the sector in Central Asia should generate shared and inclusive benefits. It should therefore be pursued in a sustainable and socially responsible manner, with a focus on value-addition, ensuring that local populations benefit directly. A governance framework that promotes transparency, community engagement and equitable distribution of benefits is crucial to prevent social tensions and conflict, especially given the proven nexus between conflict and natural resources.

In this context, the OSCE's mandate, with its practical experience in environmental governance, natural resource management, energy resilience, sustainability, and climate-related risks, can offer concrete support to Central Asian participating States. This includes, for example, leveraging the OSCE's work on anticipatory science and climate projections to enable informed, climate-resilient decision-making, while strengthening regional stability through co-operative, sustainable and inclusive approaches to resource management.

5.2 Strengthening human capital development and workforce sustainability

Strengthening human capital development and promoting the adaptability, inclusivity and long-term sustainability of Central Asia's workforce remains a critical factor for the expansion and modernization of the region's critical minerals sector. Skills shortages, the under-representation of women and existing mismatches between education systems and evolving industry needs constrain production capacity and limit progress towards higher value-added activities. Reducing digital skill gaps and improving access to digital infrastructure is increasingly critical as mining operations and supply-chain management become more technology-driven and data-intensive. In this context, enhancing upskilling and reskilling efforts and updating training and educational systems are essential steps not only to retain and attract talent across the region, but also to ensure that the workforce can respond effectively to the sector's evolving technological, operational and sustainability requirements, including those related to cleaner production processes and recycling. At the same time, improving working conditions, strengthening alignment with international standards, and increasing the sector's attractiveness for women and young people will be critical to ensure a sustainable and competitive workforce.

In this context, the OSCE's mandate and long-standing experience in promoting dialogue, facilitating the exchange of best practices and delivering capacity-building activities in human capital development – including through

regional initiatives like the OSCE Regional Task Force on Education for a Just and Inclusive Energy Transition (RTEET) – can be leveraged by participating States to strengthen alignment between education systems and labour-market needs, and to help create a skilled and future-proof workforce for this evolving sector. This can also support women’s participation and digital inclusion in key economic sectors, such as energy and natural resources.

OSCE participating States can also build on additional training expertise and initiatives developed by the OSCE in the energy field, such as ongoing training co-operation and educational partnerships with national and regional universities, educational scholarship programs for young women in energy, and the regional mentoring program for Central Asian women to advance their careers in the energy sector. These initiatives contribute to expanding technical skills and the talent pipeline, strengthening professional networks and leadership pathways for youth and women in energy-related sectors, while supporting countries advancing their energy sustainability goals.

5.3 Promoting regional and cross-regional co-operation and exchange of best practices

Regional and cross-regional co-operation remains essential to strengthen the resilience, sustainability and competitiveness of the region’s critical minerals value chains. Given shared infrastructure, water and energy interdependencies and logistical requirements for transit and exports, closer co-operation among Central Asian participating States to address these challenges and develop joint solutions would generate significant mutual benefits, enhance regional stability. Building on existing regional initiatives and bilateral co-operation mechanisms, further efforts to scale up co-ordination at the regional level could help consolidate these initial steps into more structured and sustained collaboration. Strengthened regional dialogue and co-operation can enhance policy coherence across key interconnected sectors on which the critical mineral sectors depend, such as transport, energy, water and environmental governance, while facilitating the exchange of good practices on ESG implementation, sector modernization, digitalization, EIA procedures and monitoring practices, and approaches to minimizing environmental externalities associated with mining and processing.

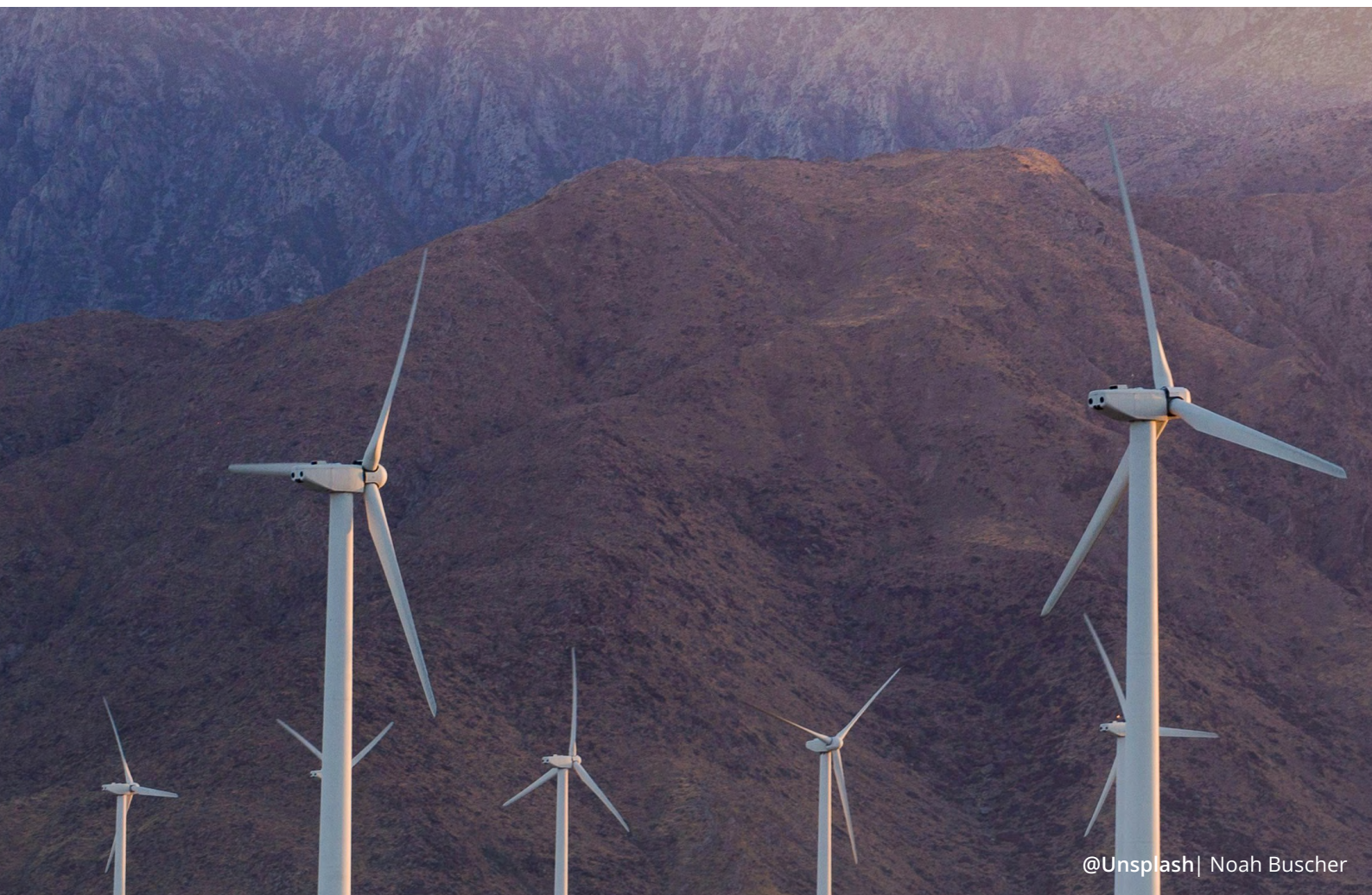
In this context, and also building on emerging initiatives for enhanced regional research collaboration on the topic, exploring the potential establishment of a regional platform or mechanism on critical minerals could be considered to further institutionalize knowledge-sharing, improve co-ordination, find complementarity and support a stronger regional response to economic, environmental and supply-chain challenges. Such a platform could help align regulatory approaches, promote joint capacity-building initiatives and foster cross-bor-



der solutions to transport, energy, climate and environmental constraints that may affect the efficiency of mineral production and exports. It could also facilitate exchanges on ESG reporting standards, gender-disaggregated workforce data, and inclusive labour-market practices, supporting a more resilient and competitive regional mining ecosystem, including co-operation on the effective implementation and harmonization of EIA standards, cleaner technologies that reduce environmental impacts, and circular-economy strategies aimed at enhancing efficiency.

In this regard, OSCE's regional mandate and longstanding experience in providing an inclusive platform for dialogue and exchange of best practices – both within Central Asia and between the region and other participating

States – could be leveraged to facilitate the exchange of technical expertise, regulatory approaches, and sustainability standards, and to connect policymakers, industry representatives and research institutions. Beyond regional dialogue, the development of concrete joint solutions to common economic, connectivity, energy, environmental and climate challenges will also be essential to unlock the region's potential in the critical minerals sector. In this context, the Organization's regional capacity-building expertise, as well as its ongoing thematic projects across these areas, including work related to connectivity, can provide practical support to the sustainable and resilient development of the critical minerals sector and its associated logistics and export corridors.



6

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