CENTRAL ASIA

REGIONAL
FORESIGHT-DIALOGUE

TASHKENT 2026

CENTRAL ASIA 2050

A REGIONAL FORESIGHT DIALOGUE

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2050

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2050

A REGIONAL FORESIGHT DIALOGUE

This book emerged from the first regional foresight dialogue in the history of independent Central Asia, bringing together leading think tanks and independent experts to explore the region's challenges, opportunities, and possible futures toward 2050. Weaving together diverse voices through conversation, visioning, and collective imagination, it invites readers to look beyond today's realities and envision what Central Asia could become and how its people might shape that future together.

Tashkent 2026

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INTRODUCTION

The Future Outlook of Central Asia

We live in an era when looking ahead has become not merely a desire, but a vital necessity.

The world is undergoing profound transformations, with developments increasingly reshaping the assumptions on which societies and governments have long relied. Central Asia, with its ancient history and distinctive cultural heritage, finds itself at a crossroads of global change.

In this region of steppes, mountains, deserts, and great rivers, questions are now being asked – "Who are we?" "What will the future of our region look like?" "What place will it hold in 2050?" – the answers are directly bound up with what tomorrow will bring.

In recent years, under the leadership of Uzbekistan's President, Shavkat Mirziyoyev, neighbourly relations between Central Asian nations have improved significantly. A new era of openness, sincere trust, and fraternal dialogue has begun among the region's countries.

For the first time in a long while, genuine mechanisms for cooperation are taking shape – from consultative meetings of Central Asian Heads of State, to the implementation of border agreements, transport and logistics projects, and joint humanitarian initiatives. This new climate of good-neighbourliness has not only strengthened mutual understanding, but also restored confidence in the region's own potential and capabilities.

This book is itself a product of these relations.

It is the result of a unique intellectual and strategic exercise undertaken in the history of the Central Asian states–the first regional foresight dialogue. For the first time ever, more than 50 representatives from think tanks operating under the presidents of all Central Asian republics, together with independent experts, have gathered at one table to exchange ideas and define possible courses of action through 2050.

This book is based on the discussions of that foresight dialogue, and readers are invited to approach it as an invitation for reflection and dialogue.

Foresight is not about making predictions. Rather, it is the art of asking the right questions, seeing beyond current trends, and, above all, shaping a vision of the future grounded in today's values, goals, and opportunities.

Foresight combines analysis and imagination, knowledge and intuition, rationality, and aspiration. It is not a simple method, but rather a distinct culture of strategic thinking and collective action.

The first regional foresight dialogue is evidence that a new culture of collaborative strategic thinking is emerging in Central Asia. Participants in the dialogue not only discussed future scenarios but also put forward concrete proposals of their own, ranging from infrastructure projects and educational reforms, to the creation of regional institutions and cooperation in the water and energy sectors.

Particular attention was given to the voices of young people, recognising youth as a driving force of Central Asia's future. As one of the world's youngest regions, Central Asia's demographic dynamism offers both significant opportunities and a responsibility to ensure that the next generation helps shape the region's trajectory. Young people from across the region were invited to contribute essays envisioning their countries in 2050. To ensure diverse perspectives and regional inclusivity, editors from Kazakhstan and Kyrgyzstan were invited to lead this chapter. Entitled *"When Central Asia Speaks…"*, it explores identity, gender, ecology, technology, and future values through the aspirations and imagination of the region's youth.

Why Now?

A year has passed since the foresight dialogue took place, and as this book goes to print, the world has hardly become an easier place. Wars and armed conflicts, geopolitical fragmentation, logistical disruptions, climate change, mounting water stress, and demographic shifts continue to reshape the global landscape and the future of Central Asia.

In such an unpredictable world, the temptation to respond to each new challenge as it arises is strong. Yet uncertainty makes foresight more important, not less. It calls on us to look beyond immediate crises, create spaces for meaningful dialogue, and cultivate the collective imagination needed to explore alternative pathways towards a more sustainable, resilient, and cooperative future.

Perhaps the most enduring lesson of foresight is that the future is not singular. Indeed, foresight insists on speaking of futures – plural, even if this defies the conventions of English grammar. For there is no single, predetermined destination awaiting us.

There are multiple possible futures, shaped by the decisions we make, the policies we pursue, the alliances we forge, and the priorities we choose to advance. Some futures may emerge by default; others must be deliberately built. Ultimately, the future of Central Asia will depend not only on what we anticipate, but on what we choose to do today.

From Foresight to Practical Action: Shaping Central Asia's Futures

Since the early 1990s, numerous initiatives have sought to strengthen regional cooperation in Central Asia. Yet translating shared aspirations into sustained collective action remains a challenge. Climate change, mounting pressure on water and energy resources, shifting trade routes, geopolitical uncertainty, and demographic change are making the costs of fragmented approaches increasingly visible.

This book examines five interconnected dimensions of Central Asia's future: climate change, water, energy, transport connectivity, and demographic change. Its central argument is that the region's long-term resilience and prosperity will depend on its ability to move beyond parallel national responses towards practical cooperation, particularly where shared challenges and converging interests create clear opportunities for collective action.

1. Turn regional aspirations into practical cooperation.

Central Asia does not lack declarations or ambitions for regional cooperation. The challenge is to translate them into sustained, measurable results. This requires practical mechanisms for joint decision-making, stronger coordination between national institutions, and cooperation built around areas where interests converge. Progress need not depend on a single, overarching model of regional integration. It can begin with concrete initiatives that deliver mutual benefits, build trust, and demonstrate the value of collective action. The ambition should be to move from responding to shared crises towards anticipating risks and managing interdependence strategically.

2. Make water and energy the foundations of regional resilience.

Climate change, growing water stress, and rising energy demand make water and energy central to Central Asia's economic security and long-term development. Their interdependence presents not only a challenge but also an opportunity to establish a stronger basis for regional cooperation. Drawing inspiration from Europe's early cooperation around coal and steel, Central Asia could develop practical arrangements for coordinated water management and energy market integration. Regional centres of excellence, shared data systems, and digital forecasting platforms could support more transparent resource management and help transform common vulnerabilities into shared capabilities.

3. Transform connectivity into shared prosperity.

Central Asia's geographical position creates significant opportunities to strengthen trade, diversify transport routes, and deepen economic links with global markets. Yet physical infrastructure alone cannot deliver these benefits. Realising the region's potential requires coordinated infrastructure planning, more efficient cross-border procedures, digital integration, and stronger links between transport, industrial development, and regional markets. Connectivity should be understood not simply as the movement of goods across the region, but as a means of expanding economic opportunity, attracting investment, and creating a more resilient regional economy.

4. Turn demographic momentum into a lasting development dividend.

Central Asia's young and growing population is one of its greatest strategic assets–and one of its most consequential responsibilities. Its demographic trajectory will shape demand for education, healthcare, housing, employment, and public services for decades to come. Whether this growth becomes a source of innovation and prosperity will depend on the opportunities available to the next generation. Investment in education quality, teacher development, digital skills, productive employment, and women's participation is essential. Regional academic mobility, collaborative research, and youth exchange can further strengthen human capital while nurturing a generation that sees cooperation across borders as a natural part of its future.

Beyond these priorities lies a broader institutional challenge: building a region connected not only through infrastructure and markets, but also through knowledge and trust. Regional cooperation need not diminish national identities; it can reinforce them by enabling Central Asian societies to pursue shared interests while preserving their distinct histories and aspirations.

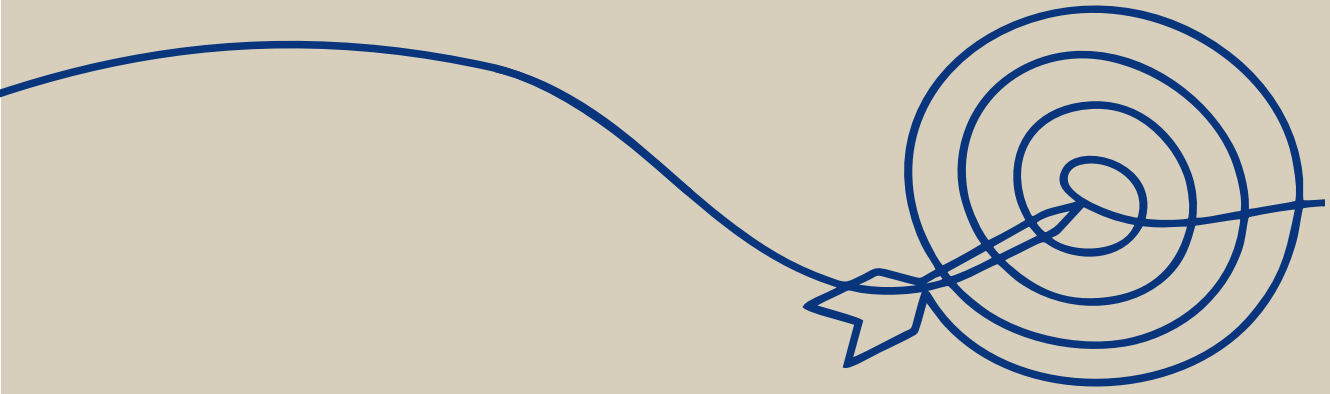
The central message of this book is that Central Asia has meaningful choices to make about its future. The opportunities identified through this foresight dialogue will not materialise automatically: they require political commitment, capable institutions, sustained investment, and a willingness to act beyond immediate national priorities.

By 2050, the region could manage its shared resources more effectively, connect its economies more deeply, and turn its demographic potential into lasting prosperity. Realising this vision will depend on the choices made today.

The defining question is not simply what the future holds for Central Asia, but what kind of future its countries choose to build – and whether they are prepared to build it together.

CHAPTER 1.

FORESIGHT METHODOLOGY



Drawing on international best practices in scenario planning, the seminar combined a range of methodological tools used to produce a comprehensive, multi-layered vision of the future. Singapore's national experience was a particular source of inspiration. At the initiative of the founding Prime Minister Lee Kuan Yew, scenario planning became a key instrument of the country's national strategy and long-term stability.

Singapore also regularly conducts a National Dialogue, through which citizens' views on the country's future development are gathered through essays and focus groups, with the particular engagement of young people.

The seminar applied the futures studies methodology developed by Professor Sohail Inayatullah, a world-renowned scholar of futures studies and a leading theorist in scenario planning and strategic foresight. The discussions were moderated by Aida Karazhanova.

His method includes the following elements:

> The **Futures Triangle**, which analyses three forces: the pull of the future, the push of the present, and the weight of the past;
>
> **CLA (Causal Layered Analysis)**, which is a multi-layered cause-and-effect analysis that identifies not only surface-level trends, but also hidden mechanisms, myths, and worldviews;
>
> **Metaphors**, being cultural and emotional images that help the collective imagination give shape to the future;
>
> **Wild Cards**, representing the analysis of low-probability but high-impact events, which are used to test the robustness of scenarios;
>
> **Backcasting**, a process of planning "from the future to the present", which involves defining the sequence of steps that must be taken today, to achieve a shared vision for 2050.

Together these tools allowed participants not only to analyse existing problems but also to draw inspiration from the experience of countries that have put strategic thinking and long-term vision into practice.

Day One:
Exploring the Future

Participants were initially divided into four sectoral groups:

1. Climate Change and Water Resources
2. The Energy Sector
3. Social Transformation and Demographic Futures
4. Transport Connectivity

In the first stage, each group created "symbols of the future", being symbolic images reflecting collective hopes, anxieties, and dreams. These symbols became the starting point for work with the Futures Triangle, within which the following aspects were analysed:

Push of the Present – current challenges and trends;

Pull of the Future – desired goals and aspirations;

Weight of the Past – obstacles and constraints inherited from history.

The primary objective of developing scenarios for the future of Central Asia was to create a tool that would help leaders make decisions under conditions of uncertainty. The work rested on several guiding principles, the foremost of which was relevance: the scenarios had to reflect the region's actual strategic challenges, including those of climate, water, energy, demography, trade, and cooperation. Logical coherence was equally essential, requiring consistent, credible links between causes and effects. A balance between analysis and imagination allowed data-driven work to be combined with creative exploration of unexpected possibilities. Cross-sectoral integration ensured that interconnections between economy, society, environment, and infrastructure were taken into account. Practical relevance meant that scenarios had to point to steps that could be implemented today. Emotional resonance was achieved through the creation of inspiring, unifying images and symbols.

To test the resilience of the scenarios, participants applied "wild cards" – hypothetical events with a low probability of occurring, but with high potential impact. One such example was a scenario involving the drying up of the Amu Darya river.

These exercises helped broaden participants' horizons, and strengthen their capacity for the type of flexible decision-making required for long-term policymaking.

In shaping a vision for the future, we inevitably confront questions that extend beyond economics. What habits and values still bind the region to the vestiges of its past? Which approaches have lost their relevance and now require reconsideration? What must be set aside in order to move forward?

It is worth asking which of our current actions and present shortcomings won't be accepted by future generations, and what role Central Asia can play in global development by 2050.

The initiatives born today may well become tomorrow's areas of growth. Strong institutions, just laws, and adaptable systems will form the foundation of that future.

The central challenge, however, is determining how to measure genuine progress. Is it measured solely through economic growth, or also through spiritual, cultural, and social development? The answer to this question will define the region's character in the twenty-first century.

Symbols of the Future

Symbols became a key tool through which the dialogue participants expressed their cultural and emotional visions for the region's future, serving as a kind of compass for scenario planning.

These symbols helped participants uncover hidden values and fears, and to define trajectories–from isolation to cooperation, from chaos to order, and from stagnation to flight.

Central Asia stands at a crossroads of eras, and its future will depend on which of these images becomes reality.

Today, the region resembles a caravan in a sandstorm: its countries travel

side by side, but a storm of global crises obscures the path ahead. Only by supporting one another can they reach their long-awaited destination – a lush oasis.

There is another possible path, however: that of scattered oases, where each country lives as it sees fit. Water exists, but there is no river to unite them. This path leads to isolation and the loss of collective potential.

The future of Central Asia is also like a river searching for its channel. Youth are its primary source of energy, but without clear direction, that energy could become an unruly wave, eroding the banks – a destructive current instead of a constructive one. If a strong channel is built through means of education, employment, and equal opportunity, this energy can become a driving force for progress.

Historically, our region served as the meeting point of the Great Silk Road between East and West. Today it can fulfil that role again, with science, technology, and ideas now taking the place of silk. A bridge does not divide, but rather it unites, transforming Central Asia from a stagnant lake into a hub of new ideas.

The region thus could become a free, strong, and confident eagle in flight. If the direction of travel and the winds of change are chosen wisely, Central Asia can soar to unprecedented heights.

Examples of the symbols developed include:

> A Caravan in a Sandstorm – countries travelling side by side, with global crises obscuring the path ahead;
>
> Scattered Oases – each country living in isolation, at the cost of collective potential;
>
> A River in Search of its Bed – the energy of youth, which could drive development if properly channelled, but could otherwise be destructive;
>
> The Silk Bridge – the region once again connecting East and West through science, technology, and ideas;
>
> The Stagnant Lake – outward stability concealing internal fractures;
>
> The Soaring Eagle – a free, strong, and confident Central Asia, harnessing the winds of change.

By the end of the first day, participants had developed four types of scenarios:

1. No Change – maintaining the status quo;
2. Minor Changes – improvements in certain areas, but without systemic change;
3. Adaptive Changes – introduction of new flexible, adaptable solutions;
4. Radical Changes – a complete transformation of values and structures.

From among these, the participants collectively selected the most plausible scenario as the basis for further planning.

In this envisioned future, Central Asia emerges not as a periphery of the Eurasian region but as its central part, being historically connected, and now united by common purpose. It is a region where restored ecosystems and green energy ensure harmony with nature, and where a culture of mindful consumption becomes part of daily life. A balanced, independent, unified energy space takes shape, integrating renewable and conventional sources alike. The economy is diversified, deeply integrated into global value chains, and increasingly focused on higher-value-added production, while modern transport corridors transform the region into a single market for goods, services, capital, and labour.

Such a future is unimaginable without personal and economic freedom, guarantees of privacy, a developed urban environment, and accessible infrastructure. It rests on rich human capital, built through an education system that cultivates critical thinking and the capacity to manage knowledge.

Today, however, we live in a different reality. Our outdated infrastructure breeds inefficiency, our institutions remain a weak foundation for innovation and investment, and inter-state relations are still constrained by narrow national interests. Our economies remain dependent on raw materials, and are vulnerable to external volatility, while our investment in human capital remains insufficient. Still, it is precisely in today's circumstances that the opportunity for change arises.

The path forward requires Central Asia to strengthen its agency and take greater ownership of its future. This means moving from paternalism to

shared responsibility, from a “mine versus yours” mindset to a culture of trust and mutual respect, and from passively adopting decisions shaped elsewhere to confidently defining the region’s own priorities, generating original ideas, and charting its own course.

The transition must be rooted in the region’s values: freedom, respect for tradition, intergenerational solidarity, and reverence for elders. These values can provide the moral foundation for a more self-assured Central Asia – one that does not simply adapt to a changing world, but actively helps shape it.

Central Asia’s future lies in becoming a region that transforms its shared history into a foundation for collective progress, its diversity into a source of strength, and its knowledge into a driver of innovation. By building trust, deepening cooperation, and investing in human potential, the countries of the region can strengthen their agency and move from adapting to global change to actively shaping the future.

Day Two:
Planning the Path Forward

The second working day shifted from analysis to strategy. Based on the scenario selected for 2050, participants backcast a step-by-step path towards the present.

Goals for 2050, 2040 and 2030 were defined, along with the political, legislative, infrastructural, technological, financial, and investment measures needed to achieve them.

This process produced broad directions for the region’s potential transformation, taking into account the challenges and opportunities existing across various sectors.

CHAPTER 2.

VOICES OF FORESIGHT – AN EXCHANGE OF IDEAS



This chapter presents not only the perspectives of experts, researchers, and civil society representatives, but also views expressed by Central Asian Heads of State. Such a dialogue offers a valuable opportunity to compare scientific and practical forecasts with political visions for the region's future. The focus here is on the search for integration models that would enable countries to respond jointly to global threats, realise their domestic potential, and build a sustainable future. This section brings together reflections on how integration can strengthen mutual trust, accelerate economic growth, and improve citizens' quality of life. The heads of the five states set out their views on the forms and directions cooperation might take, on subjects from a common market and transport connectivity, to humanitarian and educational initiatives. By combining their perspectives with expert commentary, this chapter shows that Central Asian integration is not merely a political project, but the outcome of a collective search for a future grounded in dialogue and mutual respect.

2.1. Perspectives of Heads of State on the Region's Future

President of the Republic of Uzbekistan
Shavkat Mirziyoyev

In his address to participants of the forum 'Uzbekistan, Azerbaijan, and Europe – Cooperation for Common Development', he stated:

"In these extremely challenging times, Uzbekistan and the Central Asian region offers the international community an invaluable resource: stability, trust, and progress."

President of the Republic of Kazakhstan
Kassym-Jomart Tokayev

In his article 'The Central Asian Renaissance: Toward Sustainable Development and Prosperity', published in Kazakhstanskaya Pravda, he writes:

"Amid geopolitical uncertainty and the erosion of the world's structural order, this is, in fact, the only pragmatic path forward. Our future depends on strengthening solidarity, mutual trust, and openness to the world. Only on this foundation can we ensure the renaissance of Central Asia as a vibrant, innovative, and culturally rich region."

President of the Kyrgyz Republic
Sadyr Japarov

On his Facebook page, following the signing of the Treaty on the State Border with the Republic of Tajikistan, he stated:

"...The countries of Central Asia should begin the process of introducing a mutual visa-free regime, and, for visitors from other countries, a single visa–similar to the Schengen visa–allowing free movement throughout all countries in the region."

President of the Republic of Tajikistan
Emomali Rahmon

At the Consultative Meeting of the Heads of State of Central Asia in Astana, 2024:

"In today's rapidly changing world, the need has arisen to form a shared vision for the future of Central Asia."

President of Turkmenistan
Serdar Berdimuhamedov

At the Consultative Meeting of the Heads of State of Central Asia in Astana, 2024:

"While preserving our identity, our independence, and our right to choose our own path of internal and external development, we are united in our commitment to transforming our region into a prosperous, highly developed, and deeply integrated part of modern global relations. I am convinced that only under such conditions can our states and peoples secure a worthy and lasting future."

2.2. Creators of Future Scenarios (Foresight Dialogue Participants)

Kanatbek Aziz, former Director of the Institute for Geopolitics and Strategy
(Kyrgyzstan)

"Today, Central Asia is a single region facing shared problems. This foresight dialogue comes at a very timely moment, since it's clear as day that issues like security, ecology, and energy matter to all five countries alike. We have both the resources and the needs, but we lack mutual agreement. Until we establish transparent rules, we'll remain stuck with empty words instead of practical action. We need an open market with clear tariffs, clear rules of the game, and reliable settlement mechanisms."

Sherali Rizoyon, Political Scientist
(Tajikistan)

"It used to be difficult to make long-term forecasts for Central Asia. Today, that's changing. Common development trajectories are taking shape, and good-neighbourliness is becoming not just desirable, but a necessary condition for stability. If current government plans are implemented, the region will be able to use its resources, both human and natural, far more effectively."

Saodat Jurakhonzoda, Deputy Director of the Centre for Strategic Studies under the President
(Tajikistan)

"It's fair to say that integration has already begun in practice. The agreements signed between the countries in March 2025–including the Treaty on the Junction Points of the State Borders of Uzbekistan, Tajikistan, and Kyrgyzstan, as well as the Joint Declaration of the Heads of State–reflect a shared commitment to dialogue and mutual understanding."

Farkhod Tolipov, Political Scientist
(Uzbekistan)

"The very willingness to discuss prospects out to 2050 shows that neighbouring countries are ready for, and have already moved toward, long-term planning. That, in itself, is a sign that stability and resolve are taking hold in the region."

Ovezdurda Mukhammetberdiyev, Professor at the Higher School of Diplomacy
(Turkmenistan)

"…The countries of the region will maintain their independent paths of development, but some degree of convergence is inevitable. By 2050 we can expect further integration, though perhaps not in the form of a full-fledged union. Instead, a flexible model of cooperation could emerge in which each country retains its sovereignty. Such an arrangement would help the countries of the region respond to external threats in a more coordinated way."

Rakhim Oshakbayev, Senior Economist at the Talap Centre for Applied Research
(Kazakhstan)

"My vision for the future is a Central Asia that becomes part of a broader 'Greater Asia' by 2050, uniting the South Caucasus, Iran, Afghanistan, Pakistan, Russia, and China as the centre of Eurasia … Central Asian countries will need to develop unified educational standards and a single diploma system, in which a degree earned in one country is recognised across all five."

CHAPTER 3.

CLIMATE CHANGE

Climate change is not simply an environmental challenge for Central Asia; it is a defining factor in the region's long-term development. Rising temperatures, changing water availability, and increasingly unpredictable weather will shape agricultural productivity, energy security, infrastructure investment, public health, and patterns of human settlement. These pressures are interconnected and do not stop at national borders. Decisions made today about water management, urban development, energy systems, and infrastructure will influence the region's resilience for decades to come. The central challenge is therefore not only to anticipate climate change, but to incorporate climate risks into economic planning and regional cooperation.

3.1. Key Facts and Trends

Temperatures Are Rising

The region has warmed by approximately 1.2°C since the mid-twentieth century. Mountainous areas have experienced significant changes, including an estimated 20 percent decline in snowpack depth (Fallah et al., 2024).

Warming is projected to intensify. By 2100, regional temperatures could rise by 2–6°C under many scenarios, with increases of up to 10°C under high-emissions scenarios (Zhang et al., 2019; Fallah et al., 2024).

Extreme heat is becoming more frequent. Hot days and nights are increasing, while cold periods are becoming less common.

Precipitation Intensity and Emerging Challenges

Average precipitation masks substantial regional differences. While overall precipitation has remained relatively stable, eastern areas have experi-

enced increases and western areas have become drier.

Future precipitation remains uncertain. Projections vary widely by country, underscoring the need to plan for multiple scenarios, including drought, changing seasonality, and intense rainfall.

Extreme rainfall is expected to intensify. Projections indicate an average increase of approximately 24 percent in maximum daily precipitation, increasing the risk of floods, mudflows, and other hydrological hazards.

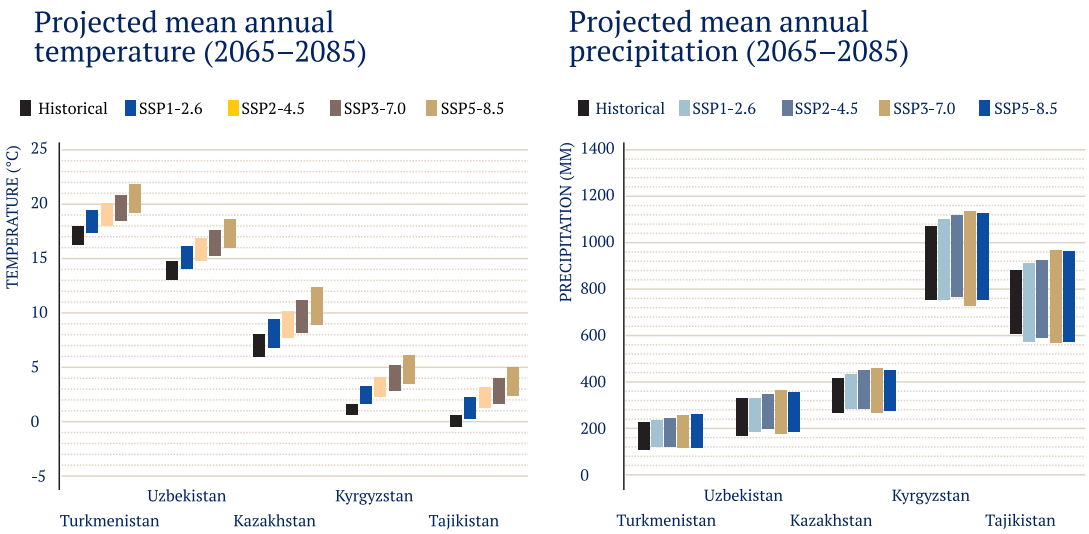


Figure 3.1. *Projected mean annual temperature and precipitation, 2065–2085. The ranges show the 10th (low) to 90th (high) percentiles of projections for each Shared Socioeconomic Pathway (SSP). Historical ranges cover 1995–2014. Data source: CCKP, 2025.*

Floods and Natural Disasters Threaten Lives and Livelihoods

Around 20 percent of Central Asia's population lives in areas at high risk of flooding, defined as a 1-in-100-year event. Half of those exposed live on less than $5.50 a day.

Disaster risks carry substantial economic costs. Potential losses in Tajikistan could reach 18 percent of GDP, while Uzbekistan experiences average

annual flood damage of approximately $236 million.

Recent disasters demonstrate the scale of exposure. The 2020 Sardoba reservoir breach in Uzbekistan displaced more than 60,000 people, while the spring 2024 floods in Kazakhstan forced more than 86,000 people to evacuate.

Economic losses could rise further. Without stronger adaptation, natural disasters could reduce Kazakhstan's GDP by 0.9 percent annually by 2050 and by as much as 3.3 percent by 2100 under a severe climate scenario.

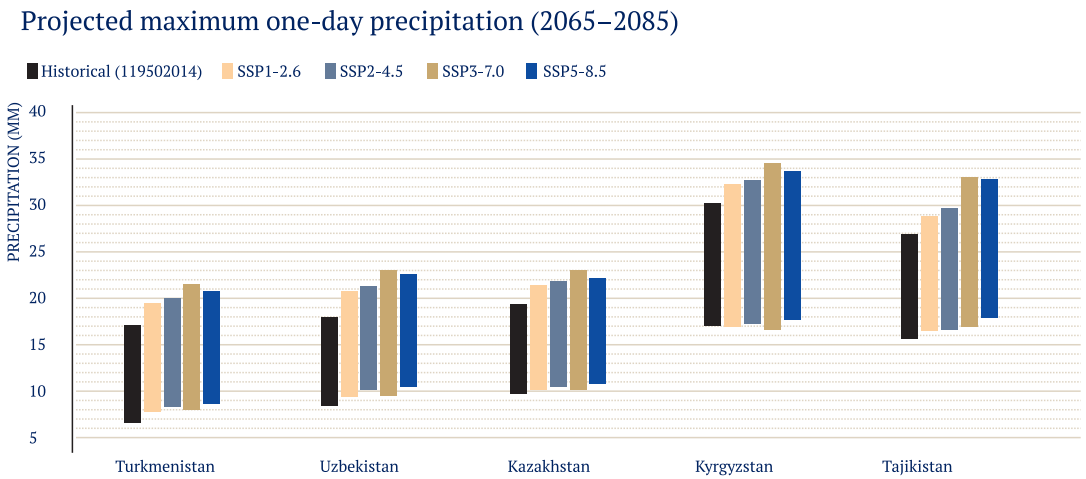


Figure 3.2. *Projected maximum one-day precipitation, 2065–2085. The ranges show the 10th (low) to 90th (high) percentiles of projections for each Shared Socioeconomic Pathway (SSP). Historical ranges cover 1995–2014. Data source: CCKP, 2025.*

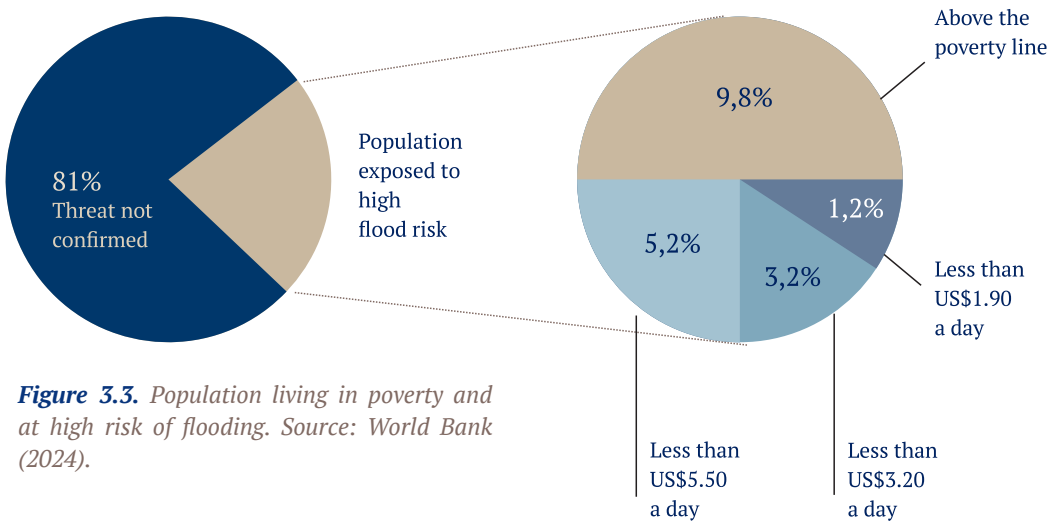


Figure 3.3. *Population living in poverty and at high risk of flooding. Source: World Bank (2024).*

3.2. Risks and Uncertainties

Drought and Water Scarcity Are Growing Concerns

Drought is a recurring regional threat. Severe droughts in 2021 and 2024 contributed to declining crop yields and livestock losses, against a broader trend towards drier conditions over the past five decades (Jiang and Zhou).

Water scarcity increases pressure on agriculture and regional water management. Competing demands for limited resources can heighten tensions within and between countries.

Regional cooperation can help manage shared risks. Kyrgyzstan's release of additional water from the Toktogul reservoir to help mitigate drought impacts in Kazakhstan illustrates the potential for coordinated responses.

The Interdependence of Water, Energy, and Food Security

In Central Asia, climate change affects water, energy, and food security through a network of interdependent systems. Rising temperatures accelerate evaporation and glacier melt, while changing precipitation patterns affect the timing and volume of river flows. These changes influence irrigation, agricultural productivity, hydropower generation, and the availability of water for households and industry.

The consequences are particularly significant because water resources, energy infrastructure, and agricultural demand are unevenly distributed across the region. Kyrgyzstan and Tajikistan depend heavily on hydropower, while Uzbekistan, Turkmenistan, and parts of Kazakhstan rely extensively on irrigation for agricultural production. Changes in river flows can therefore create competing demands for water across countries and sectors, particularly during the growing season.

The changing dynamics of the region's glaciers and river systems illus-

trate the scale of the challenge. Figure 3.5 documents the decline in glacier mass across Central Asia, while Figure 3.6 identifies the principal mountain ranges and glacier systems that underpin regional water availability. These changes have implications for the Amu Darya and Syr Darya basins, whose runoff patterns are essential to agriculture, energy production, and water management across national borders.

Climate change is also expected to alter the seasonal distribution of river flows. Figure 3.7, which presents projected seasonal runoff changes in the Vakhsh River basin, illustrates how both the timing and volume of water availability may change under different climate scenarios. Although runoff may initially increase in some areas as glaciers melt more rapidly, this cannot be assumed to represent a lasting increase in water resources. Over time, diminishing glaciers may reduce the contribution of meltwater, while changing precipitation patterns introduce further uncertainty.

These shifts make historical water-allocation arrangements and seasonal planning increasingly difficult to sustain. Decisions about reservoir operations, irrigation, and hydropower need to account for competing demands and a wider range of possible climate conditions. Hydrological forecasting and coordinated reservoir management can help countries manage periods of both excess water and scarcity.

A more integrated approach would connect water allocation, energy planning, agricultural policy, and climate adaptation. Joint forecasting, regular data exchange, coordinated reservoir operations, investment in water efficiency, and the development of alternative water-storage capacity could reduce vulnerability and improve the management of shared resources. Regional cooperation is therefore not simply a diplomatic objective: it is a practical requirement for managing the interdependence of Central Asia's water, energy, and food systems.

Climate Resilience as a Principle of Public Investment

Climate change challenges the assumptions on which long-term infrastructure planning has traditionally relied. Roads, reservoirs, drainage systems, irrigation networks, schools, hospitals, and urban utilities designed around historical climate conditions may no longer provide adequate protection against future extremes.

The potential economic consequences are substantial. Figure 3.8 compares estimated climate-related economic damages by 2050 under a dry/hot climate scenario without adaptation measures. The estimates indicate particularly significant potential losses for Uzbekistan and Tajikistan, alongside substantial risks for Kyrgyzstan and Kazakhstan. The figure provides an important reminder that climate change can affect not only individual assets or sectors but also national economic performance.

These estimates should be interpreted in the context of their underlying assumptions. They represent modelled impacts under a particular climate scenario without adaptation, rather than certain forecasts of future economic losses. Nevertheless, they demonstrate the importance of assessing climate risk before committing public resources to long-lived infrastructure and development programmes.

Public investment decisions should therefore incorporate forward-looking climate projections alongside economic, demographic, and spatial data. Project appraisal should consider not only construction costs and immediate benefits, but also exposure to climate hazards, maintenance requirements, potential service disruption, and the long-term costs of inaction.

This approach requires moving from reactive disaster response towards anticipatory risk management. Climate scenarios should inform the location, design, and financing of infrastructure. Spatial analysis can help identify exposed assets, vulnerable communities, service gaps, and areas where preventive investment would deliver the greatest benefits.

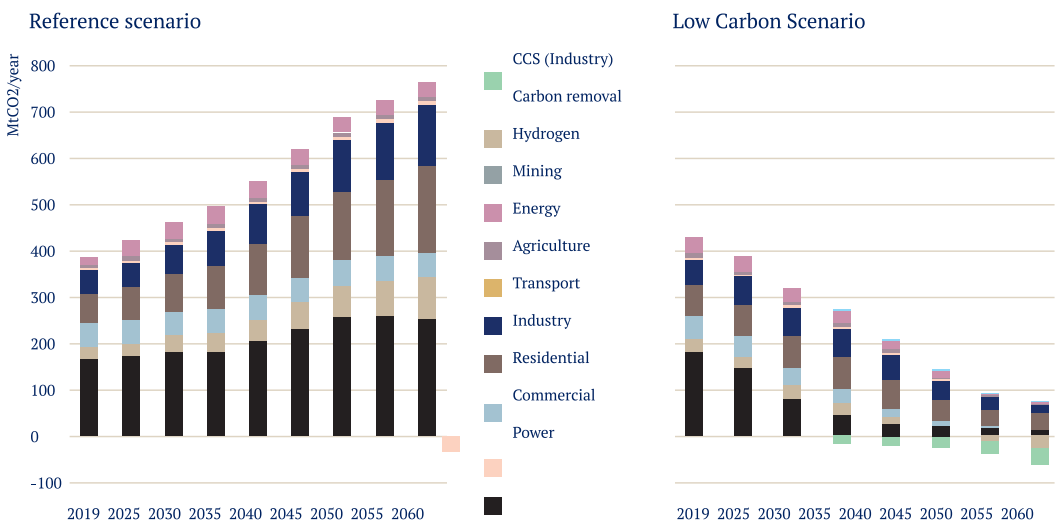


Figure 3.4. *Total emissions by sector across all five Central Asian countries combined, under the Net Zero and Reference scenarios. Note: the left-hand chart shows the reference scenario and the right-hand chart the low-carbon development scenario.*

Climate-risk assessment should also be proportionate to the investment involved. Major infrastructure projects should undergo systematic screening against relevant climate scenarios, while more detailed assessments should be undertaken where exposure or potential losses are significant. Alternative locations and designs should be compared, and the costs of resilience measures evaluated over the asset's full lifecycle.

Integrating climate risk into public investment planning can protect public assets, reduce future losses, and strengthen the continuity of essential services. It can also improve the quality of investment decisions by making climate exposure and long-term resilience explicit considerations in project selection and financing.

Implications for Regional Planning

Central Asia faces a combination of rising temperatures, uncertain precipitation patterns, more intense rainfall, changing river flows, and recurring drought. These pressures interact with population growth, urbanisation, agricultural dependence, and existing infrastructure gaps, creating risks that extend beyond individual countries or sectors.

The evidence presented in this chapter demonstrates that climate risk has both a spatial and an economic dimension. Figures 3.1 and 3.2 show the range of projected temperature, precipitation, and extreme rainfall conditions across the region. Figure 3.3 highlights the human dimension of climate risk by showing the relationship between poverty and exposure to flooding. Figure 3.8 illustrates the potential macroeconomic consequences of climate change in the absence of adaptation.

Together, these figures support a central conclusion: climate vulnerability depends not only on the intensity of a hazard but also on where people live, which assets and services they rely on, and their capacity to prepare for and recover from disruption.

Climate resilience should therefore become a core principle of regional development and public investment. Governments need to incorporate multiple climate scenarios into infrastructure design, water and agricultural management, urban planning, and long-term development strategies. Investments should be prioritised according to their exposure to climate hazards, the consequences of service disruption, and the potential benefits of preventive measures.

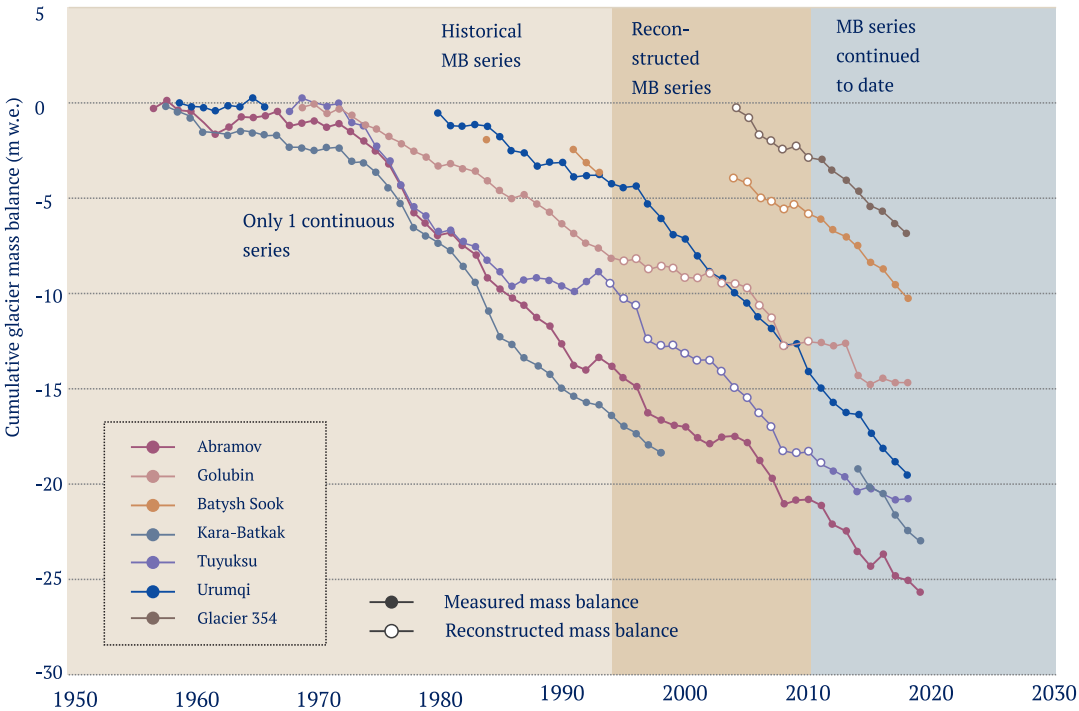


Figure 3.5. *Measured and reconstructed mass balance time series for Central Asian glaciers. Source: Barandun et al. (2020).*



Figure 3.6. *Map of the main mountain ranges and glaciers. Source: Barandun et al. (2020).*

Regional cooperation is equally important. Shared river basins, interconnected energy systems, and cross-border economic relationships mean that national responses alone cannot adequately address all climate risks. Joint hydrological forecasting, data exchange, early-warning systems, coordinated reservoir management, and collaborative adaptation planning can help countries anticipate risks and manage competing demands.

The objective should be to translate climate evidence into practical decisions: where to invest, which communities and services require protection, how infrastructure should be designed, and how shared resources should be managed under different future scenarios.

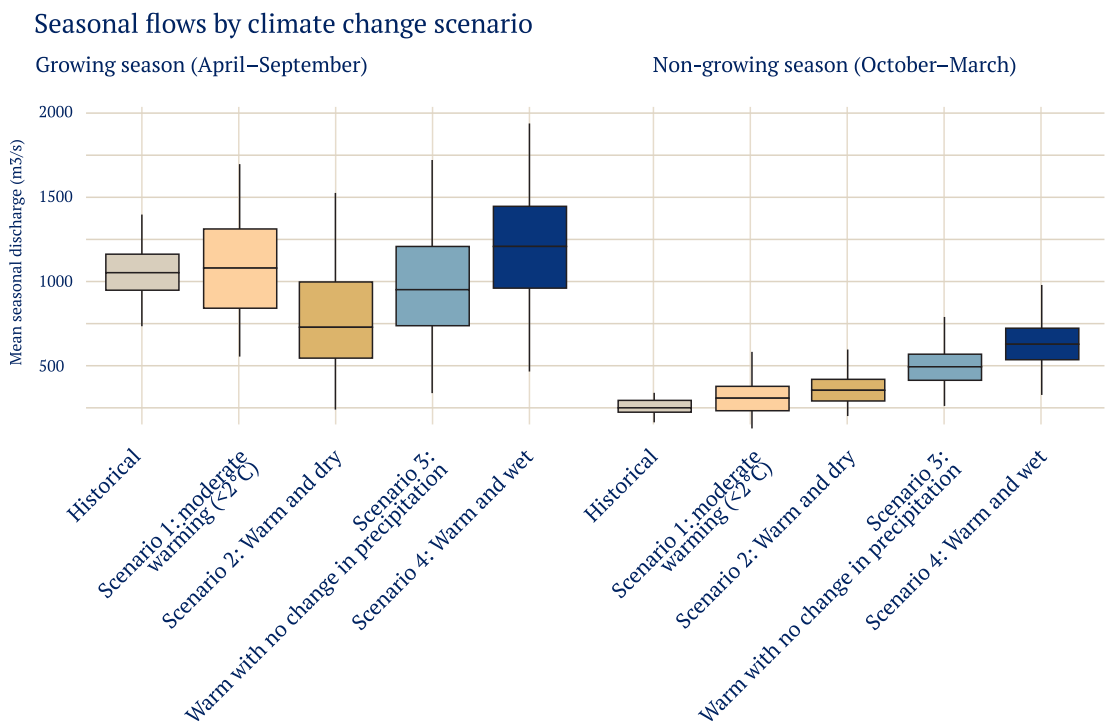


Figure 3.7. *Change in mean seasonal runoff under climate change scenarios in the Vakhsh River basin at Nurek. Each coloured block shows the range of total seasonal river flow projected for each year under different climate scenarios.*

Climate Change and Human Mobility

Climate change can reshape population movements by undermining livelihoods, particularly in communities dependent on agriculture and natural resources. Water scarcity, land degradation, drought, and recurring disasters may contribute to migration from rural areas towards cities, temporary displacement, and cross-border mobility. These movements are also shaped by employment opportunities, social networks, public services, and government policies; climate change is rarely the sole driver.

The effects are already visible in different parts of Central Asia. In Uzbekistan, environmental degradation associated with the drying of the Aral Sea has contributed to livelihood losses, population displacement, and health risks related to dust storms and water pollution. In Tajikistan, declining agricultural productivity can intensify pressure for rural-to-urban migration. In Kazakhstan, environmental risks interact with disparities in infrastructure and services and the concentration of economic opportunities in cities.

The broader demographic implications are significant. Climate-related pressures may increase demand for housing, employment, water, energy, and public services in receiving areas, while communities experiencing population loss may face declining agricultural capacity and weaker local economies. Poorly managed displacement and migration can deepen existing inequalities, particularly for low-income households, women, children, and older people.

The potential economic consequences shown in Figure 3.8 provide a broader context for understanding these pressures. Where climate impacts weaken agricultural production, livelihoods, or access to essential services, households may face greater incentives to move. However, economic losses alone do not establish the scale or direction of future migration; this also depends on local conditions, employment opportunities, household resources, and adaptation policies.

Climate adaptation should therefore be connected to demographic forecasting, regional development, urban planning, and social protection. Governments need to anticipate how environmental pressures may affect where people live and work, strengthen resilience in vulnerable communities, and ensure that people who move can access essential services and

decent employment.

Regional dialogue and shared evidence will be essential to understanding these changing patterns. Better data on environmental exposure, livelihoods, internal displacement, and migration can help governments distinguish between temporary movements, longer-term relocation, and migration undertaken as an adaptation strategy. This would support more informed planning for both communities exposed to climate hazards and the places receiving new populations.

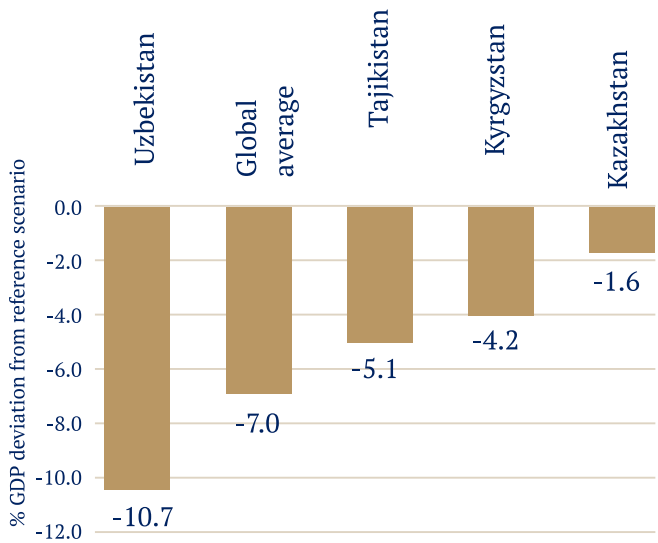


Figure 3.8. *Climate damages by 2050 under a dry/hot climate scenario (RCP 4.5) without adaptation measures. Source: World Bank Country Climate and Development Reports. Note: for Kazakhstan, the analysis does not cover all channels through which climate change could affect GDP.*

3.3. Recommendations

Central Asia should prioritise win-win measures that deliver benefits across a range of possible climate futures. These measures should reduce vulnerability while generating wider development gains, including more efficient water use, improved public health, stronger infrastructure, and better emergency preparedness. Climate resilience should be integrated into strategic planning, public investment, land-use decisions, and regional cooperation rather than treated as a separate environmental agenda.

Modernisation and Climate-Resilient Infrastructure

Transport, water supply, energy, and other critical infrastructure should be modernised to withstand changing climate conditions and increasingly intense weather events. New investments should account for projected changes in precipitation, flooding, heat, and other climate hazards, while infrastructure planning should be integrated with disaster risk management.

Practical priorities include:

Incorporating climate-risk assessments into the planning, appraisal, design, and maintenance of public infrastructure.

Protecting critical infrastructure and essential services against floods, landslides, avalanches, and extreme heat.

Prioritising upgrades to existing water, energy, and transport systems where climate exposure threatens service continuity.

Assessing long-term maintenance costs and the potential economic consequences of infrastructure failure when selecting public investments.

Disaster Risk Management and Early Warning

Governments should strengthen their capacity to anticipate, prepare for, and respond to climate-related emergencies. Risk assessments should inform long-term development plans and identify vulnerable populations, infrastructure, and economic activities across the agriculture, energy, water, and healthcare sectors.

Practical priorities include:

Developing comprehensive risk and vulnerability assessments, supported by spatial risk maps and cross-sectoral action plans.

Strengthening early warning systems and preparedness for floods, landslides, avalanches, droughts, and other climate-related hazards.

Expanding climate monitoring and improving the use of risk information in public planning and emergency response.

Introducing appropriate insurance, financial reserves, and other protection mechanisms for vulnerable households and communities.

Implementing near-term measures that reduce exposure and improve preparedness while longer-term resilience systems are developed.

Climate-Resilient Land Use and Agriculture

Agricultural and land-management policies should address rising temperatures, changing precipitation, soil degradation, and increasing pressure on water resources. Improving the resilience of rural livelihoods will require both changes in agricultural practices and longer-term approaches to restoring degraded land.

Practical priorities include:

Promoting crop diversification, drought-resistant varieties, crop rotation, soil conservation, and improved fertilisation practices.

Expanding efficient irrigation and other water-saving technologies.

Developing long-term greening, afforestation, land-restoration, and anti-desertification programmes.

Coordinating land-restoration efforts across the region through shared priorities and the exchange of technical expertise.

Integrating climate projections and demographic trends into land-use planning and agricultural development programmes.

Integrating Water and Agricultural Planning

Water availability should be a central consideration in agricultural policy and investment decisions. Production plans that assume stable or increasing water supplies may become unsustainable as climate change affects river flows, seasonal runoff, and irrigation demand. Governments should therefore align agricultural development with realistic assessments of current and projected water availability.

Practical priorities include:

Establishing coordinated water and agricultural planning, linking crop choices and production targets to available water resources.

Expanding drought-resistant crops and agricultural practices that reduce dependence on irrigation.

Improving irrigation efficiency and reducing water losses throughout agricultural production and distribution.

Incorporating seasonal and long-term water forecasts into water allocation and agricultural investment.

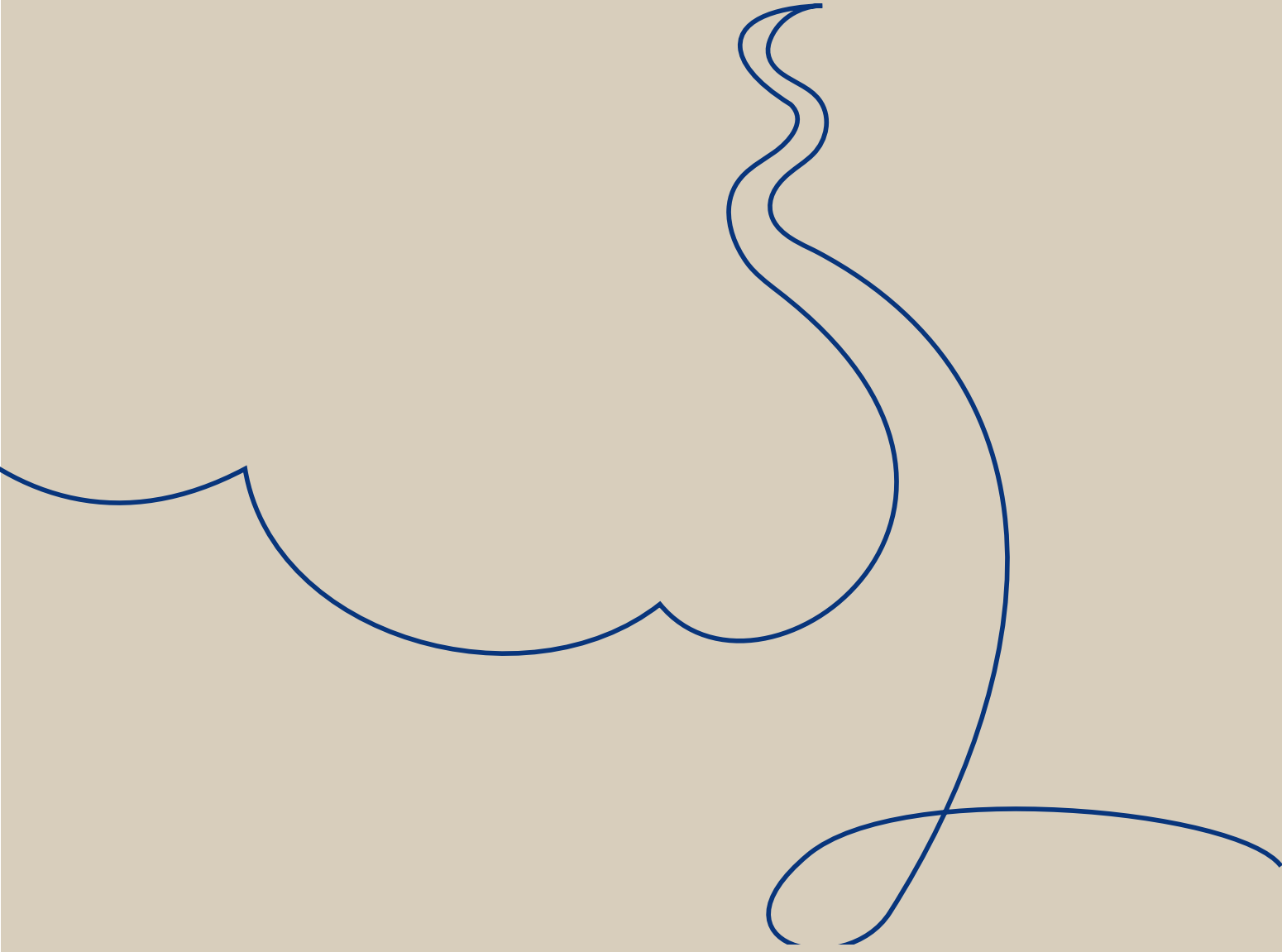
Moving from short-term water quotas towards longer-term, coordinated regional planning.

Combining water and energy management.

Using digital monitoring, remote sensing and modelling to improve decision-making.

CHAPTER 4.

WATER RESOURCES



The Cost of Inaction

Water insecurity could significantly constrain economic growth. If current water management policies and practices remain unchanged, the GDPs of Central Asian countries could decline by up to 11 percent by 2050, driven by agricultural losses, deteriorating public health, and declining incomes and property values (World Bank, 2024).

Weak transboundary cooperation carries substantial economic costs. Limited regional cooperation is estimated to cost Central Asian countries $4.5 billion annually (Adelphi and CAREC, 2017). Figure 4.2 breaks these estimated costs down into losses associated with lower agricultural productivity, higher energy prices and energy security, and limited access to international finance.

4.1. Key Facts and Trends

Central Asia Depends on Shared Rivers

Surface water accounts for 97 percent of the region's water resources. The Syr Darya and Amu Darya originate in Kyrgyzstan and Tajikistan and supply downstream countries, including Kazakhstan, Turkmenistan, and Uzbekistan (AQUASTAT, 2024).

Water consumption is exceptionally high. Overall water use in Central Asia is approximately five times the global average, reflecting the region's dependence on irrigation and the structure of its agricultural production (World Bank, 2024).

Agriculture Accounts for Most Water Use

More than 80 percent of regional water use goes to irrigated agriculture. Irrigation accounts for over 90 percent of agricultural output across the region, although the share is approximately 60 percent in Kazakhstan (World Bank, 2024).

Uzbekistan accounts for the largest share of the region's irrigated land. Of the regional total of 10.1 million hectares shown in Figure 4.3, Uzbekistan accounts for 42 percent, Kazakhstan 22 percent, Turkmenistan 18 percent, Kyrgyzstan 10 percent, and Tajikistan 8 percent (World Bank, 2024).

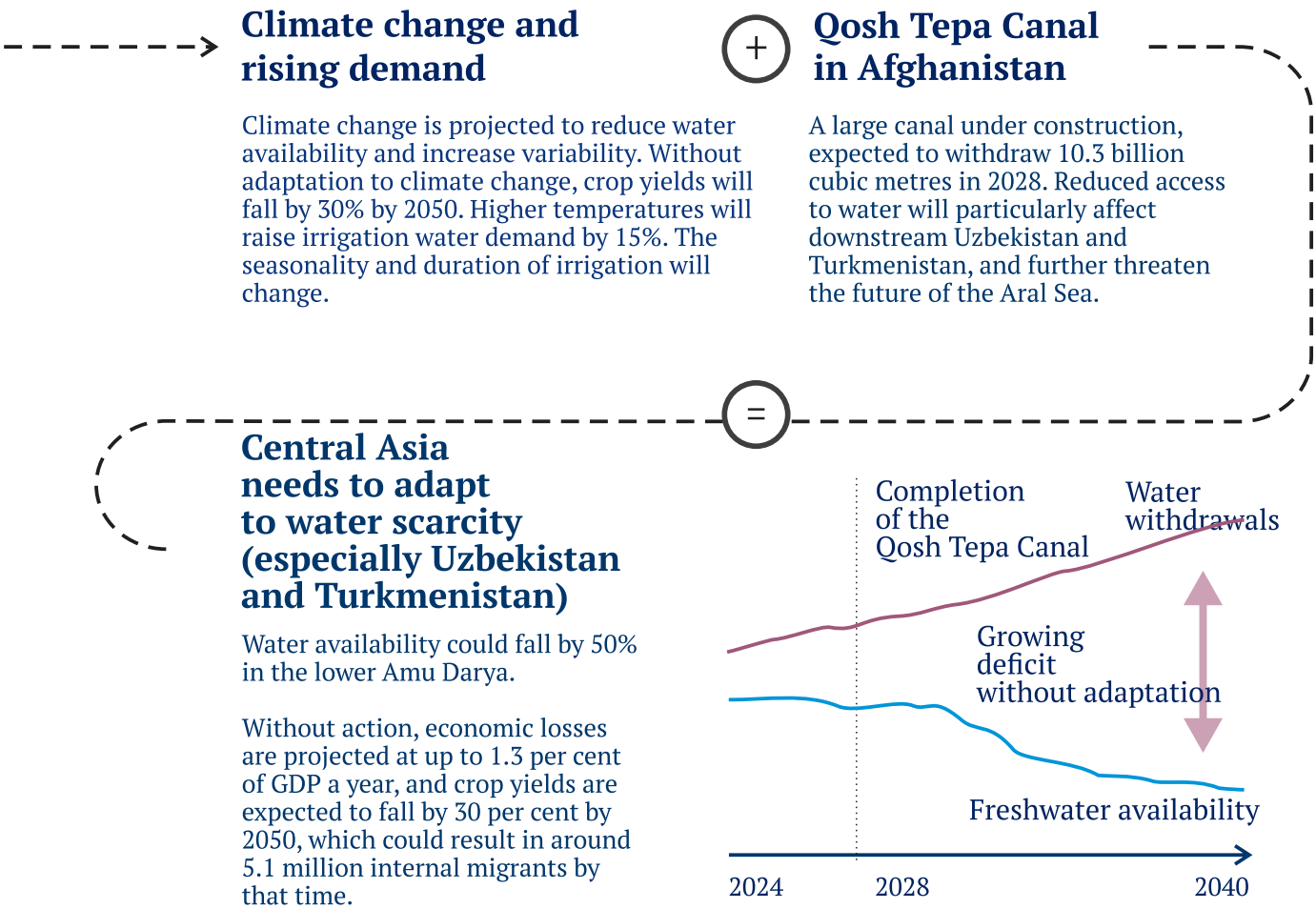


Figure 4.1. *Strategic summary of water scarcity challenges in Central Asia. Source: World Bank, 2024.*

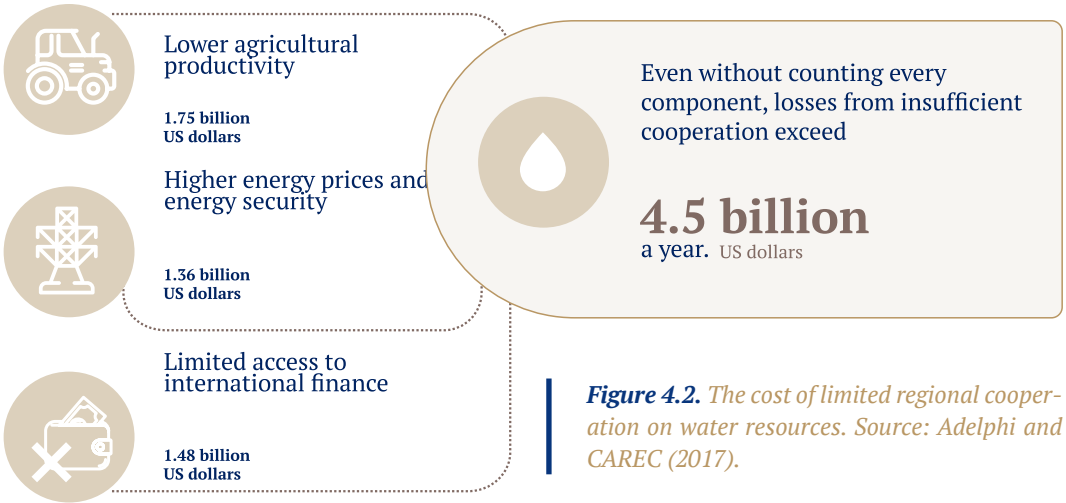


Figure 4.2. *The cost of limited regional cooperation on water resources. Source: Adelphi and CAREC (2017).*

Irrigated agriculture is central to livelihoods and economic growth. It accounts for 6–11 percent of non-commodity exports across the region. Between 46 and 73 percent of Central Asia's approximately 80 million people live in rural areas and depend directly on agriculture. In Tajikistan, Kyrgyzstan, and Uzbekistan, irrigated agriculture accounts for up to 20 percent of GDP and up to 25 percent of employment (World Bank, 2024).

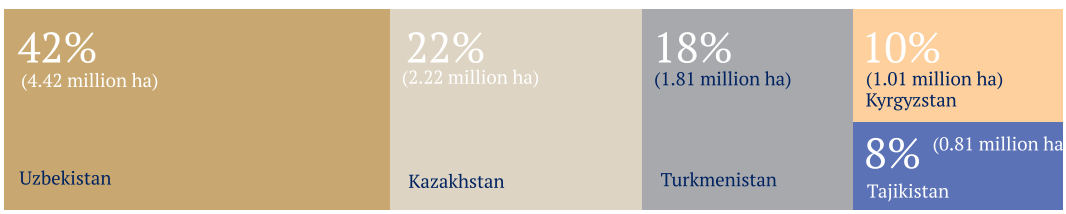


Figure 4.3. *Irrigated land in Central Asia: each country's share of the regional total (10.1 million ha), percent. Source: World Bank, 2024.*

Irrigation Infrastructure Is Inefficient

Water losses from deteriorating canals exceed 40 percent. Less than 60 percent of supplied water reaches crops, constraining agricultural productivity and increasing pressure on limited resources.

Water-use efficiency varies across countries. Figure 4.4 compares conveyance and on-farm irrigation efficiency across five Central Asian countries against a 90 percent benchmark for properly maintained lined canals and on-field drip irrigation.

Modernisation could deliver substantial gains. Reconstructing existing irrigation infrastructure could save 7 percent of water by 2030 and up to 10 percent by 2050. Modern irrigation methods could increase crop yields by 20 percent by 2030 and 50 percent by 2050 (World Bank, 2024).

Inefficient pumping increases public expenditure and emissions. In Uzbekistan, electricity for pumping stations accounts for 65–70 percent of the water sector's budget expenditure, while their operation releases more than 3 million tonnes of CO_2 annually, equivalent to approximately 2–3 percent of the country's total emissions (World Bank, 2023).

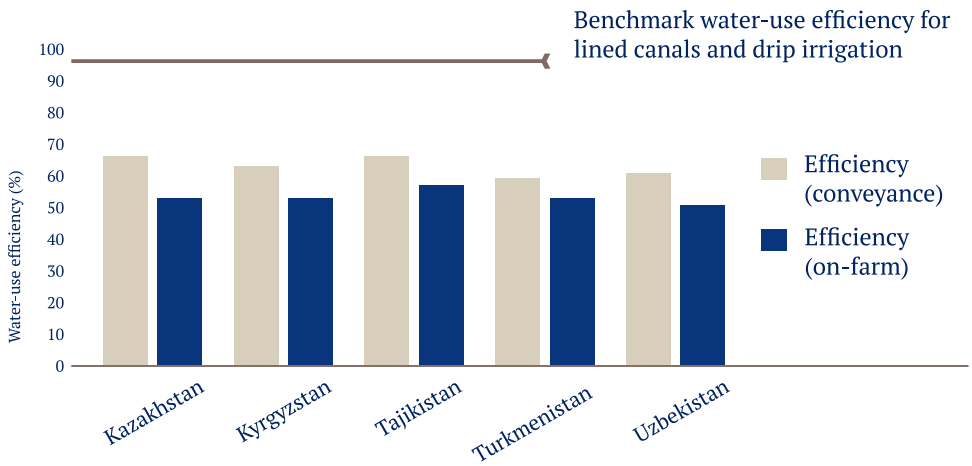


Figure 4.4. *Low water-use efficiency in irrigated agriculture in Central Asian countries. Source: World Bank. Note: the benchmark line for the efficiency of water delivery through properly maintained lined canals and on-field drip irrigation is set at 90 percent.*

Reservoir Capacity Is Declining

Nearly half of the region's dams were built before 1980. Ageing structures, outdated equipment, inadequate oversight, and insufficient maintenance undermine their reliability and effectiveness.

Sedimentation is reducing storage capacity. Central Asian dams are projected to lose an average of 26 percent of their volume to siltation by 2050 (Perera et al., 2023).

Reported reservoir volume losses are substantial. Losses stood at approximately 10 billion m^3 in 2025, reported as nearly 35 percent of total capacity, and are expected to reach 15 billion m^3 by 2050. In Uzbekistan, the capacity of the country's main reservoirs has declined by around 20 percent, while dead storage has reached 75 percent in some cases.

Groundwater and Alternative Water Sources Remain Underused

Groundwater represents a significant but underused resource. Central Asia's potential groundwater reserves are estimated at 123 billion m^3 annually, of which approximately 23 percent is currently used.

Groundwater serves several essential purposes. Of the groundwater extracted, approximately 38 percent goes to domestic and drinking needs, 42 percent to irrigation, and 8 percent to industry.

Wastewater treatment and reuse remain limited. Figure 4.6 compares wastewater collected, treated, and reused across Central Asian countries, highlighting differences in the management of a potential supplementary water resource (World Bank, 2024).

Access to Safe Water and Sector Financing Remain Uneven

Around 10 million people in Central Asia lack access to safe drinking water. Significant service gaps remain, particularly in rural areas (Vinokurov, 2024).

Ageing water supply facilities contribute to persistent losses. Many facilities were commissioned approximately 50 years ago, and average water losses across the region are estimated at 35 percent, with considerable variation among countries.

Public financing does not fully cover investment needs. National budgetary financing covers approximately 40–69 percent of the funds required for water infrastructure (CAREC, 2024), leaving significant needs for rehabilitation, maintenance, and modernisation.

4.2. Risks and Uncertainties

Climate Change Is Reshaping Water Availability

Glacier reserves are projected to decline. Central Asia's total glacier volume was estimated at 533 km^3 in 2020 and is expected to shrink by 11–19 percent by 2050 (USAID, 2025).

Water availability is becoming less predictable. Rising temperatures are shifting precipitation from snow towards rain, reducing snow cover and causing earlier glacier melt. Peak water availability may shift from summer to spring, complicating irrigation and hydropower planning.

Water scarcity could have significant economic and social consequences. Figure 4.1 summarises estimates under a scenario without adaptation, including a potential 15 percent increase in irrigation water demand, a 30 percent decline in crop yields by 2050, and a possible 50 percent reduction in water availability in the lower Amu Darya. The same assessment projects

up to 1.3 percent in annual economic losses and approximately 5.1 million internal migrants by 2050. These are scenario-based estimates, not certain outcomes (World Bank, 2024).

Upstream Development Could Increase Transboundary Pressures

The Qosh Tepa Canal could significantly affect the Amu Darya basin. The chapter's sources present estimates of water withdrawals ranging from 10.3 billion m^3 by 2028 in Figure 4.1 to 10–16 billion m^3 annually once the canal is completed. The estimates should be reconciled against their underlying assumptions and timeframes before publication.

Potential impacts extend across water and energy systems. The chapter reports projections of a 25 percent decline in inflow to the Tuyamuyun Hydroelectric Complex, a roughly 6 percent reduction in agricultural water supply, and a 22 percent decline in annual hydropower generation (USAID, 2025).

Weak regional coordination increases uncertainty. Limited trust, insufficient institutional capacity, and inadequate information exchange make it harder to anticipate and manage changes in shared water availability.

Competition Between Water, Energy, and Agriculture Could Intensify

Water and energy needs do not always align. Reservoir operations intended to support hydropower generation may conflict with downstream irrigation requirements, particularly as seasonal river flows change.

Higher energy prices can increase water-delivery costs. Electricity-price fluctuations affect pumping costs, placing additional pressure on public budgets, water providers, farmers, and consumers.

Food-security strategies may increase water demand. Efforts to expand

domestic agricultural production could intensify competition between irrigation and hydropower, depending on crop choices and production methods.

Fragmented planning can increase economic costs. Decisions made separately by water, energy, and agricultural institutions may overlook trade-offs and the effects of national decisions on neighbouring countries.

Infrastructure Deterioration Threatens Long-Term Water Security

Reduced storage capacity weakens the ability to manage seasonal variability. Reservoir deterioration and sedimentation can constrain the regulation of water flows, reducing flexibility during droughts and periods of high flows.

Delayed maintenance can increase long-term costs. Infrastructure that is not rehabilitated in time becomes more expensive to operate and less reliable, increasing the risks of water losses and service interruptions.

Infrastructure expansion alone may not deliver water security. Without better maintenance, efficient operating rules, and coordinated planning, new investments may not deliver their full potential benefits.

Groundwater Depletion and Environmental Degradation Pose Further Risks

Groundwater could become less reliable if extraction is not managed sustainably. Over-extraction, pollution, and inadequate regulation may undermine the resource's role in securing supplies during droughts and seasonal shortages.

Untreated wastewater creates environmental and public-health risks. Failure to expand treatment and safe reuse increases pressure on natural water resources while leaving a potential supplementary source underused.

Demographic, Financial, and Geopolitical Uncertainty Adds Pressure

Population growth and migration could increase demand. Changes in population, incomes, and settlement patterns affect water and electricity consumption, while rapid migration can create concentrated pressure on local infrastructure.

Financing constraints may delay essential modernisation. Limited public resources can postpone rehabilitation and maintenance, increasing operating costs and undermining service quality.

Geopolitical and economic shifts complicate regional planning. Changes in energy prices, agricultural priorities, and relations between countries can affect water demand, investment decisions, and the willingness to coordinate shared resources.

Regional water–energy modelling

This model is an excellent tool for:

1. Objectively assessing the costs and benefits of different ways of operating the system.

2. Assessing the benefits of future regional investments:

- Investment in irrigation efficiency
- Investment in hydropower infrastructure
- Investment in storage
- Optimised operation

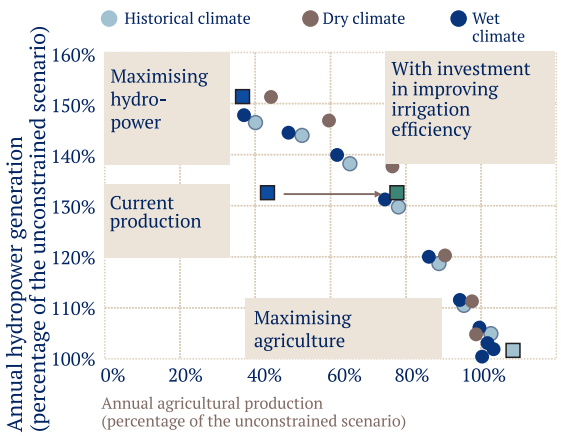


Figure 4.5. *Coordinated and optimised operation of the reservoir cascade supports water and energy security, both today and under climate change. Source: World Bank, 2020.*

4.3. Recommendations

Central Asia should shift from short-term water allocation towards integrated, efficient, and climate-resilient water management. Four overarching priorities should guide reform: increasing water-use efficiency, introducing appropriate financial instruments, digitalising the sector, and modernising and rehabilitating existing infrastructure. These efforts should be supported by coordinated water–energy planning, stronger regional institutions, and sustained investment in technical capacity.

Modernising Water Infrastructure and Maximising Existing Capacity

Countries should prioritise the rehabilitation and maintenance of existing irrigation, drainage, pumping, and reservoir infrastructure to reduce losses, improve reliability, and lower operating costs.

Practical priorities include:

Modernising irrigation and drainage networks and rehabilitating pumping stations.

Assessing reservoir safety, structural condition, sedimentation, and maintenance needs.

Prioritising the rehabilitation of critical infrastructure and addressing sedimentation where technically and economically feasible.

Exploring the recovery of value from reservoir sediments where suitable uses can be established.

Increasing Water-Use Efficiency and Agricultural Productivity

Improving the economic return generated by each unit of water is essential to reducing pressure on resources while sustaining agricultural production and rural livelihoods.

Practical priorities include:

Expanding drip and sprinkler irrigation where technically and economically appropriate.

Improving water measurement, accounting, and control to identify losses and support more efficient allocation.

Revising irrigation standards and aligning crop choices and planting patterns with local water availability and market opportunities.

Promoting crops and agricultural practices that generate greater economic value per unit of water.

Supporting local production, maintenance, and operation of modern irrigation equipment, alongside training for farmers and technical specialists.

Advancing plans to introduce modern irrigation technologies across 10.6 million hectares by 2040, including 4.3 million hectares in Uzbekistan and 2.7 million hectares in Kazakhstan.

Integrating Water, Energy, and Agricultural Planning

Water allocation, hydropower generation, and agricultural production should be planned together rather than treated as separate policy areas. Coordinated planning can help countries balance competing demands, manage seasonal variation, and strengthen shared water and energy systems.

Practical priorities include:

Establishing coordinated planning mechanisms that account for irrigation demand, hydropower generation, seasonal water availability, and climate risks.

Developing shared reservoir operating rules that balance upstream energy requirements with downstream agricultural needs.

Exploring joint investments in shared infrastructure and arrangements for distributing costs and benefits between upstream and downstream countries.

Incorporating seasonal hydrological forecasts into reservoir operations, agricultural planning, and investment decisions.

Strengthening coordination around Rogun and Kambarata-1, which the source identifies as hydropower projects designed to serve both energy and irrigation needs.

Applying integrated reservoir-cascade management to improve water and energy security under current and future climate conditions percent(see Figure 4.6).

Using the Nurek Reservoir as an example of forecast-based management: studies indicate that incorporating seasonal hydrometeorological forecasts into operations could increase annual hydropower generation by 13–14 percent while helping reduce flood and flash-flood risks.

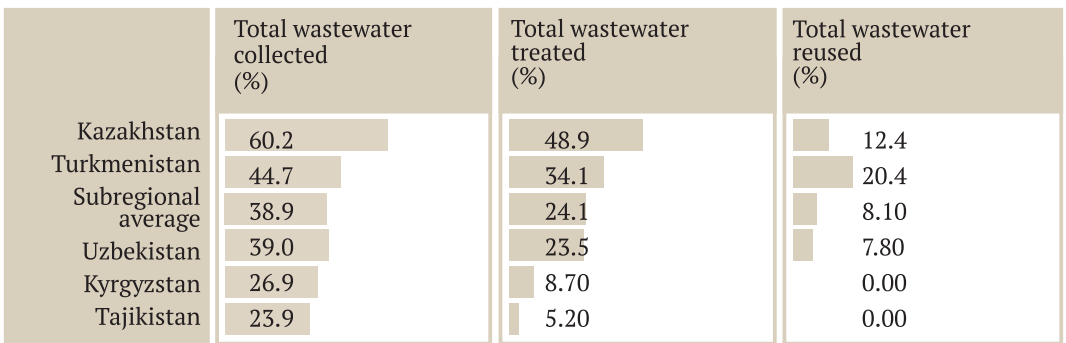


Figure 4.6. *Wastewater collected, treated and reused, by Central Asian country. Source: World Bank, 2024.*

Strengthening Groundwater Management and Developing Alternative Water Sources

Groundwater should be integrated into water-resource planning as a potential buffer against seasonal shortages, while its use must remain environmentally sustainable. Wastewater treatment and reuse can provide additional supplies and reduce pressure on natural resources.

Practical priorities include:

Improving groundwater monitoring, accounting, and regulation to prevent unsustainable extraction.

Clarifying institutional responsibilities for groundwater management and protecting groundwater quality.

Integrating groundwater into basin-level planning and drought-management strategies.

Expanding wastewater treatment and safe reuse for suitable agricultural, industrial, and other purposes.

Assessing the feasibility of recharging aquifers with treated wastewater, subject to environmental and public-health safeguards.

Exploring desalination where technically, economically, and environmentally appropriate, particularly in the Caspian Sea basin.

Using country-level evidence on wastewater collection, treatment, and reuse to guide investment priorities (see Figure 4.6).

Digitalising Water Management

Reliable and timely information is essential for water allocation, infrastructure management, forecasting, and transparent decision-making. Digital technologies should strengthen national water management while enabling more consistent information exchange across the region.

Practical priorities include:

Developing integrated digital systems for monitoring hydrological conditions, water withdrawals, water use, infrastructure performance, and ecosystem status.

Advancing the proposal for a regional digital water-management platform by 2040, subject to agreement on governance, financing, responsibilities, and implementation arrangements.

Expanding the use of remote sensing, hydrological modelling, and seasonal forecasts in water allocation and reservoir management.

Strengthening the Scientific-Information Centre of the Interstate Commission for Water Coordination in Central Asia (SIC ICWC) in data collection, analysis, and dissemination.

Improving the consistency, transparency, and interoperability of water-related data across institutions and countries.

Strengthening Transboundary Governance and Regional Cooperation

Because Central Asian countries share river basins and water infrastructure, effective water management requires sustained cooperation between upstream and downstream states. Stronger institutional arrangements, legal frameworks, and information exchange can reduce uncertainty and support more predictable water management.

Practical priorities include:

Strengthening bilateral agreements on the joint operation, maintenance, financing, and monitoring of transboundary water infrastructure.

Moving from short-term allocation decisions towards long-term strategic planning that incorporates climate risks, demographic change, and cross-sectoral priorities.

Enhancing regional cooperation mechanisms, including the role and institutional capacity of the International Fund for Saving the Aral Sea (IFAS).

Advancing basin-level dialogue with Afghanistan, taking account of the interests of all countries sharing the Amu Darya basin.

Harmonising relevant legal and institutional frameworks and developing regional standards for water management, ecosystem protection, pollution prevention, and risk mitigation.

Strengthening joint planning and investment arrangements between upstream and downstream countries, including mechanisms for sharing costs and benefits from common infrastructure.

Mobilising Investment and Strengthening Financial Sustainability

Practical priorities include:

Prioritise investments according to expected water savings, service-quality improvements, economic returns, maintenance costs and long-term resilience.

Strengthen lifecycle costing, financial oversight and maintenance planning.

Explore appropriate private-sector participation in modernising and operating pumping stations and on-farm irrigation systems.

Assess opportunities to recover value from reservoir sediment, including its potential use in construction materials or fertilisers.

Explore desalination to improve drinking-water supply in the Caspian Sea basin where feasible.

Deploy renewable energy to power pumping stations and irrigation in remote areas where appropriate.

Coordinate public, private and external financing around clearly defined national and regional priorities.

Developing Institutional Capacity and Human Capital

Practical priorities include:

Strengthen national water institutions and basin organisations in integrated planning, water accounting and infrastructure management.

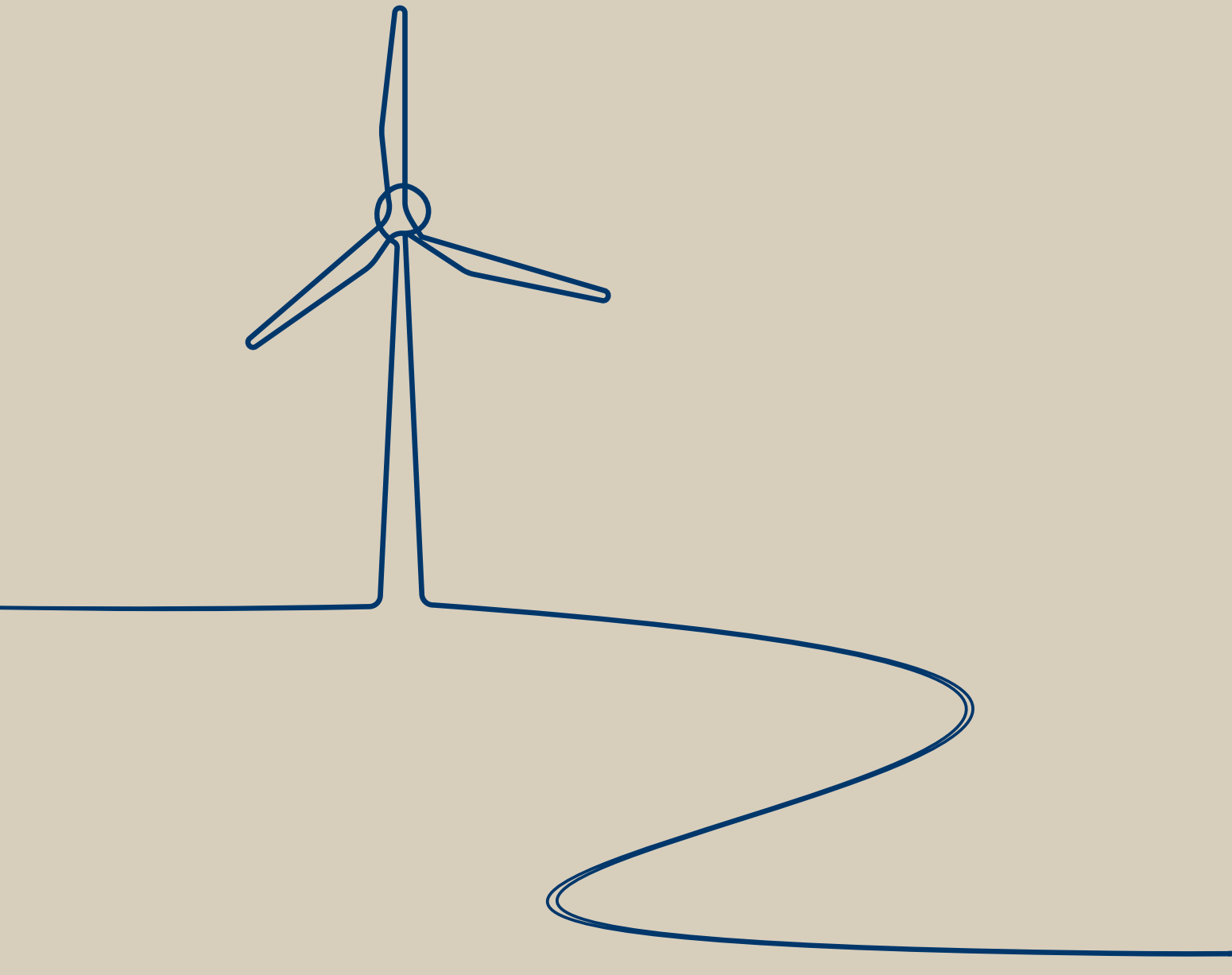
Advance the proposed Regional Centre of Competence for Water Management as a platform for scientific cooperation, research, water-saving technologies, digital monitoring and professional training.

Develop joint educational and professional programmes for water and energy specialists.

Build technical expertise in digital monitoring, remote sensing, hydrological forecasting and modelling.

CHAPTER 5.

ENERGY



Central Asia's energy future will depend on how effectively countries combine their different resource endowments, modernise infrastructure, and develop interconnected energy markets. Kazakhstan and Turkmenistan possess substantial fossil-fuel resources, while hydropower is particularly important in Kyrgyzstan and Tajikistan. Uzbekistan has significant potential to expand solar and wind generation. These differences create opportunities for regional complementarity, but also make energy security dependent on the reliability of cross-border infrastructure and cooperation.

Regional integration could reduce generation costs, improve supply reliability, and enable countries to balance seasonal demand and variable renewable generation. At the same time, rising domestic consumption, financial constraints, air pollution, and changing global demand for fossil fuels are creating pressure to modernise national energy systems.

The central challenge is therefore twofold: to ensure reliable and affordable energy in the near term, while preparing the region for a more interconnected, efficient, and lower-carbon energy system by 2050.

5.1. Key Facts and Trends

Energy Resources Are Unevenly Distributed but Potentially Complementary

Central Asia's energy resources differ significantly across countries. Kazakhstan is a major oil, gas, and coal producer; Turkmenistan is a major natural gas exporter and also produces oil; Uzbekistan combines gas production with rapidly growing domestic demand; and Kyrgyzstan and Tajikistan rely heavily on hydropower. These differences create opportunities for cooperation where infrastructure and operating arrangements allow national systems to complement one another.

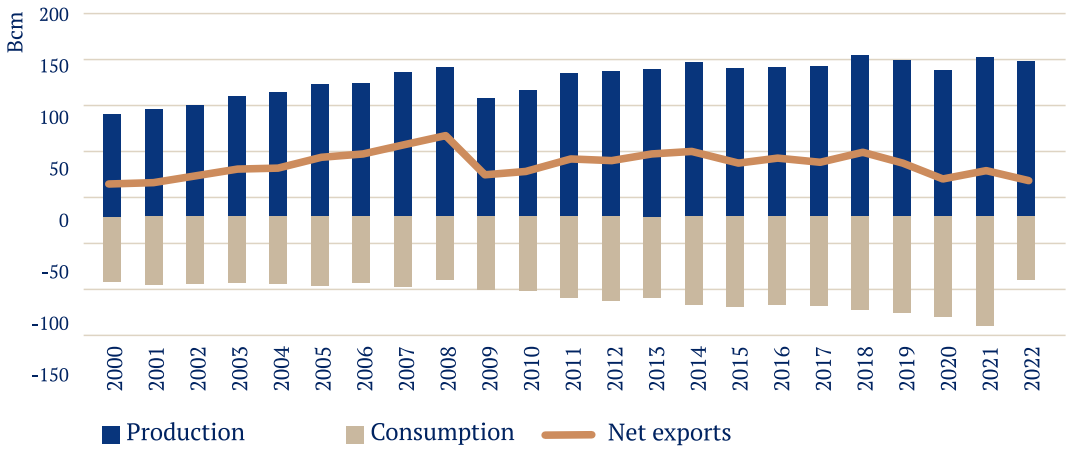


Figure 5.1. *Gas production, consumption and net exports, by Central Asian country. Source: World Bank, 2024. Note: gas production is shown in grey and consumption in yellow; the red line shows the level of gas exports.*

Natural gas reserves and production are concentrated in a small number of countries. Turkmenistan holds more than 80 percent of the region's proven gas reserves and has historically accounted for around half of its production. Uzbekistan and Kazakhstan also produce substantial volumes, while Kyrgyzstan and Tajikistan have very limited domestic gas production. Figure 5.1 presents country-level patterns of gas production, consumption, and net exports; Figure 5.3 compares energy production by country in petajoules.

The often-cited regional gas balance is a historical baseline. Central Asia produced approximately 155 billion m^3 of natural gas in 2022, of which around 108 billion m^3 was consumed domestically. More recent country-level data show that Turkmenistan produced approximately 77.6 billion m^3 in 2024, while Uzbekistan produced about 41.5 billion m^3, down from 46.7 billion m^3 in 2023. As the national figures may use different definitions, they should not be combined into a new regional total without checking methodological consistency (U.S. International Trade Administration, 2026; National Statistics Committee of Uzbekistan, 2025).

Electricity generation reflects different national resource endowments. Hydropower is particularly important in Kyrgyzstan and Tajikistan, while fossil-fuel generation remains significant in Kazakhstan, Turkmenistan, and Uzbekistan. Solar and wind resources offer opportunities to diversify the regional energy mix, especially where high solar irradiation and strong wind potential can be connected to reliable transmission networks.

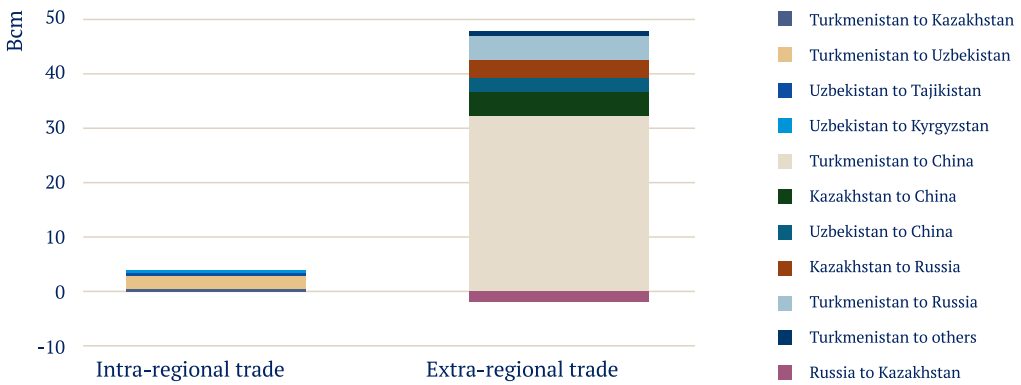


Figure 5.2. *Intra- and extra-regional gas trade in Central Asia, 2022. Source: Energy Institute, Statistical Review of World Energy 2024; International Energy Agency.*

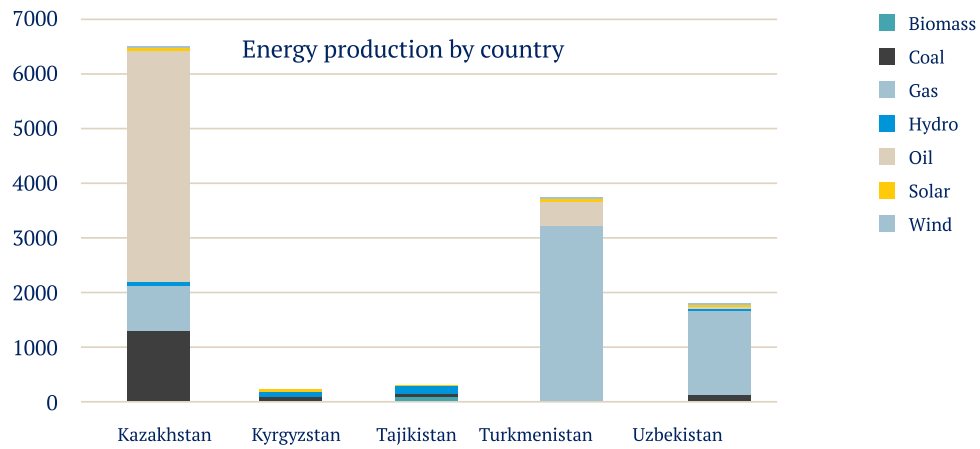


Figure 5.3. *Energy production by country, 2025, PJ.*

Oil Exports Connect the Region to Global Markets

Kazakhstan dominates Central Asia's oil exports. Kazakhstan exported approximately 78.7 million tonnes of oil in 2025, of which 64.8 million tonnes–around 82 percent–moved through the Caspian Pipeline Consortium (CPC) system across Russian territory to the Black Sea. Alternative routes through pipelines, Caspian ports, and connections towards China provide some diversification, but remain much smaller than the CPC corri-

dor (Ministry of Energy of Kazakhstan, 2026).

Concentrated export routes link oil revenues to transport reliability. A disruption affecting a major pipeline or terminal can affect export performance even when oil production remains available. The concentration of exports also makes route diversification and the commercial viability of alternative corridors relevant to Kazakhstan's economic resilience.

Turkmenistan is also an oil producer, although its sector is smaller than Kazakhstan's. Turkmenistan produced approximately 8.3 million tonnes of oil in 2024. Around half of its output is consumed domestically, while the remainder is exported across the Caspian Sea to international markets (U.S. International Trade Administration, 2026). Oil therefore connects the region to global markets primarily through export earnings and transport corridors, rather than through extensive intra-regional trade.

Natural Gas Trade Is Becoming More Two-Way

China remains a major market for Central Asian gas. In 2025, Turkmenistan, Kazakhstan, and Uzbekistan supplied approximately 38 billion m^3 of pipeline gas to China, compared with around 40 billion m^3 in 2024. Turkmenistan remained the principal Central Asian supplier (GECF, 2026).

Competition among suppliers is changing the external market. Russian pipeline gas deliveries to China reached approximately 39 billion m^3 in 2025, slightly exceeding the combined volume supplied by the three Central Asian countries. These figures illustrate the changing pattern of external supply, rather than a decline in China's importance as a market for Central Asian gas (GECF, 2026).

Intra-regional gas trade remains modest compared with external flows. Figure 5.2 records less than 3 billion m^3 of trade among the five Central Asian countries in 2022. Although this is a historical snapshot, it illustrates the potential to strengthen regional exchange where production, infrastructure, contractual arrangements, and domestic demand allow.

Rising Electricity Demand Increases the Value of Interconnection

Electricity demand is expected to grow substantially. A regional assessment by the Eurasian Development Bank projects that electricity demand could increase by approximately 40 percent by 2030, reflecting population growth, urbanisation, rising incomes, and economic development (Eurasian Development Bank, 2026).

Modernisation is needed alongside new generation. Ageing power plants and grid infrastructure, together with high losses in some networks, can constrain reliability and increase system costs. Expanding generation without upgrading the networks needed to transport and balance electricity may limit the benefits of new investment (Eurasian Development Bank, 2026).

Regional connections could help countries manage differences in resources and seasonal demand. Hydropower can support electricity balancing, but output depends on seasonal water availability. Stronger cross-border connections, reliable data, compatible technical standards, and transparent trading arrangements could help countries share available capacity and reduce the need for every national system to provide independently for each peak-demand period.

Energy Security, Affordability, and Environmental Quality Are Interconnected

Energy choices affect household welfare and economic competitiveness. Energy prices, reliability, and efficiency influence household affordability, industrial costs, and the delivery of public services. Inefficient buildings, heating systems, and industrial processes increase demand and can put additional pressure on infrastructure.

Air pollution remains an important concern in several urban areas. Reliance on coal and other high-emission fuels contributes to poor air quality. Cleaner generation and heating, improved energy efficiency, and gradual

technology upgrades can help reduce pollution while limiting pressure on energy supply.

Energy planning is closely connected to water management. Hydropower depends on the timing and availability of water, while irrigation, pumping, and water distribution also require energy. Considering water and energy together can help anticipate seasonal constraints and reduce the risk that decisions in one sector create additional pressures in another.

5.2. Risks and Uncertainties

National Energy Pathways Depend on Policy Choices and Regional Conditions

The modelled pathways illustrate possibilities rather than guaranteed outcomes. The World Bank energy system model compares a reference scenario with a low-carbon development scenario for 2025–2050. Outcomes depend on assumptions about technology, investment, demand, and policy. Changes in the ratio of energy exports to domestic supply should not be interpreted directly as forecasts of crude-oil export volumes or export revenues.

Kazakhstan faces uncertainty in fossil-fuel markets and the pace of diversification. Under the Low Carbon Scenario, energy exports relative to domestic supply could decline substantially as international markets shift towards lower-carbon energy. Wind and solar could create new opportunities for electricity exports, while renewables could rise from a very small share of supply to more than 60 percent by 2050. Outcomes will depend on technology costs, grid capacity, investment, and developments in oil, gas, and coal markets.

See Figure 10.1: Kazakhstan–energy security and regional electricity trade. Source: World Bank energy system model.

Kyrgyzstan's hydropower opportunities depend on financing, implementation, and water availability. In the low-carbon pathway, Kyrgyzstan could move from importing a substantial share of its energy to becoming a net exporter by 2050. Hydropower capacity could expand by more than 4 GW, including through projects

such as Kambarata-1, while solar could complement hydropower. These outcomes depend on timely project delivery, financing, environmental and social safeguards, domestic demand, and seasonal water availability.

See Figure 10.2: Kyrgyzstan–energy security and regional electricity trade. Source: World Bank energy system model.

Tajikistan could reduce energy-import dependence, but diversification will require investment. The Low Carbon Scenario indicates that increased domestic renewable generation could reduce imports and create opportunities for electricity exports. Petroleum-product imports could fall substantially, and solar generation could increasingly complement hydropower. The extent of these changes will depend on investment, transmission capacity, water availability, and access to domestic and neighbouring markets.

See Figure 10.3: Tajikistan–energy security and regional electricity trade. Source: World Bank energy system model.

Turkmenistan's long-term gas outlook depends on external demand and diversification. Natural gas is likely to remain strategically important, but future export prospects will depend on demand in major importing markets, investment in production and transport, and domestic energy needs. The Low Carbon Scenario allows for a substantial increase in renewables by 2050, while uncertainty around gas demand becomes more pronounced over the longer term.

See Figure 10.4: Turkmenistan–energy security and regional electricity trade. Source: World Bank energy system model.

Uzbekistan faces uncertainty around rising demand and future import exposure. Under the reference scenario, net energy-import dependence could rise markedly by 2050. Expanded domestic renewable generation could keep this dependence substantially lower under the Low Carbon Scenario, with a large increase in solar and wind generation. The future roles of natural gas, nuclear power, and other sources will depend on investment, domestic demand, technology development, and the need to maintain reliable supply.

See Figure 10.5: Uzbekistan–energy security and regional electricity trade. Source: World Bank energy system model.

Export Routes and External Markets Create Shared Exposure

Oil export concentration creates vulnerability to transport disruptions. In 2025,

approximately 82 percent of Kazakhstan's oil exports moved through the CPC route. Interruptions, operational constraints, or geopolitical developments affecting this corridor could affect export revenues beyond the energy sector. Alternative routes may improve resilience, but their capacity, cost, and commercial viability need to be assessed realistically.

Natural gas export patterns are changing. Central Asian pipeline deliveries to China declined from around 40 billion m^3 in 2024 to approximately 38 billion m^3 in 2025, while Russian deliveries to China rose to about 39 billion m^3. At the same time, Russian gas deliveries to Uzbekistan increased to 6.48 billion m^3 in 2025. Future patterns will depend on domestic consumption, production trends, existing contracts, pipeline availability, and external demand (GECF, 2026; UzDaily, 2026).

New export infrastructure carries long-term market and financing uncertainty. The proposed Line D pipeline could influence future export opportunities, but its prospects depend on demand, financing, implementation, and the distribution of costs and benefits among participating countries. A regional gas hub could support price discovery and trade, but would require sufficient supply, storage, connectivity, transparent commercial arrangements, and confidence among market participants.

Rising Demand and Ageing Infrastructure Could Put Pressure on Supply

Demand may outpace infrastructure upgrades. The Eurasian Development Bank projects that electricity demand could rise by about 40 percent by 2030 and identifies significant wear in parts of the region's power-generation and grid infrastructure. If investment lags behind demand, countries could face more frequent shortages, higher costs, and constraints on integrating new generation (Eurasian Development Bank, 2026).

Seasonal shortages may persist while new capacity is being developed. Winter gas and electricity shortages can arise when demand peaks, infrastructure is constrained, or domestic supply is insufficient. Additional hydropower in Kyrgyzstan and Tajikistan and solar and wind generation in Uzbekistan could ease some pressures, but project delays, financing constraints, and lower-than-expected output could prolong them.

Regional electricity exchange can help, but only where systems are connected and trading arrangements are reliable. Cross-border trade and coordinated system planning could help manage differences in seasonal demand. The benefits will depend on adequate transmission, dependable commercial arrangements, and confidence in the operation of interconnected systems.

Climate and Water Variability Add Uncertainty to Energy Planning

Hydropower output is sensitive to changes in water availability. Changes in precipitation, glacier melt, drought, and the timing of river flows may affect both the amount and seasonal distribution of water available for generation in Kyrgyzstan and Tajikistan. Water releases also affect irrigation and other downstream uses, making it important to consider energy and water planning together.

Variable renewable generation requires complementary investment. Solar and wind can diversify supply and reduce fuel use, but their integration at scale requires transmission capacity, storage, flexible generation, accurate forecasting, and cross-border balancing arrangements. Without these supporting investments, additional renewable capacity may not translate into equivalent improvements in reliability or affordability.

Financing and Market Arrangements Could Slow Modernisation

Weak financial performance and uncertain rules can deter investment. Unclear price signals, inconsistent regulation, and limited access to reliable data can make projects more difficult to finance. The constraints affect renewable generation as well as the maintenance of existing power plants, grids, gas pipelines, storage, and heating systems.

Physical interconnections alone do not guarantee effective regional trade. Differences in tariffs, technical requirements, trading rules, and market structures can make cross-border exchange difficult even where infrastructure exists. Clear com-

mercial rules, better data exchange, and joint planning could help countries identify cooperation that delivers practical benefits while respecting national priorities.

The pace of transition is itself uncertain. A regional assessment highlights the importance of combining modernisation of existing conventional generation with phased renewable expansion, storage, grid upgrades, digitalisation, and regional integration. Maintaining existing systems without modernisation, or expanding renewables without supporting infrastructure, could both leave important reliability and affordability challenges unresolved (Eurasian Development Bank, 2026).

Air Quality, Affordability, and the Social Effects of Transition Require Attention

Reducing pollution needs to be compatible with affordable energy. Cleaner generation and heating, higher energy efficiency, and gradual technology upgrades can improve air quality, but measures should account for households that have limited capacity to change fuels or invest in more efficient equipment.

The transition could affect workers and regions unevenly. Communities and businesses that depend on oil, gas, and coal may face changes in investment and external demand, while new jobs may emerge in renewables, grids, storage, and energy services. Training, retraining, and support for affected workers and communities can help make this transition more inclusive.

The scenarios highlight choices, not one inevitable future. Central Asia's energy outlook will depend on investment, policy implementation, technology development, climate conditions, and international markets. A measured approach that improves reliability and efficiency, gradually diversifies energy sources, strengthens export-route resilience, and expands regional cooperation where it adds value can help countries manage these uncertainties.

5.3. Recommendations

Many aspects of Central Asia's energy security are regional in nature, even though policies and investment decisions are generally made at the national level. Electricity systems, gas networks, oil-export routes, seasonal demand and water availability are connected in different ways. Countries also have complementary energy profiles: some have substantial hydropower potential, others have strong solar and wind resources, while Kazakhstan and Turkmenistan are important producers and exporters of hydrocarbons. A regional approach could help countries make better use of these differences, strengthen energy-system resilience and manage risks associated with disconnected planning, infrastructure bottlenecks and changing global markets. Oil has a somewhat different regional role from electricity and gas: its importance lies especially in export revenues, transport corridors and exposure to disruptions in transit infrastructure.

A useful starting point may be to strengthen the practical foundations for a more connected regional market, through: coordinated planning, reliable cross-border infrastructure, compatible rules, transparent data, investable projects and a standing mechanism for collective decision-making.

Strengthen Regional Energy Planning and Cross-Border Trade

Regional trade can help improve reliability, moderate the cost of meeting peak demand and make more effective use of existing generation and network capacity. Differences in seasonal demand and energy resources may create opportunities for exchange, particularly where countries coordinate plans and develop predictable technical and commercial arrangements.

Practical priorities include:

Considering a regional energy-planning framework that brings together forecasts for electricity and gas demand, generation capacity, transmission, storage and major infrastructure investments.

Exploring opportunities to expand cross-border electricity and gas trade, including exchanges that respond to seasonal peaks, temporary

surpluses and supply disruptions.

Strengthening coordination, where useful, between hydropower generation, downstream electricity demand and seasonal water-management requirements.

Identifying bottlenecks in interconnectors, transmission networks and gas pipelines, and assessing which upgrades may offer the greatest benefits relative to cost.

Where relevant, sharing information on the resilience of major oil-export and transit corridors, recognising that oil flows are primarily oriented towards external markets and depend on distinct commercial and transport arrangements.

Assessing the feasibility of a regional electricity-trading platform and the market rules, infrastructure and safeguards that could support transparent gas trading.

Reviewing earlier estimates of potential benefits of up to US$6.4 billion over 2020–2030 as one input to evaluating the gains from regional electricity trade, while making the underlying assumptions explicit.

Explore Renewable Energy as a Complementary Regional Portfolio

The region's renewable resources are distributed unevenly, which may create opportunities for countries to complement one another's strengths and avoid unnecessary duplication. Solar and wind can expand rapidly in resource-rich countries, while hydropower can provide valuable flexibility and balancing capacity when water availability permits. The benefits would depend on connected grids, adequate storage, coordinated dispatch and investment decisions that take regional demand into account alongside domestic needs.

Practical priorities include:

Exploring ways to coordinate solar and wind development with resource potential, grid readiness and regional electricity demand.

Taking seasonal water needs, downstream interests and opportunities for regional electricity exchange into account when planning hydropower projects in Kyrgyzstan and Tajikistan.

Considering improvements to cross-border transmission so that renewable electricity can reach markets where and when it is needed.

Assessing the role of battery storage and other balancing solutions, particularly where variable renewable generation is growing faster than dispatchable capacity.

Assessing major generation projects not only on national benefits, but also on their potential regional contribution to reliability, flexibility and affordable supply.

Seeking greater alignment between renewable energy expansion, energy-efficiency measures, emissions objectives and long-term investment plans across the five countries.

Invest in Infrastructure and Strengthen System Resilience

Reliable infrastructure would help countries capture more of the potential benefits of regional integration. Ageing grids, constrained transmission, gas-network bottlenecks and inadequate storage can limit trade and increase exposure to seasonal shortages. Oil-export infrastructure presents a related but distinct resilience question, since disruptions to major pipelines, terminals or transit routes can affect export revenues even when domestic energy supply is not directly constrained. A joint assessment of regional needs could help guide investment, including by considering how infrastructure performs under extreme weather, changing demand and disruptions to export or transit routes.

Practical priorities include:

Considering upgrades to electricity grids and cross-border interconnectors to improve reliability and accommodate additional renewable generation.

Assessing where gas transmission and distribution networks could be upgraded and cross-border flows better coordinated.

Reviewing gas-storage needs and options for helping manage seasonal demand and supply interruptions.

Developing, where feasible, shared approaches to system adequacy, emergency communication, backup capacity and strategic reserves.

Continuing to improve energy efficiency across buildings, transport and industry, which could ease pressure on generation and network investment.

Promoting cleaner heating, including heat pumps and efficient centralised heat supply where technically and economically appropriate.

One proposal envisages a regional underground gas-storage programme with total capacity of 12–15 billion m^3. The facilities identified include expansion of Gazli to 10 billion m^3, restoration of Sokh at 1.3 billion m^3, and new facilities in the Bukhara and Kashkadarya regions with capacities of 3–4 billion m^3. These proposals could be assessed together against regional demand, geological conditions, costs and the potential role of storage in cross-border supply security.

Improve Market Conditions and Encourage Regional Investment

The success of cross-border projects depends on more than physical connections. Investors also need predictable regulation, transparent prices, credible contracts and clear procedures for settling cross-border transactions. Greater compatibility between national market rules could make regional infrastructure and renewable generation easier to finance, without requiring countries to adopt identical energy policies or tariffs.

Practical priorities include:

Supporting improvements in the financial performance and accountability of energy-sector institutions, helping sustain maintenance and investment.

Considering improvements to tariff and network regulation and reviewing subsidies where appropriate, alongside well-targeted support for

vulnerable households.

Gradually developing competitive electricity-market arrangements and predictable rules for cross-border exchanges, balancing services and settlement.

Exploring a regional pipeline of priority projects, using transparent criteria to assess costs, regional benefits, financing needs and implementation readiness.

Mobilising public, development and private finance where appropriate, supported by suitable risk-sharing instruments and bankable project structures.

Supporting investment, where appropriate, in clean technologies such as heat pumps, electric vehicles, batteries, energy efficiency and grid digitalisation.

Encouraging research, technology deployment and workforce development through joint initiatives and knowledge exchange.

Exploring whether emissions trading and carbon-market instruments could be relevant as national systems and regional markets evolve.

Manage Oil and Gas Resources in a Changing Market

Oil and natural gas will remain important to several Central Asian economies, both as sources of public revenue and as components of domestic energy supply. Oil adds a distinct dimension to the regional energy picture: most oil is exported to global markets through specific pipeline, port and rail corridors, rather than traded through an integrated regional market. Kazakhstan is the region's principal oil exporter. In 2025, it exported approximately 78.8 million tonnes of oil and gas condensate, of which 64.8 million tonnes – around 82 percent – were transported through the Caspian Pipeline Consortium system. Turkmenistan produced approximately 8.28 million tonnes of oil in 2024; around half of its oil production is consumed domestically, with the remainder exported across the Caspian Sea. These patterns underline the importance of export-route resilience and the risks associated with reliance on a limited number of corridors.

Practical priorities include:

Considering oil and gas production, domestic demand, export commitments and infrastructure plans together, so that national decisions can take account of their regional implications.

Evaluating opportunities to diversify oil-export and transit routes where commercially and technically viable, with attention to costs, capacity, environmental implications and geopolitical risks.

Exploring improvements to the reliability and efficiency of existing oil and gas infrastructure, including measures to reduce losses, methane emissions and operational risks.

Appraising proposed pipelines and other export infrastructure against a range of demand scenarios, financing costs and the risk that assets may be underused over time.

Considering cross-border gas exchange where it could improve supply security and is consistent with available production, storage and network capacity.

Exploring ways to prepare for changes in global oil and gas demand, including economic diversification, improved energy efficiency and alternative sources of growth and employment.

Encouraging both energy-exporting and energy-importing countries to participate in regional dialogue on infrastructure, market risks and the longer-term transition.

Considering how oil-exporting countries can strengthen economic resilience to changes in global oil demand and prices, including through fiscal planning, value-added activities and broader economic diversification.

Address Air Pollution and Support an Inclusive Transition

Air pollution and the social consequences of energy restructuring extend beyond

individual national borders. Reliance on highly polluting fuels, inefficient buildings and ageing industrial equipment affects public health and raises the cost of energy services. At the same time, changes in global demand and the deployment of new technologies may affect employment and public revenues in traditional energy sectors. A regional transition could combine cleaner energy with attention to affordability, workforce development and support for communities facing structural change.

Practical priorities include:

Taking air-quality and emissions impacts into account in energy and infrastructure planning.

Exploring opportunities to expand lower-emission generation and cleaner heating, and to reduce reliance on highly polluting fuels where practical alternatives are available.

Continuing to improve energy efficiency in buildings, transport and industry, which can help reduce household costs and peak demand.

Improving, where feasible, the monitoring and exchange of comparable data on emissions, energy use and air pollution.

Exploring regional training and retraining programmes in renewable energy, efficiency, grid operations, digital energy systems and infrastructure maintenance.

Assessing how the transition may affect employment, public revenues and energy-dependent communities, and considering targeted measures to support adaptation.

Explore a Stronger Regional Mechanism for Energy Cooperation

A more permanent mechanism could help translate regional energy dialogue into coordinated planning and follow-through. One option would be to develop an Energy Council of Central Asian States from existing meetings of energy ministers, with a clearer mandate, regular work programme and arrangements for following

up on agreed priorities. Regional energy-flow monitoring and network coordination could form part of the Council's core functions, avoiding the need for a separate institution with an overlapping mandate.

Practical priorities include:

Exploring how existing consultative meetings among energy ministers could evolve into a more permanent Energy Council of Central Asian States.

Agreeing on an appropriate mandate for monitoring regional energy flows and exchanging reliable data on production, consumption, capacity, prices and cross-border trade, with information-sharing on major oil-export corridors where this adds value to regional risk assessment.

Considering a shared pipeline of regional energy projects, supported by transparent appraisal criteria, financing plans, responsible institutions and implementation milestones.

Developing practical procedures for following up on decisions and resolving operational issues, while respecting national regulatory responsibilities.

Assessing, over time, whether a more integrated regional energy market and greater alignment of tariff principles would be feasible; any proposal for a single tariff policy by 2040 would require further discussion of its scope and implications.

Implementation Priorities for Regional Energy Integration

A regional approach could proceed through a practical sequence of shared actions:

1. **Strengthen planning and data exchange** by developing compatible energy forecasts, monitoring cross-border flows and assessing infrastructure needs at the regional level.

2. **Build opportunities** for mutually beneficial trade through electricity and gas interconnections, transparent market arrangements and seasonal exchange.
3. **Support a complementary low-carbon system** by linking solar, wind and hydropower development with transmission, storage and energy efficiency.
4. **Strengthen resilience and manage risks** by upgrading infrastructure where needed, reviewing storage options and assessing exposure to external markets and transit corridors, including the concentration of oil exports along a small number of routes.
5. **Encourage investment** through predictable regulation, stronger project preparation, compatible market rules and clear assessment of regional benefits.
6. **Support people and communities** by addressing air pollution, energy affordability and the workforce implications of structural change.
7. **Strengthen regional follow-through** through an agreed mechanism, potentially an Energy Council, with a clear mandate, work programme and measurable implementation milestones.

A Regional Low-Carbon Pathway

The modelled country pathways illustrate the scale of change that may be possible if national investment is accompanied by greater regional integration. An important opportunity lies not only in increasing renewable capacity in each country, but also in improving how generation, transmission, storage, demand and trade are considered together. These electricity and low-carbon projections complement, rather than replace, the separate consideration of oil-export exposure and the future of hydrocarbon revenues.

Under the modelled Low Carbon Scenario:

Electricity generation could more than quadruple by 2050, with installed renewable energy capacity potentially reaching 655 GW.

Solar capacity could grow nearly thirtyfold, led by Uzbekistan and Kazakhstan, while wind capacity could increase more than fifteenfold.

Hydropower generation could increase more than elevenfold, with projects including Rogun and Kambarata contributing to the wider regional system, subject to hydrological conditions and coordinated operation.

Battery storage could support grid balancing from around 2030, particularly in countries where variable renewable generation expands and hydropower flexibility is more limited.

Electric vehicles and heat pumps could become much more widespread. The scenario indicates potential for up to 20 million electric vehicles by 2050 and heat pumps in more than half of households.

Energy efficiency could reduce energy consumption by up to 30 percent, with final consumption projected to decline by roughly one-third under the scenario assumptions.

Employment patterns could change significantly. Regional investment in renewables, grids, storage and energy services could create new opportunities while traditional coal, oil and gas industries adjust to changing demand.

These projections illustrate one possible pathway rather than a guaranteed outcome. Their realisation will depend on investment, technology costs, implementation capacity, national policy choices and the evolution of international energy markets. Regional cooperation could help support this pathway by enabling countries to plan infrastructure together, share flexibility, manage costs and make better use of complementary energy resources.

Central Asia's energy future will be shaped by both national choices and the quality of connections between countries. A more connected regional system could strengthen supply security, widen access to markets, support a lower-carbon transition and help reduce exposure to external shocks. Realising these benefits would be helped by national reforms alongside regional planning, transparent markets and a suitable mechanism for turning shared priorities into practical action.

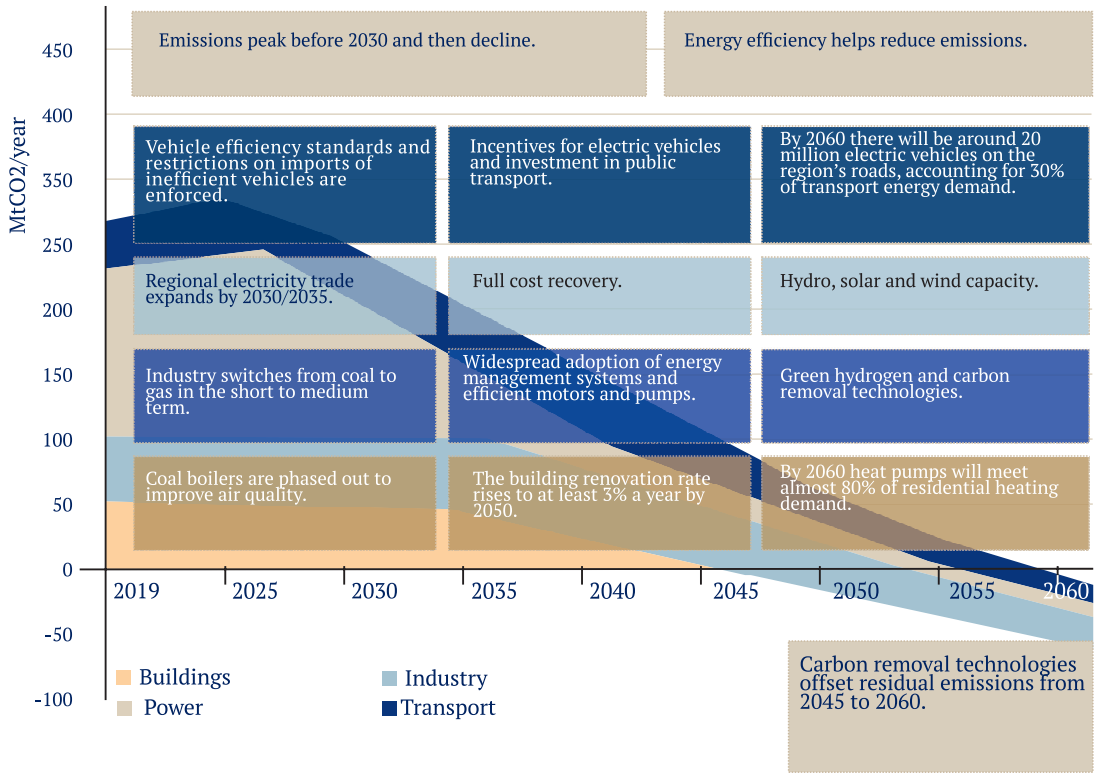
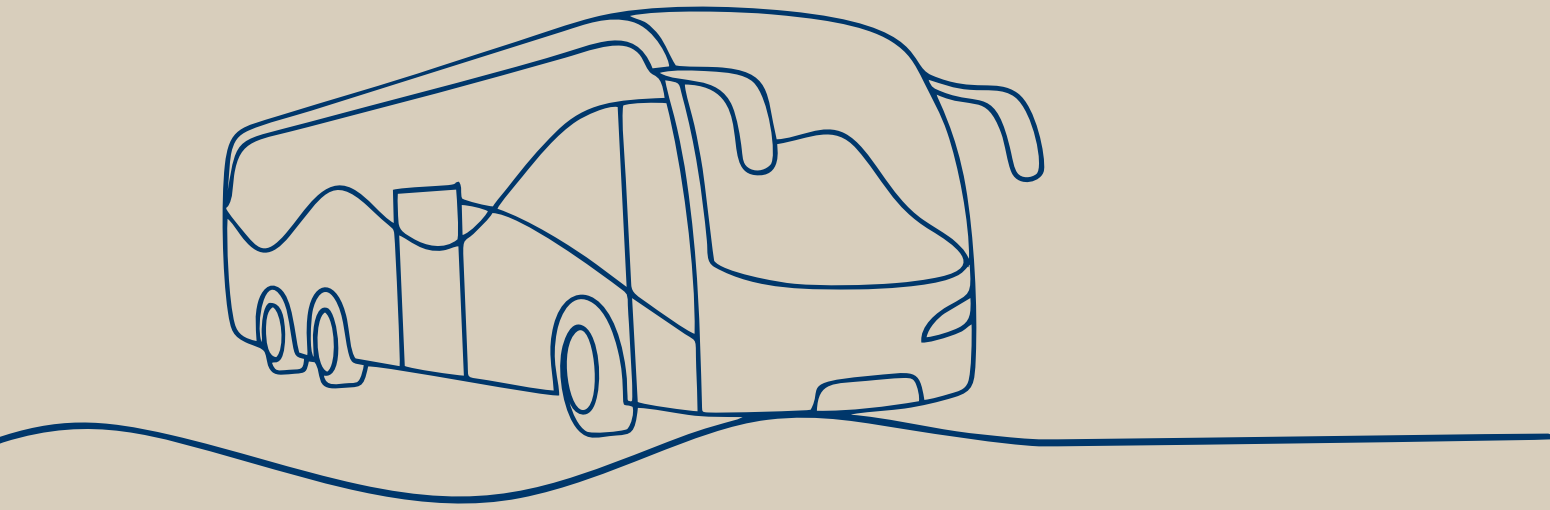


Figure 5.4. *Low-carbon policy pathway in Central Asia: key milestones and opportunities. Background: total emissions by sector (MtCO2eq). Source: World Bank energy system model. Note: the chart focuses on the main energy-consuming sectors and does not cover emissions from mining, agriculture, hydrogen production or energy-sector own use.*

CHAPTER 6.

TRANSPORT CONNECTIVITY



6.1. Key Facts and Trends

Central Asia's location between Europe and East Asia gives the region an important role in Eurasian trade. Historically connected by the Silk Road, the five countries are now seeking to modernise transport corridors, logistics services and domestic networks to meet changing trade patterns. As all five countries are landlocked, reliable connections to international markets are particularly important for trade diversification, economic development and access to global supply chains.

Central Asia's Transit Potential Remains Underused

The region has an important geographic advantage, but its share of Eurasian trade remains limited. Annual trade between Europe and East Asia exceeds $1.5 trillion, while Central Asia's share is estimated at less than 3 percent. Infrastructure gaps, border procedures, regulatory differences and limited coordination constrain the region's ability to capture a larger share of these flows.

Several transport corridors are developing in parallel. The main routes include the Trans-Caspian or Middle Corridor, Southern and North–South connections, and proposed Trans-Afghan links. Each offers different access to markets and ports, while their value to the region depends on how effectively they connect with one another and with national road and rail networks.

The Middle Corridor has expanded rapidly. The route crosses Kazakhstan and the Caspian Sea and provides an alternative connection between China and Europe. Cargo traffic increased from 0.8 million tonnes in 2021 to 4.5 million tonnes in 2024, with traffic projected to reach 10 million tonnes by 2030. Some assessments suggest that, for particular shipments and route conditions, it can shorten delivery times compared with maritime transport. Its reliability will depend on coordinated port, rail, ferry and border operations across the corridor.

Southern routes could improve access to the Indian Ocean and South Asian mar-

kets. Proposed connections would link Central Asia with ports in Iran and Pakistan and create additional options for trade with China, India, the European Union and markets beyond the region. Their commercial value will depend on infrastructure completion, security, border arrangements and competitive transit costs.

New Rail and Road Links Could Expand Regional Connectivity

The China–Kyrgyzstan–Uzbekistan railway could create a new east–west connection. The proposed railway is approximately 532.5 km long and could connect with wider Caspian and southern routes. Integration with Iran's rail network, within the relevant regional transport frameworks, has been estimated to reduce the East Asia–Europe route by around 900 km and delivery times by 7–8 days. These benefits will depend on the final route, operating arrangements and effective connections to other networks.

Road links can complement the railway network. The China–Tajikistan–Uzbekistan highway and other cross-border road improvements could broaden access to markets in the Caucasus, Turkey, Iran and South Asia. Their contribution will depend not only on physical infrastructure but also on maintenance, border-crossing capacity and harmonised transport procedures.

The Trans-Afghan railway could become an important link between Central and South Asian markets. Preliminary estimates by EY indicate potential freight volumes of up to 22 million tonnes annually by 2030, rising to 34 million tonnes by 2040, with a substantial share expected to consist of transit cargo. These projections remain subject to the completion of feasibility studies, the availability of financing, security conditions and the development of commercially viable freight flows.

Logistics Infrastructure Is Expanding, but Connectivity Remains Uneven

New logistics facilities are strengthening national and cross-border networks. Kazakhstan's Khorgos dry port has a reported annual capacity of 500,000 twenty-foot equivalent units (TEU). In Uzbekistan, the 123 km Angren–Pap railway has shortened the route to the Fergana Valley by approximately 295 km. Plans for a multimodal hub in the Tashkent region envisage capacity of 150,000 TEU per year, alongside proposed centres in Jizzakh and Syrdarya.

Road quality remains a constraint in some mountainous countries. More than 30 percent of highways in Kyrgyzstan and Tajikistan are reported to be unsuitable for year-round use. Seasonal access constraints can raise transport costs, disrupt supply chains and limit opportunities for remote communities and businesses.

The region's transport performance varies across countries. World Bank Logistics Performance Index data for 2023 placed Kazakhstan 79th out of 139 economies, Uzbekistan 88th, Tajikistan 97th and Kyrgyzstan 123rd. The differences point to scope for improvements in logistics services, border processes, infrastructure quality and the predictability of transport operations throughout the region.

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Digitalisation and Multimodal Transport Are Increasingly Important

Regional connectivity depends on more than new infrastructure. Electronic documentation, compatible data systems, efficient customs procedures and predictable transit rules can reduce delays and transaction costs across existing routes. Greater use of digital tools can also improve cargo visibility and help logistics operators plan routes and capacity more efficiently.

Greater use of rail and multimodal solutions could improve efficiency. Road transport accounts for an estimated 70 percent of regional freight turnover. This reliance creates an opportunity to expand rail and combined road–rail transport where routes, cargo types and service quality make them competitive. Such a shift could also support the region's environmental objectives.

Domestic and rural connectivity remains an essential part of the regional agenda. International corridors will have broader economic effects when local roads, rail services and logistics centres connect rural and mountainous areas to markets, employment and essential services. Investments in local access can help ensure that the benefits of transit growth extend beyond major hubs.

6.2. Risks and Uncertainties

Geopolitical and Route Concentration Risks Could Disrupt Trade

The region's transport options remain exposed to external developments. Routes through Russia, the Caucasus, the Caspian Sea, Iran and Afghanistan are affected by different geopolitical, security and regulatory conditions. Sanctions, conflict, border restrictions or disruptions at ports and crossings can change travel times, costs and the relative attractiveness of routes.

Multiple corridors do not automatically provide effective diversification. Alternative routes are useful only when they have sufficient capacity, predictable operating conditions and competitive prices. Differences in rail gauges, customs systems, technical standards, port handling and ferry availability may limit how easily cargo can move between corridors.

Financing Needs Are Large and Investment Capacity Is Uneven

Modernising the region's transport system will require substantial investment. An Asian Development Bank estimate cited in the chapter puts regional transport investment needs through 2030 at approximately $500 billion. Between 2001 and 2024, 22 transport projects were implemented under the CAREC framework, with a total value of $6.1 billion. China has invested more than $20 billion through the Belt and Road Initiative, while the European Union has announced plans to invest up to €10 billion in developing the Trans-Caspian route under its Global Gateway programme.

Financing is concentrated in some countries. Where external investment relies heavily on a single partner, large projects may move forward, but fiscal exposure and dependence on particular financing conditions can increase. Diversifying funding sources and strengthening project preparation can improve resilience and help countries select projects according to regional value as well as national priorities.

Infrastructure ambitions may exceed the resources available for implementation and maintenance. New railways, highways, ports and logistics centres require ongoing operating expenditure as well as capital investment. Without realistic demand forecasts, transparent procurement and adequate maintenance budgets, new facilities may not deliver their expected economic returns.

Institutional and Operational Barriers May Limit Corridor Performance

Border procedures can reduce the benefits of physical infrastructure. Delays, duplicative documentation, inconsistent inspections and differences in transit rules may create costly bottlenecks even where roads and railways are in good condition. The lack of interoperable digital systems can further limit cargo tracking and predictable delivery times.

National projects may not be synchronised across borders. Infrastructure built in one country may deliver limited benefits if connecting sections, border terminals, schedules or operating rules in neighbouring countries are not ready at the same time. Inconsistent tariffs and access conditions can also discourage operators from using regional routes.

Differences in logistics performance point to uneven institutional capacity. The reported 2023 Logistics Performance Index rankings vary considerably across the region. Improving performance will require sustained attention to customs, logistics services, infrastructure reliability and the capacity of public agencies to coordinate with each other and with private operators.

Climate, Environmental and Social Pressures Require Attention

The current freight mix creates scope for lower-emission transport, but the transition will take time. Road transport's large share of freight turnover indicates potential to expand rail and multimodal services. However, shifting cargo between modes will require reliable rail services, suitable terminals, competitive prices and connections that meet businesses' needs.

Climate and terrain can affect infrastructure reliability. Mountainous roads and exposed transport links are vulnerable to severe weather, seasonal closures and physical damage. Resilience measures and maintenance planning are important for keeping routes dependable throughout the year.

Benefits may concentrate around major corridors unless local links are improved. Large infrastructure investments can expand transit and trade, but rural and mountainous communities may gain less if local access roads, public transport and connections to logistics centres remain weak. Planning should consider accessibility and distributional effects alongside freight volumes and transit revenues.

6.3. Recommendations

Central Asia's transport agenda would benefit from a region-wide approach that connects national infrastructure plans, improves the performance of existing corridors and develops additional routes where they offer clear economic value. Cooperation need not mean that every country follows the same model: the aim is to make national investments work better together, widen access to markets and improve the reliability of transport services across the region.

Coordinate Corridor Development and Improve Regional Connectivity

A connected network of east–west, north–south and trans-Caspian routes could give the region more options for reaching international markets. The greatest benefits will come when new infrastructure complements existing corridors and when capacity, border operations and schedules are planned with neighbouring countries.

Practical priorities include:

Coordinating national transport plans to identify missing links, capacity constraints and opportunities to connect the Middle, Southern, North–South and Trans-Afghan routes.

Assessing new corridor proposals against expected demand, transit costs, security conditions, environmental impacts and their contribution to regional connectivity.

Synchronising cross-border rail, road, port and logistics investments so that new facilities can operate as parts of a connected network.

Improving access to the Caspian Sea and to southern ports while retaining a range of route options for different cargoes and destinations.

Encouraging regular exchange of information on corridor capacity, transit times, bottlenecks and operational disruptions.

Modernise Railways, Roads and Multimodal Logistics

Transport infrastructure should support reliable year-round movement and make it easier for businesses to combine road, rail and maritime services. Priority should be given to projects that close network gaps, improve the use of existing assets and offer benefits beyond a single national segment.

Practical priorities include:

Improving the quality and reliability of strategic roads and railways, including links serving mountainous and remote areas.

Developing multimodal centres, dry ports and container services at suitable locations, with clear links to national networks and cross-border corridors.

Improving rail capacity and service quality, including electrification and modern rolling stock where commercially and technically appropriate.

Upgrading port, ferry and terminal operations along the Trans-Caspian route to reduce avoidable delays and improve schedule reliability.

Planning maintenance and climate-resilience measures alongside new construction so that infrastructure remains usable throughout the year.

Using phased rail freight targets– including the proposed increase in rail's share of regional freight from around 30 percent to 45–50 percent by 2035–as planning benchmarks, subject to a consistent definition and baseline for the indicator.

Simplify Border Procedures and Strengthen Digital Connectivity

Efficient border operations and interoperable digital systems can increase the capacity of existing infrastructure without requiring every bottleneck to be resolved through new construction. Better coordination can also make transit times and costs more predictable for businesses.

Practical priorities include:

Expanding electronic documentation and data exchange, including the use of e-TIR and e-CMR where appropriate and agreed by participating countries.

Improving interoperability between customs, border agencies, railway operators, ports and logistics providers.

Modernising border checkpoints and cargo inspection facilities, while coordinating operating hours, inspections and traffic management across borders.

Exploring green corridors and risk-based controls for eligible freight, supported by transparent procedures and effective oversight.

Working towards compatible technical standards, licensing arrangements and transit rules through existing regional frameworks, including CAREC and TRACECA.

Tracking border-crossing times and other service indicators to identify bottlenecks and evaluate whether reforms are improving performance.

Strengthen Project Preparation and Diversify Financing

Large transport investments should be based on transparent assessment of demand, costs, maintenance needs and wider regional benefits. A diversified financing approach can help countries manage fiscal risks and attract private capital where projects have viable revenue and risk-sharing arrangements.

Practical priorities include:

Developing a transparent pipeline of priority national and regional projects, with clear project sponsors, implementation stages, financing plans and expected outcomes.

Assessing projects against economic value, connectivity benefits, environmental and social effects, resilience and lifecycle costs–not only construction costs or headline capacity.

Coordinating engagement with multilateral development banks, the European Union, China and other partners to reduce duplication and align support with regional priorities.

Expanding public–private partnerships where demand, revenue structures and risk allocation make them suitable, rather than applying the model uniformly.

Improving transparency in borrowing, procurement, contingent liabilities and project performance.

Protecting sufficient budgets for operations and maintenance so that existing and newly built infrastructure remains reliable.

Promote Greener and More Inclusive Transport

Regional transport development can support economic growth while reducing environmental impacts and improving access to markets and services. The appro-

priate mix of interventions will vary with geography, cargo patterns, infrastructure and local needs.

Practical priorities include:

Encouraging a greater role for rail and multimodal freight where these offer reliable and competitive alternatives to road transport.

Incorporating energy efficiency, emissions and environmental safeguards into transport planning and major infrastructure assessments.

Improving road safety, maintenance and all-season access, particularly in rural and mountainous areas.

Connecting local producers and communities to transport hubs through feeder roads and suitable logistics services.

Assessing how major corridors affect local employment, land use and access to services, and taking steps to ensure that benefits are shared more widely.

Supporting training for logistics, digital transport management and infrastructure maintenance as technologies and operating practices evolve.

Strengthen Regional Coordination and Shared Accountability

A sustained regional dialogue could help countries sequence investments, resolve operational problems and identify common standards while respecting national responsibilities. Existing regional mechanisms provide a starting point for more systematic cooperation.

Practical priorities include:

Developing a regional transport and digital connectivity framework that links national strategies to agreed corridor priorities and practical implementation milestones.

Considering the proposed Council for Infrastructure Development as a platform for coordinating priority cross-border projects, financing needs and delivery progress.

Exploring a dedicated financing mechanism for agreed regional projects, with transparent selection criteria and clear accountability for results.

Developing a Transport Connectivity Index tailored to regional circumstances, using comparable indicators for border delays, transit times, route reliability, logistics performance and access to markets.

Exploring gradual convergence of transport documentation, technical parameters and infrastructure-access rules where this would improve interoperability.

Evaluating proposals for a "Single Customs Area of Central Asia" through phased pilots and practical agreements on data, inspection, legal responsibilities and enforcement before considering broader implementation.

Publishing periodic progress updates on corridor performance and agreed actions, helping governments, operators and development partners assess results and adjust plans.

Implementation Priorities for Regional Transport Connectivity

The recommendations point to a shared agenda: connect national networks more effectively, improve the reliability of existing corridors, simplify border procedures and develop infrastructure that can be sustained over time. Progress can be made incrementally, beginning with practical improvements to data exchange, border operations and the coordination of projects already in development.

The priorities are to:

1. **Coordinate corridor plans and investments** so that cross-border links and logistics facilities develop in a complementary way.

2. **Improve the reliability of transport infrastructure** through targeted rail, road, port and multimodal upgrades, with maintenance and resilience built in from the outset.
3. **Make cross-border transport easier and more predictable** through digital documentation, interoperable systems and coordinated border procedures.
4. **Strengthen project quality and financing** by assessing demand, lifecycle costs, regional benefits and fiscal risks, while diversifying appropriate funding sources.
5. **Expand greener and more inclusive connectivity** by improving rail and multimodal options and linking rural and mountainous areas to wider transport networks.
6. **Build a practical regional coordination framework** with shared indicators, transparent project priorities and regular monitoring of corridor performance.

The Longer-Term Opportunity

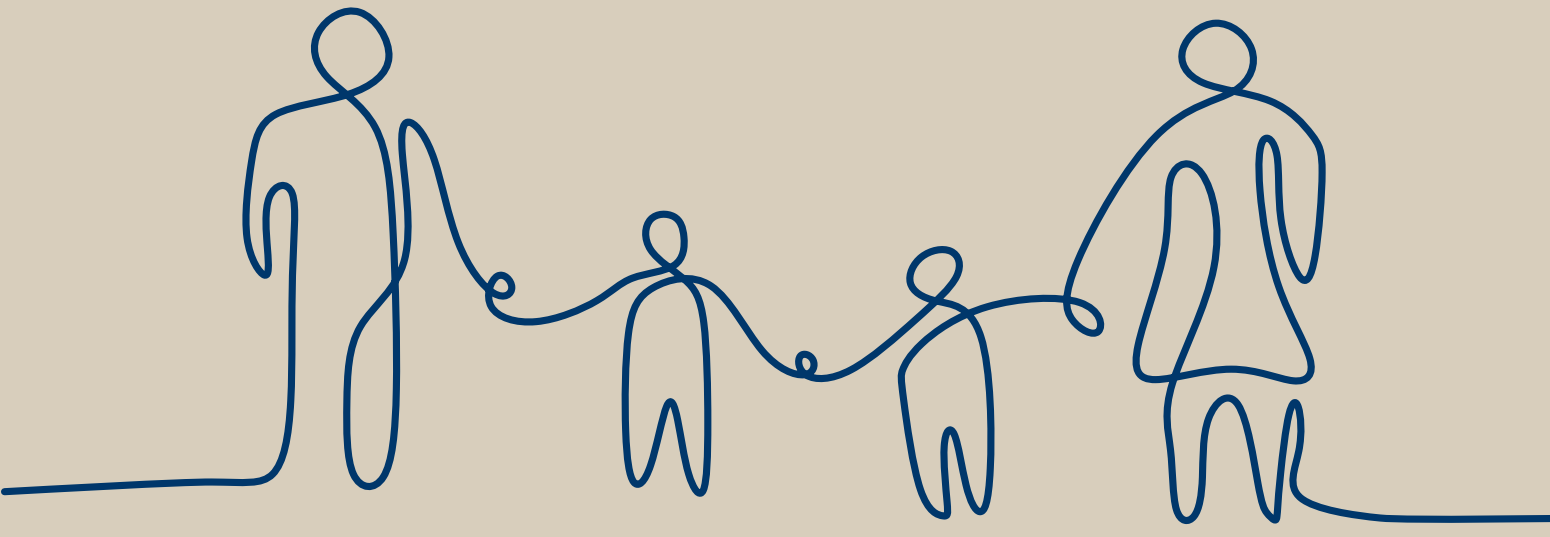
Regional assessments cited in the chapter suggest that more coordinated corridor development could substantially increase Central Asia's role in Eurasian transit. Illustrative projections include transit volumes three to four times higher by 2050, an increase in the region's share of Eurasian transit from around 3 percent to 8–10 percent, and annual transport revenues of $25–30 billion. Other projections indicate that raising rail's share of freight to 55–60 percent could reduce the sector's carbon footprint by 35–40 percent, while transport and logistics could contribute 1.5–2 percent to national GDPs each year.

These figures should be treated as scenario estimates rather than guaranteed outcomes. Realising the opportunity will depend on demand, infrastructure delivery, the security and competitiveness of routes, border efficiency and the ability of countries to coordinate investment and operations. Central Asia's potential as a transit region will therefore depend not only on building new corridors, but also on making the wider transport system more connected, reliable and accessible.

International transport routes are being actively developed across Central Asia, each with its own advantages and limitations. The strategy pursued by the region's countries centres on strengthening existing corridors along the Trans-Caspian (Middle), Southern, and North-South routes, alongside infrastructure development and the digitalisation of logistics.

CHAPTER 7.

SOCIAL TRANSFORMATION AND DEMOGRAPHIC FUTURES



7.1. Key Facts and Trends

Central Asia stands at a critical juncture in its demographic development. The region's young and growing population presents a significant opportunity for economic transformation, but realising this potential will require sustained investment in human capital, productive employment, and inclusive public services.

By 2050, Central Asia's population is projected to exceed 114 million, an increase of approximately 30 million within a single generation. According to UNDP data, the region's population grew nearly fivefold between 1950 and 2023, rising from 17.5 million to 80.8 million. Unlike many European countries and some other Asian nations, Central Asian countries continue to experience relatively high birth and fertility rates, contributing to rapid population growth and a young population structure. The region's average age is around 30. By comparison, the global and Asian populations more than tripled over the same period, while Europe's population grew by approximately 35 percent before beginning to decline after 2020.

Key demographic facts:

- **A predominantly young population:** More than 60 percent of Central Asia's population is under the age of 35, making the opportunities available to this generation central to the region's future.
- **A large youth cohort:** More than 25 million people are aged 15 – 29, a formative period during which education, skills, professional aspirations, and leadership potential develop.
- **A substantial child population:** Nearly one-third of the region's population is under the age of 14, highlighting the importance of early childhood development, education, and healthcare.
- **A growing working-age population:** By 2050, approximately 20 million young people are expected to reach working age, creating a significant opportunity to expand the labour force, strengthen innovation, and accelerate economic development.

These trends create the potential for a demographic dividend: accelerated economic growth resulting from an expanding working-age population, provided that people have the education, health, skills, and employment opportunities needed to participate productively in the economy.

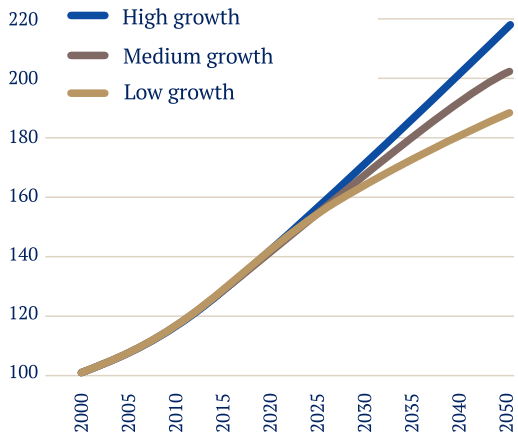


However, demographic growth does not automatically translate into prosperity. Without adequate investment in human capital and sufficient opportunities for productive employment, a growing population can intensify pressure on education and healthcare systems, social protection, infrastructure, and labour markets. The challenge for Central Asia is therefore not simply to accommodate demographic growth, but to prepare for it strategically and translate it into higher productivity, inclusive growth, and improved living standards.

Key facts:

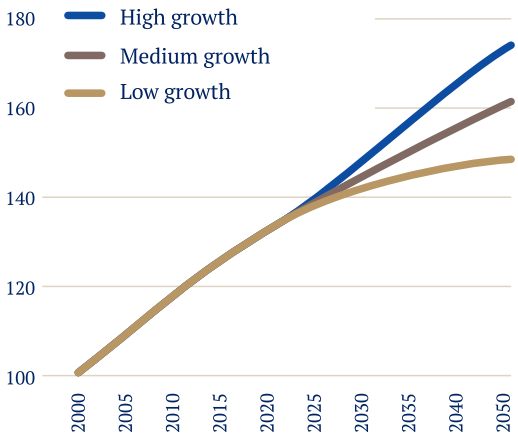
- By 2050, the number of Central Asians aged over 65 is projected to more than double.
- Healthy ageing requires investment in healthcare, lifelong learning, and opportunities for continued social and economic participation.
- Older people contribute through employment, family care, mentorship, and the preservation of cultural heritage.
- Intergenerational exchange can connect traditional knowledge with new skills and technologies.

Figure 7.1. *Current and projected population growth scenarios for Central Asia (2000–2050).*



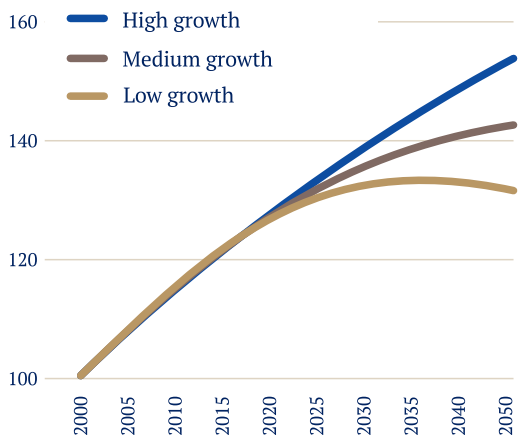
Population in 2000 = 100. UNFPA calculations based on UN DESA Population Division estimates (2000–2025) and projections under three scenarios (2024–2050).

Figure 7.2. *Current and projected population growth scenarios for the world (2000–2050).*



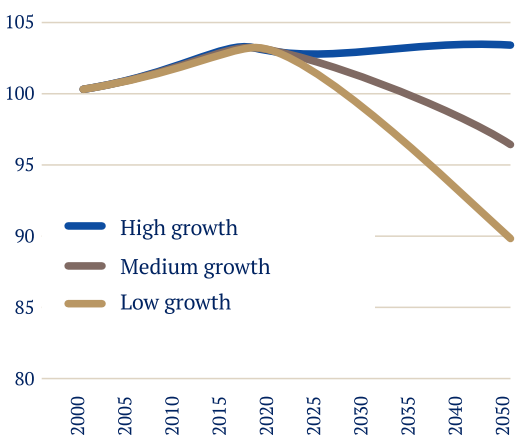
Population in 2000 = 100. UNFPA calculations based on UN DESA Population Division estimates (2000–2025) and projections under three scenarios (2024–2050).

Figure 7.3. *Current and projected population growth scenarios for Asia (2000–2050).*



Population in 2000 = 100. UNFPA calculations based on UN DESA Population Division estimates (2000–2025) and projections under three scenarios (2024–2050).

Figure 7.4. *Current and projected population growth scenarios for Europe (2000–2050).*



Population in 2000 = 100. UNFPA calculations based on UN DESA Population Division estimates (2000–2025) and projections under three scenarios (2024–2050).

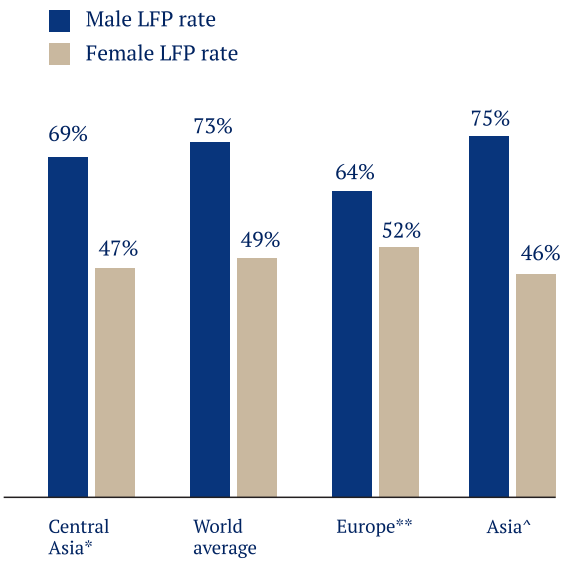


Figure 7.5. *Labour force participation rate (2024).*
Source: World Bank, World Development Indicators database (modelled ILO estimates).

** Regional average calculated using 2023 country population data from the UN Department of Economic and Social Affairs (UN DESA).*

*** Data for European Union countries.*

^ Regional average for additional regions calculated using UN DESA population data for 2023.

7.2. Risks and Uncertainties

Central Asia's demographic trajectory differs significantly from those of many other regions. Nearly one-third of its population is currently aged 0 – 14, compared with approximately 25 percent globally, 23 percent in Asia, and 16 percent in Europe.

According to demographic scenarios developed by the United Nations Department of Economic and Social Affairs (UN DESA), Central Asia's population is projected to continue growing through 2050. Even under the region's low-growth scenario, its projected population exceeds the high-growth scenarios for the world, Asia, and particularly Europe. This underscores the scale and persistence of the region's demographic transformation.

Under the medium-growth scenario, Central Asia's working-age population, defined as people aged 15 – 64, is projected to increase from 50 million to 71 million by 2050. Its share of the total population is expected to rise slightly, from 62 percent to 63 percent. By contrast, the working-age population share is projected to decline from 67 percent to 64 percent in Asia and from 64 percent to 58 percent in Europe over the same period.

This demographic trajectory could give Central Asia an important advantage at a time when other regions face population ageing and a declining

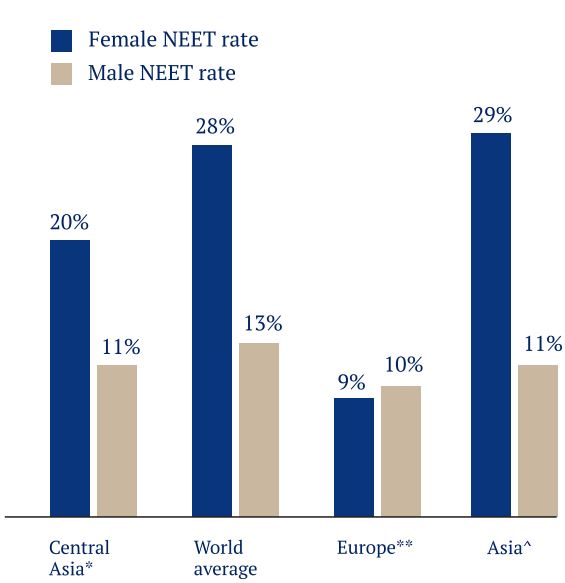


Figure 7.6. *Share of young people not in education, employment or training (NEET rate, 2024).*
Source: World Bank, World Development Indicators database (modelled ILO estimates).

** Regional average calculated using 2023 country population data from the UN Department of Economic and Social Affairs (UN DESA).*

*** Data for European Union countries.*

^ Regional average for additional regions calculated using UN DESA population data for 2023.

share of working-age people. A larger working-age population can support economic expansion, increase the potential tax base, and strengthen domestic markets. However, these benefits will depend on the region's capacity to create productive jobs, improve labour productivity, and ensure that population growth is matched by investment in public services and infrastructure.

Demographic change also requires forward-looking planning. Shifts in fertility, life expectancy, migration, and the age structure of the population will affect demand for education, healthcare, housing, employment, social protection, and other public services. Reliable demographic data and forecasting models are therefore essential for aligning long-term development strategies, public expenditure, and infrastructure investment with the needs of a changing population.

Realising Central Asia's demographic potential requires evidence-based planning and sustained investment in human capital. Reliable demographic data and forecasting models are essential for anticipating changes in population size, age structure, and migration, enabling governments to plan more effectively for education, healthcare, social protection, employment, and infrastructure.

Education, Skills, and Productive Employment

Improving the quality of education and healthcare, developing skills for the digital and green economies, and strengthening active labour market policies are essential to preparing the region's growing population for a changing economic environment. These measures should be aligned with evolving labour market needs, helping young people transition into productive employment while enabling businesses to access the skills required for innovation and growth.

The scale of the opportunity is substantial. If economic activity rates reach the 2024 global average by 2050, an estimated 2.4 million additional people could enter the labour market. Combined with the creation of decent jobs, greater participation could contribute to GDP growth, reduce poverty, and help address inequalities across gender, region, and age groups.

Realising these gains will require a coordinated approach that connects education and skills development with economic policy, private-sector demand, and employment opportunities. Without sufficient investment in skills and job creation, the region risks leaving a significant share of its young population unable to realise its potential. The resulting exclusion could undermine social mobility and weaken the foundations for long-term economic growth.

Expanding Women's Economic Participation

Women's economic participation is another essential component of Central Asia's demographic strategy. Women account for approximately 49 percent of the region's working-age population of around 70 million, representing a substantial source of human capital and productive capacity.

Policies that enable women to combine professional and family responsibilities, expand access to quality education and formal employment, and strengthen the care economy can help unlock this potential. Accessible childcare, appropriate support for working parents, and improved opportunities for women's skills development and career progression can contribute to higher labour force participation, more inclusive growth, and greater economic resilience.

Expanding women's participation is therefore not only a matter of equality and social development; it is also an important economic priority. Making better use of the skills and capabilities of the entire working-age population will be essential to sustaining growth as Central Asia's demographic structure evolves.

Strategic Planning for Demographic Resilience

To prepare for demographic change, governments need to integrate population projections into strategic planning, public investment decisions, and the allocation of public resources.

This requires stronger demographic data systems, regular forecasting, and closer alignment between population trends and policies on education, healthcare, employment, housing, infrastructure, and social protection.

Planning must also account for differences across countries and territories. National population trends may conceal significant variations in the pace of growth, migration patterns, age structure, and demand for public services across regions.

More granular demographic analysis can help governments identify emerging pressures, target investment more effectively, and ensure that public services respond to the needs of different population groups.

Ultimately, Central Asia's demographic trajectory presents both an opportunity and a responsibility. A large, young, and increasingly skilled population could become a powerful driver of innovation, productivity, and prosperity. Achieving this outcome, however, will depend on sustained political commitment, effective institutions, inclusive labour markets, and investment in the capabilities of every generation.

The central challenge is to turn demographic momentum into a lasting development dividend – one that expands economic opportunity, reduces inequality, and strengthens the foundations of long-term prosperity across Central Asia.

7.3. The Demographic Profile of Central Asia

To understand Central Asia's demographic future, we must begin with its people: their ambitions, experiences, and contributions across generations.

Children and Youth: A Generation of Opportunity

Samira, 14

(Uzbekistan)

"My educational chatbot for schoolchildren won first place at a city hackathon. I want to study artificial intelligence and develop technologies that improve lives across Central Asia. More girls are entering STEM, which is inspiring. We want more than diplomas – we want to shape the world around us. Our greatest resources are knowledge and ideas, and we are ready to put them to work."

Aynur, 19

(Kyrgyzstan)

"I moved from a mountain village to the capital to study architecture. I want to help connect cities and remote communities through modern infrastructure without losing sight of where I come from. As Central Asia urbanises, we must make this transformation inclusive and ensure that rural communities are not left behind."

Malika, 13

(Tajikistan)

"I dream of becoming a neurosurgeon and working in my city's hospital. My parents, a doctor and a teacher, have taught me that education opens doors. Children across Central Asia have ambitions like mine. With the right opportunities, knowl-

edge, and confidence, we can become the professionals and innovators who transform our region."

Temur, 24

(Uzbekistan)

"My friends and I founded a company that helps farmers conserve water and other resources. Our entire team is under 30. We want innovation to emerge from Central Asia and solve real problems. Change begins with initiative. We are not waiting for the future – we are building it."

The Adult Population: Architects of Today

Chori, 40

(Turkmenistan)

"I work in logistics, coordinating cargo along international transport corridors. Central Asia's location creates opportunities to connect East and West, North and South. Every shipment contributes to a more connected region. But connectivity is about more than roads and trade routes; it is also about creating opportunities that people across our countries can share."

Dinara, 48

(Kazakhstan)

"I am an engineer specialising in drip irrigation. With climate change and water scarcity threatening the region, efficient resource management is essential. My work helps conserve water and protect our future. I want our children to grow up in a safe, green Central Asia, and I am proud to contribute to that goal."

Gulnora, 35

(Kyrgyzstan)

"I am a civil servant and a mother. Balancing work and family remains difficult when household responsibilities fall mainly on women. Many women have to sacrifice their careers because childcare is unavailable or working ar-

rangements are inflexible. Yet change is possible: family support programmes are emerging, fathers are becoming more involved, and employers are beginning to adapt. I want my children to grow up in a society where women can fulfil their potential both at home and at work."

Abdurakhmon-ota, 72

(Uzbekistan)

"After retiring as a factory foreman, I became more involved in my mahalla. Through an intergenerational project, young people teach us digital skills. I can now use online services to check my pension and pay utility bills. We learn technology from them, and they learn wisdom and tradition from us."

A Treasury of Values and Experience: Active Longevity in Central Asia

Nurlan, 70

(Kazakhstan)

"After a career in teaching, I now share my experience with young people and my grandchildren. I remain active in community life, mentor younger generations, and continue learning from them. As Central Asia changes, older people can help shape its future. Our experience is a resource, and our voices deserve to be heard."

Zamira, 68

(Turkmenistan)

"After retiring as an accountant, I began teaching embroidery to girls at our local centre. Passing on this craft gives me a sense of purpose. Older people carry knowledge, traditions, and cultural memory that should not be lost. We can remain active and contribute to society throughout our lives."

Key facts:

• Central Asia's working-age population is projected to grow from 50 million to 71 million by 2050.
• Women's labour force participation is, on average, 22 percentage points lower than men's.
• Women perform more than 75 percent of unpaid care and domestic work across the region.
• Realising the demographic dividend depends on expanding women's opportunities in employment, public life, and decision-making.

Together, these stories reveal Central Asia's most important demographic asset: the potential of its people across generations. The challenge is to create the conditions in which children, young adults, working-age people, and older citizens can all contribute to the region's future.

Gender Equality and the Empowerment of Women and Girls

Central Asia cannot fully realise its demographic dividend while women face persistent barriers to economic participation. In 2024, the gap between women's and men's economic activity rates stood at 22 percentage points, representing a substantial loss of productive potential. Barriers include limited access to childcare and family planning, inflexible working arrangements, unpaid care responsibilities, and constraints on education and career progression. These pressures can push women out of formal employment and erode their skills and earnings over time.

Several countries have introduced reforms, including lifting restrictions on women's employment in heavy industry and providing support for women-led enterprises. However, legal changes alone cannot resolve the unequal distribution of unpaid care work.

Progress requires investment in childcare and other social infrastructure, more flexible employment policies, and measures that expand women's access to education, formal work, and leadership. Such reforms would advance gender equality while strengthening the region's productive capacity.

Active and Healthy Ageing

Central Asia's population structure is expected to change significantly by 2050. The share of young people is projected to decline from 32 percent in 2023 to 26 percent, while the working-age share will remain broadly stable at 63 percent. The proportion of people aged over 65 is projected to rise from 6 to 11 percent, increasing pressure on pension and social protection systems.

Women face particular risks in older age. Longer life expectancy, combined with interrupted careers and higher rates of informal employment, can leave them with lower pension savings and increase their vulnerability to poverty.

Governments will need to adapt pension and social protection systems while investing in preventive healthcare, lifelong learning, and opportunities for older people to remain economically and socially active. The emerging silver economy – goods, services, and employment opportunities associated with an ageing population – could help turn this demographic shift into a source of innovation and growth.

Demographic forecasting should inform healthcare and social protection planning well in advance, including the development of services suited to older people's needs. Policies should also support continued employment, self-employment, volunteering, and participation in community life.

Demographics, Natural Resources, and Climate

Population growth is intensifying pressure on Central Asia's natural resources, while unequal access to water, land, energy, and ecosystem services compounds existing regional disparities. Rural and mountainous communities may face limited access to essential resources and services, while densely populated areas, including the Fergana Valley, experience growing demand. These pressures intersect with poverty, inequality, and demand for social protection.

Climate change is making these challenges more acute. Melting glaciers, changing precipitation patterns, and drought threaten agriculture and food security, contribute to soil degradation, and accelerate migration towards

cities. Urban areas must then absorb additional demand for housing, infrastructure, water, energy, and public services.

With approximately 30 million more people expected by 2050, these pressures are likely to intensify. Addressing them will require regional cooperation on shared resources, more efficient water and agricultural systems, expanded renewable energy, and the integration of demographic projections into climate adaptation and public investment planning.

Migration and Mobility

Migration has long shaped Central Asia, from rural-to-urban movement and Soviet-era resettlement to contemporary seasonal and international labour migration. Increasingly, climate change and environmental degradation are adding a new dimension to these patterns. The United Nations has highlighted Central Asia as a region vulnerable to climate-related migration, as water scarcity, land degradation, drought, and declining agricultural productivity threaten livelihoods and may drive population movements.

Remittances remain particularly important to Kyrgyzstan and Tajikistan, while Uzbekistan also relies on income sent home by migrant workers. Kazakhstan, meanwhile, has become a major destination for migrants from neighbouring countries.

Migration supports household incomes and connects the region to wider labour markets, but it also creates vulnerabilities. Informal employment can expose migrants to exploitation and limit access to social protection. Families left behind may face additional care burdens, while children risk inadequate support and social exclusion. Climate pressures could intensify these challenges, contributing to internal displacement and rural-to-urban migration, while increasing demand for housing, infrastructure, and public services.

Coordinated action can help Central Asia anticipate population movements, protect vulnerable communities, and ensure that migration contributes to resilience and shared development rather than deepening inequality.

7.4. Recommendations

Regional cooperation can help Central Asia turn demographic change into a dividend by investing in human capital, expanding economic participation, and preparing for an ageing population. This requires coordinated policies that respond to the needs of women, youth, vulnerable groups, and older people, while aligning demographic trends with economic, social, and environmental planning.

Invest in Human Capital and Gender Equality

Expand access to essential services: Increase investment in healthcare, education, and skills development, prioritising women, girls, people with disabilities, and underserved rural communities.

Strengthen social infrastructure: Coordinate regional standards, financing, and knowledge exchange to improve access to quality healthcare, education, childcare, and youth services, particularly in rural and border areas.

Make labour markets family-friendly: Expand reproductive health services, paid parental leave, flexible working arrangements, and affordable early childhood education to support women's employment and family well-being.

Scale up effective policies: Establish regular regional exchanges to identify and replicate successful approaches to reducing gender and social inequalities.

Build a Regional Skills and Labour Market

Central Asia should move towards common educational standards and an integrated regional labour market, enabling its countries to pool talent, expand eco-

nomic opportunities, and compete more effectively in the global economy. A larger, more connected market would allow businesses to access a broader skills base, specialise in areas of comparative advantage, and build cross-border value chains that generate greater value within the region.

Align educational standards and qualifications: Develop common competency frameworks, compatible curricula in priority fields, and mutual recognition of qualifications to enable skills acquired in one country to be recognised across the region.

Enable regional labour mobility: Harmonise relevant labour market rules and simplify procedures for cross-border employment, while safeguarding workers' rights and social protection.

Develop skills for regional value chains: Coordinate education, vocational training, and workforce development with emerging regional industries, including digital technologies, renewable energy, advanced agriculture, logistics, and the care economy.

Connect talent with regional opportunities: Establish regional platforms linking employers, educational institutions, and jobseekers, alongside cross-border internships, apprenticeships, and professional mobility programmes.

Invest in the next generation of regional talent: Expand scholarships, university partnerships, research collaboration, and entrepreneurship programmes to build a connected pool of skilled professionals and future innovators.

Expand Economic Participation and Create Higher-Value Jobs

Build cross-border value chains: Encourage businesses to combine complementary skills, technologies, and productive capacities across Central Asia, moving beyond fragmented national markets towards integrated regional production and innovation.

Create jobs in emerging sectors: Promote employment in renewable energy, sustainable agriculture, logistics, digital services, and the care economy, linking investment to regional skills development.

Unlock the full potential of the workforce: Remove barriers to women's employment, expand access to formal work for young people and vulnerable groups, and encourage employers to provide childcare and other family-friendly arrangements.

Prepare for an Ageing Population

Strengthen pension and care systems: Modernise pension and long-term care arrangements to ensure financial sustainability, equitable coverage, and access for women and workers in the informal economy.

Promote active and healthy ageing: Expand lifelong learning, digital education, retraining, mentoring, and volunteering to enable older people to remain active in economic and community life.

Improve regional preparedness: Share demographic projections and expertise to anticipate changing demand for healthcare, pensions, and social services.

Make Migration Safer and More Inclusive

Coordinate migration governance: Strengthen cooperation on migrants' rights, standardised labour contracts, legal protection, and mutual recognition of qualifications, with particular attention to women and young people.

Protect access to social benefits: Develop bilateral and regional agreements that safeguard accrued pension entitlements and improve migrants' and their families' access to healthcare and education across

borders.

Enable secure mobility: Explore interoperable digital identification and administrative systems to make cross-border movement more transparent and accessible for workers, students, and professionals.

Integrate Demography into Climate and Resource Planning

Align demographic and climate strategies: Incorporate population projections into urban planning, water supply, agriculture, food security, and climate adaptation.

Strengthen regional resource management: Deepen cooperation on shared water, land, and ecosystems, particularly in the Aral Sea basin.

Improve early warning and preparedness: Develop systems that account for the different vulnerabilities of women, children, young people, and older people in the face of climate risks and natural disasters.

Improve demographic forecasting: Conduct regular censuses and population projections to anticipate changes in population size, age structure, migration, and demand for public services.

Harmonise regional statistics: Align demographic indicators and methodologies to enable reliable cross-country comparisons and joint planning.

The priority is to move from recognising demographic change to planning for it jointly. By investing in people, enabling participation across generations, and coordinating policy across borders, Central Asia can turn demographic transformation into a foundation for inclusive and sustainable prosperity.

CHAPTER 8.

WHEN CENTRAL ASIA SPEAKS…



The future of Central Asia cannot be understood through policy frameworks, economic forecasts, or geopolitical analysis alone. It must also be understood through the voices of the people who live its transformations, navigate its uncertainties, and shape its aspirations. To capture these perspectives, young people from across the region were invited to imagine 1 May 2050 and describe what Central Asia might look like on that day: how people would live, how societies and economies might have changed, how countries would relate to one another, and what hopes and challenges would define the region. This simple but powerful exercise encouraged contributors to look beyond the immediate concerns of the present and envision the future from the perspective of those who will help shape it.

This chapter, *Central Asia Speaks*, brings together a selection of essays chosen from more than one hundred submissions received from across the region in just one month. Curated by Dina Iglikova, founder of the Mampassi Collective of Central Asia, and Dr. Siynat Sultanaliyeva, a researcher of Central Asia and resident of the Collective, these essays offer a rare window into how the region's citizens perceive the present and imagine the future.

Their significance lies not only in the diversity of perspectives they represent, but also in what they reveal about the hopes, anxieties, ambitions, and shared concerns that transcend national borders. These are not merely personal reflections or speculative visions; together, they form a collective portrait of a region in transition, capturing dimensions of change that statistics and policy documents often leave unseen. By placing citizens' experiences and ideas alongside the book's broader analysis, this chapter underscores a fundamental premise: Central Asia's future will be shaped not only by the decisions of governments and the dynamics of global politics, but also by the voices, choices, and aspirations of its people.

Central Asia 2050: Notes from a Future in Progress

Long since romanticized as a crossroads of cultures with long lines of caravans moving goods and ideas across the vast steppe, towering minarets and snow-capped mountains as the backdrop for ancient politics, round yurts and herds of horses populated by proud but war-like peoples that sometimes like to kidnap their women for marriage, Central Asia has rarely had a chance to narrativize itself, almost always the object of someone else's poetization of the bygone days. Often framed as a hinterland, a periphery to the bigger players on the continent, Central Asia's identity has

been suspended between its glorified past and uncertain future imagined mostly by others. The essays in this collection offer an alternative to this. Together they come as a choir of distinct voices that tells the story of the region's future steeped in the lived realities of the many millions that call Central Asia 'home'.

The futures imagined do not shy away from the harsh realities of the region, but instead of ruminating on the past, as has long been the tradition, the stories presented here look ahead with nuanced hope, one that sits on a foundation of memory and moral sensibility. The former allows the writers to pick out the practices and traditions of Central Asia they feel could best help prepare the region for the decades to come, and the latter invites the readers to think about something more fundamental: what kind of society can we become if we set aside our differences and grievances, and instead focus on what unites and nurtures us? These are not easy questions and the authors of this collection – researchers, practitioners, observers – do a stellar job in answering them.

In these pages, one finds children who learn civic trust by forming a line for ice cream, teachers who guide students not only through syllabi but through the emotional architecture of disagreement, and parents who swap discipline for dignity in raising the next generation. There are rooftop gardens in Osh where therapy sessions unfold beside biotech experiments, and kitchens in Bishkek that have been retrofitted into commons, where community, care, and coffee coexist in plausible harmony. These essays drift between registers – from poetic to policy-oriented, from grounded to speculative, but they share a refusal to treat the region as static, or as hostage to external circumstance. In the uncertain times we find ourselves in, they offer an anatomy of rebuilding, not through statecraft or foreign investment alone, but through shifts in tone, habit, and self-perception.

The proposals are not grandiose, some of them spring from an idea of a revised school curriculum or a walkable city plan. Others go deeper into the history of the region, picking up common concepts like 'asar' (also written ashar or hashar) and re-constructing them as a basis for an interconnected future history of Central Asia, where people support people across the regional borders, but on scales much larger than ever imagined before. Instead of looking away from ourselves and our neighbours and into the faraway lands, we are invited to see that what we seek abroad may be waiting for us right next door. That new celebrity crush? It might be a rising synthpop star from Turkmenistan that all youth in the other four countries are crazy about. The tech that gives the best yield in the fertile soil of Fergana? It may have been developed in northern Kazakhstan and delivered

overnight by drones.

Not all the essays are as strikingly optimistic – some look unflinchingly at the damage wrought by decades of short-termism, environmental neglect, and bureaucratic entropy. The futures described in them are neither utopias nor dystopias, but provisional, conflicted, and in motion. A warning, if you will, by those that care very deeply about the region and its future, and hope that by drawing our attention to how it may all go south we may be jolted into action to prevent that from happening. There is not much time, the change must start now.

To read these essays is to be reminded that the work of imagining a region is, ultimately, the work of imagining a self that belongs to others – a

Hashar (ashar, asar)

The village work-bee where neighbours dredge canals, repair roofs, or harvest before frost. The essays argue that the region already holds a living blueprint for mutual aid and stewarding shared resources, whether water today or data grids tomorrow.

self-capable of mutuality, of care, of responsibility not just to nation or kin but to strangers, neighbours, and future citizens. And if there is a kind of quiet audacity here, it lies in the belief that Central Asia's future will not be handed down by decrees or summoned into being through investment alone, but shaped through a dispersed, evolving practice of attention to the built environment, to the subtleties of speech and gesture, to the fragile infrastructures of trust that undergird all functioning societies.

This collection is neither a prediction, nor a master plan – it is a field of possibilities held together by a shared willingness to think forward with care. The future does not begin with certainty of one truth over another, but with humility, intimacy, and with the knowledge that every choice we make today will greet a child waking on 1 May 2050.

8.1. An Initial Vision: Who Will We Be in 2050?

We start with three pieces that set the tone for our collection of futures imagined. Firuza Tatybaeva gives us the stakes of our choices in prose as fragile and sharp as glass. It comes from a deep concern that she manages to transform eventually to hope that warms us with possibilities of a future in which we stand united.

In the second, Tilek Mamutov launches us headfirst into a future ruled by imagination and therapy. It leaves no space for existential dread, as the steps that need to be taken are very clear and feasible. Some may think it is far too utopian, and it may very well be so, but what it does well is set the tone for a region that is no longer afraid to dream. And that's worth something.

Dina Iglikova completes this section with her matter-of-fact description of a future Central Asia that became a crucial node in global supply chains for computational power and cutting-edge research that combined tech with tacit knowledge and culture in addressing specific industrial tasks, while the rest of the world was still struggling with accepting the new reality of AI taking over routine cognitive tasks. All three sure paint the picture of a future worth living for.

Firuza TATYBAEVA

Born in Uzbekistan, she left academia after the Soviet collapse, built Central Asia's largest seed-potato enterprise, then returned to university teaching to research female leadership.

Two Mornings in Central Asia

"If change must come, let it come with our hands –
not the winds that bury what we love."
– From the voices of a waiting land

The first sun of May 1, 2050, brushes blue domes of Bukhara and Samar-

kand. It touches the wind-carved dunes of Karakalpakstan and slips softly over the peaks of the Tien Shan. Somewhere, a rooster crows too early, and in reply, an old man mutters, “He thinks he owns the sunrise.”

And in that small joke is a truth: the land remembers everything. The laughter. The warnings. The choices.

But today, in times of uncertainty, instability and turbulence Central Asia wakes to two possible mornings.

In one, life stirs. In the bazaars across whole Central Asia, apples from the Fergana Valley shine beside meat and kumis from Kazakhstan and Turkmen melons. Young people with shining eyes and restless minds cross open borders, not to flee and wander in search of better life in faraway places, but to build and flourish in their own land. They speak many languages, but dream in one: of homeland, shared and whole.

In the other morning, there is only wind, dry and hot. The air tastes of salt and sand. The Amu Darya is a threadbare ribbon. The laughter of children has gone silent, their footsteps vanished down foreign roads. The land, once carved by rivers and love, cracks open like an unanswered question.

There was a time when we believed the land would forgive anything – overgrazing, overbuilding, destruction. But it doesn’t. It remembers every neglected canal, every poisoned field, every wall we built between ourselves.

If we do not act together, the desert will act for us. And the desert is not merciful.

Without shared care, the rivers die. Without shared markets, our economies stagnate. Without shared hope, our people drift. One nation alone cannot hold the wind. But five? Five might learn to dance with it and build a future worth choosing, where:

A young Kyrgyz woman starts a tech firm in Tashkent. A Turkmen farmer sends solar-powered irrigation pumps to Tajik villages. A Kazakh artist paints the waters of the Syr Darya, and an Uzbek schoolchild sells postcards of it online, with pride. The border is no longer a scar, but a seam. Labor flows freely, money circulates with trust, and ideas rise like spring after frost. Hashar, a national tradition present in all of Central Asia, becomes a regional rhythm. When one field suffers, all hands rise. When one well runs dry, five nations answer.

"The Uzbek and Kazakh, Turkmen and Tajik, Kyrgyz and Karakalpak peoples, whose languages are close, whose hearts are close, whose lands lie side by side, who drink from the same river, and whose joys and sorrows at weddings and gatherings have long been one."
- Erkin Vohidov

The land doesn't know what passport you carry. Our soil has been weary too long. It screams for poets and planners, environmentalists and engineers. Collaboration is not charity; it is survival. The Syr Darya and the Amu Darya do not vote in elections, but they decide futures. And they will not wait while we argue over droplets.

If we share water, we share life. If we hoard it, we inherit dust.

None of this blooms from slogans. It begins with decisions to invest in youth education, to resist petty nationalism by embracing a global vision grounded in shared soil, to curb corruption and bureaucracy through adopting transparent, digital governance built on accountability, and to nurture trade and trust, not tariffs and fear.

Hoja Nasreddin once planted spoons in his garden and told neighbors to wait for a spoon tree. They laughed.

"Why not?" he smiled. "We've planted worse things and waited longer."

And here we are, still waiting – or finally planting rationally.

But what if not just one nation? What if five, once torn by borders, now sewn with courage – rise as one?

If we fragment, we fade.
If we unite, we flourish.
If we delay, the desert will swallow us and write our story.
But if we begin now – together – we will write our own.

And one May morning the wind will carry not dust, but song – the anthem of the United Central Asia.

Tilek MAMUTOV
The first Kyrgyz at Google, later a project lead at Google X, he now runs Outtalent, a platform that helps engineers from emerging markets win jobs at top tech firms.

Central Asia is the North Star of Love, Happiness and Creativity

In the centre of Osh, 17-year-old Aida walks into her school's rooftop garden. It's Wednesday, "Creator's Day." Instead of a traditional math class, she's presenting her biotech-themed card game to a panel of local and international angel investors. Her classmates cheer her on from beanbags under apricot trees, their tablets open with prototypes for VR comics, animated films, and citizen science projects.

In the afternoon, Aida heads to her weekly psychotherapy session, a normal part of school life, like brushing your teeth or washing your hands. Her therapist helps her process creative stress and plan boundaries with online collaborators spread across the globe.

Outside, the streets buzz not with traffic, but with small outdoor galleries, coffee shop concerts, and murals being painted by teenagers. It's the same in Samarkand, Taraz, and Dushanbe. Mental health and creativity have become the soul of society.

Children are raised not with yelling or fear, but with emotional support and patience. Parenting classes are as common as driving schools. Beating a child is not just socially condemned, it's illegal and quickly addressed.

By 2050, creative and deep tech industries make up 10 times more of Central Asia's GDP than extractive industries. It's normal for a young person to launch a successful creative project that sets them up for life. Hundreds of billionaires have emerged from games, movies, and startups – not from oil or gas, but from imagination and inner peace.

Central Asia, once known for its deserts and steppes, is now the global capital of love, creativity, and emotional intelligence. People don't just come to visit. They come to learn how to raise children, how to collaborate, and how to live.

Central Asia's transformation didn't come from copying Silicon Valley. It came from doubling down on its own strength: its cultural resilience and love of learning.

From surviving deserts and mountains to building world-class madrassas and universities centuries ago, Central Asians have always adapted. The Soviet legacy left behind surprisingly strong foundations in education and literacy. But historically, emotional resilience was built through hardship, not healing.

To modernize without losing essence, the region didn't throw away its toughness. It evolved it. We taught parents to swap punishment for presence. We invested in community mental health as a public good, just like water or electricity. We created platforms where creative ideas were as fundable as oil wells – with local-language accelerators, youth creator hubs, and mentorship platforms.

We kept our culture, music, hospitality, storytelling, and made it the engine of a new economy.

This became possible because by 2030 the Central Asian states have jointly launched National Wellness Funds and National Creative Funds in each, where the former supported and invested in public campaigns encouraging everyone to care about their mental health, provided free support through apps, games and videos, offered education to psychotherapists, supported parenting schools, services and resources, and mainstreamed on-site psychologists in all public schools. The latter supported weekly arts and creative expression classes in all schools, established creator hubs in every city and region including rural areas and provided microgrants for creative projects.

We realized this was feasible because social stigma about going to therapy was already overcome in some cities around the world at that time (e.g. Los Angeles, London, Buenos Aires) as mental health services had become widely available online too. Doing this broke the generational trauma cycle and transformed education from rote memorization to self-expression, which led to Central Asia becoming a global benchmark not for extraction but for imagination as millions of Central Asian youths felt supported both mentally and financially by their states.

Dina IGLIKOVA
A Kazakh analyst and executive with 15 years in healthcare, public diplomacy, and community building in Central Eurasia.

The Steppe Transformation

May 1, 2050

On a crisp spring morning in Kostanai, concrete blocks cast long shadows across a field of vent stacks. Twenty meters below me, neuromorphic processors thrum in a vaulted cavern where the temperature never rises above twelve degrees. Engineers learned early that the steppe's fierce summers would cook any surface data hall, so they carved cities of compute into limestone and tucked others high in the Tian Shan, letting night winds slip through mesh floors. Every watt that powers these clusters comes from wind or from solar fields that once drove pumps and drills; now the surplus keeps processors cool and greenhouses warm.

Twenty-three years ago, when the rest of the world was still debating whether artificial intelligence would displace human workers, Central Asia made a different calculation: it would happen anyway, so why not get ahead of it? The transformation began when Central Asian nations recognized a fundamental truth that AI tech CEOs had articulated decades earlier: in an age where AI agents could outperform humans at virtually any cognitive task, the old equation linking labour to capital had become obsolete. When the Great Decoupling accelerated in the early 2030s, as AI agents began replacing millions of workers globally, Central Asian nations found themselves in the dramatic economic transformation. The old model of resource extraction and labour export collapsed as AI agents made most work useless.

Instead of fighting this reality, the region embraced it, becoming the first to implement a fully functioning Foundation economy at scale. When Kazakhstan's wind farms began generating more electricity than the country could use, someone suggested using the excess to train AI models. When Uzbekistan's solar installations reached capacity, the logical next step was computational infrastructure rather than more copper wires carrying power nobody needed. Every kilowatt that once powered industrial machinery was converted into computational power and now feeds AI supercomputers that tackle humanity's greatest challenges.

The currency revolution happened almost by accident. When traditional monetary policy became meaningless – how do you manage inflation when most goods are produced by AI systems that don't demand wages? The region's economists turned to algorithmic solutions. Foundation Coins, earned through verified contributions to beneficial research, replaced the need for universal basic income debates. Culture Coins, their supply automatically adjusted by monitoring algorithms, eliminated the boom-bust cycles that had plagued resource-dependent economies.

The new Foundation economy mechanics were elegantly simple yet revolutionary. Each citizen received an address on a public ledger and a small balance of Culture Coins – simply for being human. Real wealth flowed through Foundation Coins, minted only when a person's data or model measurably improved the intelligence commons.

People still work – a yak herder near Naryn diagnosed hoof rot with an eight-billion-parameter vet model and earned more in a day than he once saw in a season. A grandmother in Bukhara shared an irrigation trick that satellite moisture maps confirmed; her payout cleared before the kettle boiled. A teenager in Dushanbe generates income by contributing to educational datasets that train AI tutors for children across the developing world. A former oil worker in Atyrau now curates geological data that helps optimize renewable energy placement, earning more than he ever did extracting fossil fuels. The anxiety that once accompanied economic life has largely vanished. When your contribution is measured by impact rather than hours, when algorithms ensure fair compensation based on global benefit, the familiar desperation of job searches becomes obsolete.

The technical infrastructure tells a more dramatic story. Arrays of neuromorphic processors, each operating at energy efficiencies that would have seemed impossible in 2025, handle everything from climate modelling to cancer research. The approach was deliberately unglamorous: instead of competing with massive general-purpose AI systems, Central Asia focused on specialized models designed for specific tasks. The result is a computational ecosystem that provides ninety-five percent of advanced AI capabilities while consuming a fraction of the resources demanded by the massive language models that dominated the 2020s.

Manufacturing followed a similarly distributed path. Small communities now produce complex electronics and precision instruments using AI models that incorporate centuries of materials science knowledge. The old paradigm of massive factories churning out standardized products gave way to networks of local producers creating customized goods on demand.

Quality improved as algorithms learned from every production run across the network. Waste plummeted as AI systems optimized material usage in real-time.

The international implications were unexpected. Rather than becoming a backwater, Central Asia emerged as a crucial node in global supply chains, not for raw materials, but for specialized knowledge and computational services. The region's AI models, trained on unique datasets combining traditional knowledge with cutting-edge research, became export commodities more valuable than oil ever was.

Critics had predicted cultural homogenization, the loss of local traditions to algorithmic efficiency. Instead, the opposite occurred. When traditional (tacit) knowledge became economically valuable, when a herder's understanding of seasonal migration patterns could improve agricultural AI systems worldwide, culture became a source of prosperity rather than a barrier to it.

The broader transformation was measured not in GDP growth, which became meaningless when AI systems handled most production, but in more fundamental metrics. Educational outcomes improved by sixty percent as personalized AI tutors adapted to individual learning styles. Medical diagnostic errors fell by ninety percent as AI systems, trained on global datasets, caught conditions that human doctors might miss. Energy consumption per capita dropped by forty percent despite massive increases in computational activity.

Perhaps most remarkably, the transition occurred without the social upheaval that economists had predicted. There were no mass unemployment riots, no political revolutions, no civilizational collapse. Instead, there was a gradual recognition that when algorithms could handle routine cognitive tasks, human value lay elsewhere: in creativity, cultural preservation, emotional intelligence, and the kind of contextual understanding that no amount of training data could replicate.

The rest of the world is now scrambling to implement similar transitions, but Central Asia's head start has created advantages that may prove permanent. The region that was once dismissed as a geopolitical afterthought has become a laboratory for post-industrial civilization, proof that the future of human society might be found not in the tech capitals of the coast, but in the patient planning of the steppes.

8.2. Civic Culture and Social Trust

The previous section took us on a wild journey of seeing the future of Central Asia depending on attention to mental health and readiness to embrace AI in the region's culture, planting seeds for the next section – in which we explore ideas centred around civic culture and social trust as foundational for a Central Asia that is strong and united in 2050.

We open with Dilrabo Tosheva's elegant meditation on the ability of citizens to hold a queue as critical to development of civic trust – this is social change not through revolutions, but through quiet discipline and early education. We then flow into Daniar Amanaliev's dispatch from the future written by someone who already lives there. It is a future where emotional literacy and mutual aid of 'ashar' is part of everyday culture and even policy. He shows us a Bishkek of collective ownership, where people are not in something out of fear, but participate out of care.

We finish with Azamat Alagoz, who looks back at stories almost lost and dares to frame oral tradition as civic infrastructure. His is a slower paced meditation on memory, but not as nostalgia – as resistance.

Dilrabo TOSHEVA

A historian of medieval Eurasian art and architecture from Uzbekistan with a PhD from the University of Queensland, she has held post-doctoral posts at Yale and Harvard studying Central Asian heritage.

The Line at the Ice Cream Shop

On May 1, 2050, I'm standing at the end of a long, winding line for ice crIt's a warm afternoon in Tashkent on May 1, 2050, and I'm standing at the end of a long, winding line outside an ice cream shop. My grandchildren tug gently at my sleeves, excited for their treats. The queue stretches some twenty meters, a silent testimony to something more profound than the desire for pistachio or vanilla: a quiet discipline, a civic pact. No one push-

es; no one cheats. Everyone honours the rule that needs no signage – first come, first served.

It wasn't always this way.

Thirty years ago, in the same city, a crowd like this would have dissolved into chaos. There were no real lines then, just flocks. At airports, passengers would mob the gate as soon as boarding was announced, elbowing their way to the front. As soon as the aircraft touched down in Tashkent, a rush would erupt toward the exit, passengers scrambling to be first, indifferent to pregnant women, elderly or children.

This behaviour was never foreign to me. I had grown up in Uzbekistan and recognized the logic of the pack. At my school's cafeteria counter, in rural Bukhara, there were no queues, only bodies pressed tightly together. The strongest and tallest, with their elbows sharpened and arms extended under the saleswoman's nose, were the ones who got served. I remember watching younger children retreat from the crowd, breathless and defeated. Even those who managed to get their bread faced the next obstacle – escaping the throng without losing it or getting crushed. After some 20 years, things did not change even in the capital city. My children faced the same challenge in one of the reputable schools of Tashkent.

At the time, it felt like normal. But later, as I travelled across the world, I began to feel shame. I questioned as to why Uzbeks/Kazakhs/Central Asians cannot organize a queue and follow the simple rule of "first came first served"?

In Australia, I understood that education plays a crucial role in developing the foundation of civic habits: children taught to queue from their earliest years. As a part-time school staff member, I watched how teachers guided students in every shared activity – lining up for lunch, for the toilet, for the library. There were no barriers or ropes. Just the constant, calm enforcement of a simple rule: take your turn. Over time, it sank in. Orderliness wasn't in anyone's DNA. It was cultivated, modelled, repeated, and rewarded.

And that changed everything.

What began as a habit in the schoolyard translated into a civic culture. People respected each other's rights – be it a minority, a weaker member of society, or someone who does not share the same value with them. And they did so not because they feared punishment, but because they had learned

to. When things went wrong – a broken promise, a rigged system, or simply a skipped line – they protested. Not in outrage, but with clarity. They had been taught from childhood that fairness was not a luxury, but a given.

That's the quiet revolution I now see blooming in Central Asia.

By 2050, the culture of the line, of patience, fairness, and shared space is no longer foreign. It is native. It has spread from city squares to rural clinics, from ice cream counters to municipal services. This didn't happen by accident. Around 2030, schools across Uzbekistan, Kyrgyzstan, Kazakhstan, and beyond made a radical choice: to treat civic education not as an abstract subject, but as a daily practice. Teachers trained not only minds but habits. Children began to learn how to disagree respectfully, how to wait, how to share.

That was the turning point.

We already had the raw material. Central Asia has long been home to the hashar tradition, a form of mutual aid where neighbours gather to build homes, fix roads, or harvest crops. Hashar is not just about labour; it's about community, about acting for the common good. When we began channelling that spirit into the rituals of everyday civility, transformation followed.

Now, as I stand here, watching children hold hands and elderly women greeted with smiles as they're allowed to skip ahead, I feel something more than pride. I feel belonging. We are not imitating the West. We are becoming who we were always meant to be: a region where mutual aid meets mutual respect, and where the smallest rules, like the line for ice cream, carry the greatest weight.

Daniar AMANALIEV

Co-founder and "Band Master" of OLOLO Group, he develops creative hubs across Kyrgyzstan and champions collective entrepreneurship and urban innovation.

A Kitchen in Bishkek in 2050

May 1, 2050. 6:12 a.m.

I wake not from an alarm, but from the smell of coffee – my neighbour down the hall is brewing strong arabica. I live in a co-living space in Bishkek, my own room, my own rhythm, but shared kitchens, gardens, and conversations just outside my door. Ten years ago, this building was a typical post-Soviet apartment block. Now it's a vibrant, self-managed community, redesigned by the people who live here, supported by the city's mutual-aid platform.

Outside, voices gather. May Day. But not the Soviet version. We reclaimed it – ashar, the tradition of voluntary collective work. People are painting walls, planting herbs, repairing the fountain. Some brought shovels, some poetry, some just hands. Everything they build will belong to all of them, no paperwork needed. Ever since we launched our first open-source City-as-Community protocol in 2031, this kind of action stopped needing approval.

When people ask what really moved Central Asia forward, I don't talk about tech or GDP. I talk about three things:

1. We were young. In 2025, half our population was under 30. The rest of the world was aging and shrinking. But we were bursting with energy, urgency, and a hunger to build. We didn't inherit systems, we created our own. Startups didn't wait for the sceptical VC's to recognize Central Asia, they bootstrapped. Schools taught civic imagination more than test scores.

2. We were flexible. Nomadic heritage isn't just yurts, it's mental. We adapted fast, collaborated widely, improvised better than we planned. AI didn't scare us – we adopted it early and used it to launch ideas and solve real problems. We didn't reinvent the tech; we just needed access. Once we had it, the field levelled. A student in Karakalpakstan could start a business in two clicks and probably had more hunger and urgency than his peer in the U.S. Communities leapfrogged past old bottlenecks.

3. We had nothing to lose. We didn't carry the heavy legacy of empire or monopoly. Our institutions were weak, and that became a strength. We could experiment. When one city failed at a housing pilot, five others tried again and improved it. Our pain tolerance turned into resilience, and then into capacity.

But the shift began around 2030 when we made one key decision: we recognized creativity as key infrastructure.

Not soft power. Not export. Real infrastructure – for economic, civic, and

social life. We gave legal standing to creative spaces. We rewrote freelance tax codes. We integrated community governance into local budgets. It wasn't flashy, but it worked.

From 2035, every city had "Centres of Self-Sufficiency" – places to work, learn, organize. Open-source, locally governed, sometimes run by teenagers. That was our new politics.

Not everything is perfect in 2050. Climate stress, old power reflexes, they haven't vanished. But now we meet them with tools, networks, and language. We know how to talk across gaps. And we listen.

Not out of politeness, because something has shifted. The people of Central Asia have become emotionally literate. We don't wear silence like armour. We don't confuse obedience with peace anymore.

Children learn to name what they feel. Not just in therapy, but in assemblies, poetry slams, and kitchen chats. Men cry on camera. Women say no, and it lands as a full sentence.

By 2050, we've steadily melted the old iceberg – pride, shame, fear, suppression. And I see it in our women.

Young women now read about abuse, femicide, control – and ask, "Did that really happen here?" Not out of denial, but disbelief. It's become history. Because somewhere around 2030, we collectively said: enough.

We didn't just change laws. We changed culture. We replaced fear with voice. Not through UN programs, but through daughters texting mothers: "We deserve more." We taught boys that strength means presence, not dominance. We taught everyone that happiness isn't a privilege, it's a right.

You can feel it, in how people look each other in the eye, without hierarchy. In how strangers ask, "How are you really?" and wait for the answer. In how every person feels entitled to define joy and dignity for themselves.

This is part of what holds us up now – emotional freedom, mental clarity, and the simple habit of seeing each other fully. Empathy isn't a skill anymore. It's how we live. With less fear and more love.

We didn't copy the West. We didn't try to escape the East. We just stayed and did the work. This place is enough. And we are enough.

Azamat ALAGOZ
Kyrgyz PhD researcher who uses digital mapping to reveal the trade and cultural networks of medieval Central Asia for a new generation.

Learning to Belong: A Shared Future Along the Syr Darya

The first light of dawn glimmers on the banks of the Syr Darya River on 1 May 2050. In the distance, the silhouettes of ancient minarets and archaeological ruins blend with solar-powered domes and digital pavilions. A group of schoolchildren walks along a riverside heritage trail that winds through one of Central Asia's most culturally rich corridors. Among them is a 10-year-old girl, holding a sleek tablet. As she raises it, the scene transforms: holograms show merchants arriving with goods from distant lands, scholars engaged in debate in medieval Khujand, and nomads performing epic poetry by the fire. She's not just a visitor to a historic site, she's part of a regional learning journey that makes the past come alive.

This is what has fundamentally changed for the better in Central Asia. A new generation is growing up with a regional identity rooted in the rich, shared history of the peoples who lived along rivers, mountains, and steppes, not divided by modern borders, but connected by trade, language, migration, and ideas. In places like the Syr Darya valley, once a centre of scholarship and exchange – young people now learn a story that belongs to all of them. The past is no longer viewed through narrow national lenses but as a collective inheritance.

In the early 21st century, history education across Central Asia was heavily shaped by post-Soviet nation-building efforts. While the formation of national identity was essential, it often came at the cost of regional perspective. Many historical figures, such as Al-Farabi, Avicenna, Jusup Balasagyn, Mahmud Kashgari, and Ulugh Beg, were each claimed exclusively by individual states. The broader cultural and intellectual networks they belonged to were often overlooked. Entire epochs of shared experience, from the flourishing of Islamic philosophy to the resistance against colonial rule, were fragmented or simplified.

And yet, the Syr Darya River tells a different story. For centuries, its waters sustained urban centers, nomadic routes, and intellectual havens. Cit-

ies like Otrar, Bukhara, and Khujand were not isolated points, they were nodes in a larger web of interaction. Ideas travelled as surely as goods did. Manuscripts were copied in one town and debated in another. Oral traditions echoed across the steppes, and epic poems such as Kutadgu Bilig, written by Yusup Balasagyn in the 11th century, articulated a political and ethical vision that still resonates today.

The decision to embrace this shared past, and to teach it accordingly, was transformative. In the 2030s, regional governments, academic institutions, and civil society organizations launched the Central Asian History and Identity Curriculum Initiative. The aim was to develop a joint educational framework that could be adapted by all five republics. This included revised textbooks, teacher training programs, digitized archives, regional history competitions, and traveling exhibitions that explored themes such as knowledge transmission, migration, and cultural coexistence.

The curriculum did not replace national histories. It expanded them. Students began to study the philosophical writings of Al-Farabi, the medical innovations of Avicenna, the statecraft wisdom of Balasagyn, and the star charts of Ulugh Beg. They explored how different ethnic groups, faiths, and social systems coexisted, clashed, and transformed one another. They were taught not only to memorize dates but to think critically about causes, connections, and context.

The effects extended beyond the classroom. As young people learned a common historical language, they developed new forms of dialogue. University networks began to offer regional degrees and shared research centres. Environmental groups collaborated on Syr Darya conservation, aware that shared water demands shared responsibility. Cultural festivals began to highlight the region as a whole, celebrating its diversity within unity. People began to see one another not as outsiders, but as neighbours with a common story.

The key turning point came with one bold but achievable step: the creation of a regional curriculum alliance by 2030. It succeeded because the foundations were already there, scholarly cooperation, cultural diplomacy, and a public hunger for connection. What had long been fragmented was finally woven into a narrative of belonging.

Now, in 2050, the girl walking along the Syr Darya doesn't just learn about the greatness of individual figures or cities, she understands the broader canvas they were part of. She sees the river not as a dividing line, but as a thread linking past to future, community to community. And in her eyes is

the confidence of someone who knows she is part of something greater, a shared Central Asian world.

8.3. Youth, Gender, and Identity

Renewed civic culture and social trust would only benefit from greater investment in specific groups and areas of Central Asia's greatest capital – the human capital.

Thus, our third section starts with Iroda Oripova's idea about how a youth summer camp fashioned not too differently after already existing programs like Erasmus+ could become the seedbed for regional identity as students share thoughts, ideas, emotions with each other, as they learn about the region's history and get ready to shape its future.

Kamronbek Khushev follows her with a bold vision for an industrial shift that changes Uzbekistan from being an exporter of raw materials to becoming a producer of high-value, tech-critical goods owing to opening the region's first ultra-pure copper refining plant – unapologetically ambitious and daring to imagine something more.

Voriskhon Ibn Abdulla Muradov takes us to a sphere not often discussed in strategic discussions about the future in Central Asia – he proposes to consider sports as not just games or competition, but as identity, diplomacy, and equity in motion.

Gulnora Mukhamadieva offers us to think about benefits of a double dividend that bets on women's full participation in the region's economy – not as an afterthought, as invisible workers of the care economy, but as equal partners in the labour market.

Iroda ORIPOVA
Tashkent-born specialist working in the Strategic Development of Preschool Education Institutions; she volunteers regularly in children's centres, libraries and charity projects.

Summer Arrives Early in Central Asia

Summer has arrived early in Central Asia this year. While not entirely unexpected, it seems this region is destined to endure various forms of heat, be it from its climate, rich historical and cultural heritage, or ambitious future aspirations.

A bus filled with Kyrgyz students has just arrived at Tashkent's international bus station. The overnight journey was long, but the laughter and chatter lasted even longer – in fact, they did not ever stop. Like their Kazakh, Tajik, and Turkmen peers who arrived earlier, these recent high school graduates are being welcomed by coordinators of annual short-term summer programs in the region. After some rest, they will embark on a project involving heated debates and discussions on topics vital to Central Asia. No, they won't be questioning why their parents still travel to neighbouring cities to visit relatives scattered across the region during the Soviet era. They are aware of the reasons; school history textbooks have long been revised to emphasize Central Asia's shared historical background, highlighting both the gains and losses experienced collectively over the centuries.

These students are here to shape the future. In the previous program held in Almaty, participants discussed strategies to make Central Asia cleaner and greener. Several poster projects on resource management, recycling, and green initiatives were presented at the conclusion of the 10-day program. This year's summer program at the Central Asian University in Tashkent is titled "Who Am I in Today's Central Asia?". Participants are expected to explore the integration of traditions and modern trends into young lives, as well as local and global influences on the unity of Central Asian youth. At the program's outset, participants will envision their ideal community, and, through engaging activities, they will develop, revise, and shape their self-perceptions, ultimately proposing individual and communal interventions to embody the Central Asian identity they imagine. Several senior students who attended the same youth program in previous years have been invited to speak, alongside established Central Asian entrepreneurs, academics, and prominent community activists.

The agenda includes interactive lectures, workshops, group and individual reflection sessions, and more.

This collaborative spirit among Central Asian youth, initiated at the early stages of adulthood, is truly inspiring. To foster such initiatives, strategic investments in youth, education, and regional integration were essential. The Erasmus+ program can serve as a model. Launched in 1987 by 11 European countries, it initially targeted higher education, allowing students to spend part of their studies in another European country with academic recognition. Over time, the program has expanded significantly, now encompassing schools, vocational training, adult, and non-formal education.

Even in the absence of a centralized executive body in Central Asia that matches the European Commission in scale and authority, regional institutions and dialogue platforms can gradually initiate educational initiatives based on a shared supranational vision. Institutional gaps, economic disparities, and political tensions may naturally pose obstacles to the realization of such a project, but the very essence of youth initiatives lies in confronting and overcoming these challenges over the next 25 years in Central Asia.

These programs are crucial because student and youth exchanges initiated now will lay the foundation for strategic partnerships, economic, and political cooperation in the future. Youth dialogue in Central Asia will help dismantle longstanding dogmas and stereotypes, nurturing future leaders and leading to thoughtful policy reforms aimed at common prosperity and development. Such initiatives foster a shared "Central Asian identity" and represent a long-term investment in understanding mutual values, interests, and perspectives.

Kamronbek KHUSHEV

Born in Uzbekistan and raised in Canada, he studies international affairs and dreams of a homeland where Uzbeks thrive without emigrating.

The Faces of a Generation That Stayed

The sun crests over Tashkent on the first of May 2050, brushing the skyline with warmth that once belonged only to dreams. Along the pedestrian avenues

of Yunusabad, students sip *saffron chai* and check their calendars – final interviews today. The firms they're applying to are not abroad, but across town: AI logistics startups, copper-based semiconductor manufacturers, and design houses exporting smart irrigation systems to water-stressed regions around the world. The young no longer dream of escape, they are the architects of a homeland redefined.

In 2025, Uzbekistan stood at a crossroads. A youthful population full of energy and intelligence was pouring out of the country, their talents lighting up research labs in Europe, startups in Seoul, and oil rigs in the Gulf. Back then, people spoke of brain drain as if it were fate. But that narrative collapsed in 2030, the year the first ultra-pure copper refining plant opened in Navoi. That single step, modest on the surface, marked the beginning of Uzbekistan's industrial shift: from exporter of raw materials to producer of high-value, tech-critical goods.

Copper changed everything. In the decades since, Uzbekistan has become a cornerstone of the global technology supply chain, not by mirroring the extractive models of the past, but by daring to refine, design, and innovate on its own soil. Navoi's copper is now found in data centers in Helsinki, solar farms in Nairobi, and even the hulls of orbital stations circling the Earth. But perhaps more remarkable than where it travels is who handles it: Uzbek engineers, Uzbek chemists, Uzbek executives. Homegrown minds for a homegrown miracle.

This shift didn't come from nowhere. It was built on something ancient: the *asar* tradition of collective action and mutual aid. In the early 2030s, this ethos was reborn in digital form. Co-ops sprang up, not just for farming, but for code, design, and renewable infrastructure. Crowdfunded by diaspora investors and coordinated through transparent public platforms, asar became the operating system of national development. By 2040, every region from Karakalpakstan to Surxondaryo had its own "Smart Asar" hubs, blending ancestral values with cutting-edge tools.

Infrastructure followed. No longer held hostage by foreign utilities or decaying Soviet grids, the state completed its multiphase energy overhaul by 2042. Gas and oil revenues, once hoarded, now subsidize universal electricity access. Internet access, once patchy, is now ubiquitous. From a classroom in rural Andijan to a smart mining rig in Zarafshan, the network hums. Economic self-sufficiency is no longer rhetoric, it's a lived reality, felt in every household with working lights, warm water, and a liveable income.

None of this made Uzbekistan isolationist. Quite the opposite. The country's emergence coincided with the waning of a unipolar world. Multipolarity

allowed Tashkent to chart its own course, strengthening ties across Asia, Africa, and the Middle East, not just through diplomacy, but through trade and technology. With partners like South Korea, Türkiye, and Canada, Uzbekistan co-developed new supply chains for rare earths, green hydrogen, and agricultural AI. Yet it always remained grounded in its own terrain, proud and pragmatic.

Walking through the Polytechnic Quarter of Tashkent in 2050, one sees the legacy of these choices. Billboards advertise internships in copper microfabrication and AI ethics. Public buses run on solar-methane hybrids developed by Samarkand's youth collective. Parks are full of books and readers. Even the children carry a confidence that borders on revolutionary: they believe, without hesitation, that they will grow up in a country worth serving.

None of this was guaranteed. It began not with slogans or state decrees, but with a decision: to stop exporting genius, and start investing in it. That step, taken in the factories, classrooms, and town halls of the 2030s has carried us here. A country once known for its silence is now known for its signal: clear, strong, and homegrown.

And as the sun continues to rise on this May morning, it catches the copper lining of the rooftop labs, the code running beneath the city's heartbeat, and the faces of a generation that stayed and built something worth staying for.

Voriskhon Ibn Abdulla MURADOV

Sport-science student at the University of Birmingham who aims to apply data-driven coaching to raise athletic standards in Uzbekistan.

A Sporting Future Rooted in Identity and Innovation

By 2050, I see Central Asia not just as a region bridging continents, but as one that has come into its own – politically stable, economically ambitious, culturally self-assured, and globally connected. Its rich historical identity, youthful population, and strategic geography will have evolved into sources of soft power and influence. And in this vision, sport is not a sideshow – it is central.

Born and raised in Uzbekistan, and now studying Sport Science, Coaching,

and Physical Education at the University of Birmingham in the UK, I've had the chance to observe how sport shapes national character, community life, and even diplomacy. Looking at Central Asia from afar has only deepened my belief: by 2050, our region can become a serious player on the global sporting stage, not just in terms of medals, but in ideas, systems, and spirit.

Central Asia, home to over 75 million people across Uzbekistan, Kazakhstan, Kyrgyzstan, Tajikistan, and Turkmenistan, will face both challenges and opportunities by 2050. Climate change, urbanization, digitalization, and shifting political alliances will all impact our development. But if we focus on inclusive growth, education, and innovation, we can turn these into engines of progress.

Sport, I believe, will mirror this transformation. Already, countries like Uzbekistan and Kazakhstan have begun laying the groundwork through investments in infrastructure, youth programs, and international partnerships. But this is just the beginning.

Much of Central Asia's sports infrastructure dates to the Soviet era, remaining functional but outdated. By 2050, I envision modern, accessible, and tech-enhanced facilities across all major cities and even rural areas. Uzbekistan has already shown ambition through the construction of Olympic training centres and football academies. This momentum must continue.

More than buildings, however, it's the people that matter. With over 60% of the population under the age of 30, the region is bursting with potential. But talent must be identified early and nurtured systematically. We need national scouting programs, elite youth academies, and a culture that balances education and athletic growth. Learning from European systems and even integrating with UK university partnerships could be a gamechanger.

One of the key lessons I've learned at the University of Birmingham is how central sports science is to success. Whether it's biomechanics, performance analysis, or psychological preparation, science and data now drive coaching decisions. By 2050, Central Asia must fully embrace this approach.

Countries like Kazakhstan and Uzbekistan are already experimenting with wearable tech, AI analysis, and recovery science. But we need to go further – build local expertise, send more students abroad, and establish regional centres of excellence. Imagine a generation of Central Asian coaches who are as skilled in GPS tracking and load management as they are in motivation and team culture.

We cannot talk about the future of sport without addressing equality. Al-

though women's participation in sport has historically been limited in parts of Central Asia due to cultural norms, the tide is turning. Uzbek women have already made headlines in boxing, judo, and gymnastics. By 2050, equal opportunity in sport must be the norm. That means equal funding, equal facilities, and media coverage that values women's sport as much as men's. Schools must promote girls' physical education from early years, and leadership roles in coaching and sport governance must be accessible to all.

Central Asia is not just a region of Olympic dreams – it is also the cradle of unique traditional sports that reflect our nomadic and warrior heritage. Kurash, buzkashi, kokpar – these are more than games; they're living history. I envision a future where these traditional sports are professionalized, digitized, and globalized. Uzbekistan, the birthplace of kurash, can lead this movement by establishing international federations, organizing world championships, and integrating these sports into educational curricula.

In this way, we don't just preserve our culture – we share it with the world.

Sport has always been a unifying force, and in a region with complex politics, shared ethnic histories, and common challenges, it can be a tool for deeper cooperation. By 2050, I hope to see Central Asian nations hosting regional games, launching joint leagues, and even bidding together for mega-events like the Asian Games or Youth Olympics. When athletes from Uzbekistan, Kyrgyzstan, and Tajikistan stand side by side on a podium, they send a message far louder than politicians ever could: we are different, but we are united.

As I look ahead to 2050, my vision for Central Asia is grounded in hope, but also responsibility. Sport alone cannot solve every challenge, but it can inspire, include, and innovate. From grassroots to elite levels, from traditional wrestling arenas to high-tech stadiums, from Tashkent to London – I see a future where Central Asia is not just playing in the world's games but helping to define them. As a student from Uzbekistan studying sports science in the UK, I hope to be part of this journey not just watching it from afar but contributing to it on the ground. After all, the future doesn't just happen. We build it. One match, one policy, one dream at a time.

Gulnora MUKHAMADIEVA

The Aga Khan Foundation's Global Lead for Gender Equality from Tajikistan, guiding gender integration and civil-society strategy across South and Central Asia. Gulnora advocates pragmatic, locally rooted empowerment of women and girls.

Strength in Numbers

I write on the first morning of May 2050, looking across a region that now numbers 113 million people, almost a third more than the eighty-five million we counted in 2025. The steep fertility that once packed our classrooms has eased, moving the bulge up the age pyramid just as projected: children stand at 26 percent of the population, adults of working age still at 58 percent, and elders have grown from 12 to 16 percent. Kazakhstan and Turkmenistan feel the weight of grey hair; Kyrgyzstan and Tajikistan, flush with two-thirds of their citizens in prime earning years, radiate youthful momentum.

A quarter-century ago we warned that numbers alone guarantee nothing. To harvest a dividend, the expanding labour force had to be skilled, healthy, and – crucially, open to women. Governments listened. They channelled unprecedented funding into schools, wired villages for digital classes, and overhauled curricula so girls and boys advanced together. They transformed unpaid care into a recognised sector: nurseries spread from capitals to market towns, elder-care centres took root where ageing felt sharpest, and private initiatives flourished under new, equitable regulation. With care responsibilities shared, women stepped into paid work in record numbers, transforming household budgets and corporate boards alike.

The payoff is visible on every street. The labour force has grown from 49 million to 66 million, its new entrants, many of them women – earning wages that circulate through cafés seed labs, and logistics hubs across the region. The economic surge we once imagined as a double dividend has materialised: more workers overall, and far more women among them. Social attitudes have shifted, too; the lists of "forbidden" occupations for women are museum pieces now, and girls recite multiplication tables beside 3-D printers without questioning why they belong there.

Challenges remain. An older generation presses on pension funds, and rural broadband gaps still limit option sets in remote valleys. Yet the central lesson of the past twenty-five years holds firm: when countries invest in human capital, formalise care, and tear down gender barriers, a favourable demographic curve becomes shared prosperity. The dividend is no longer a

forecast; it is the morning rhythm of Central Asia in 2050, lived equally by women and men who now build the region's future together.

8.4. Healthcare

The human capital of Central Asia discussed in the previous section needs to be able to realistically enjoy the highest attainable health and welfare – which the two following authors discuss in this next section. Assel Mussabekova walks us through a future in which digital tools, AI diagnostics, and community approaches to public health threats help transform endemic threats into societal resilience, where herd immunity is not a gift sent from abroad, but a reality of a region that trusts its own people.

Ruslan Rakhimov imagines a future in which introduction of medical artificial intelligence relieves the strain on the region's healthcare systems, allowing everyone the care and support needed without overflowing queues in hospitals and lack of specialists. In this vision human doctors and AI assistants work together to keep Central Asians healthy.

Assel MUSSABEKOVA

Kazakh molecular biologist specialising in RNA viruses and vaccinology; she communicates vaccine science in four languages.

Future Central Asia Through a Public Health Lens

At dawn on May 1st, 2050, a father in Ak-Terek village, Kyrgyzstan, finishes his morning tea and checks a simple health app on his phone. It shows his daughter's vaccinations are up to date, the local clinic is stocked, and community health volunteers have scheduled a check-up for his elderly mother. He remembers when, in his childhood, measles outbreaks shut down entire schools and left children deaf, blind, or weakened for life – and when, back in 2024, floods nearly erased his village from the map. Today, Ak-Terek

stands stronger than before, protected by better infrastructure and by the invisible wall of herd immunity – a living version of asar, the ancient tradition of mutual aid, now reimagined for public health.

Across the region, this spirit fuels new stories of local leadership and scientific self-reliance. In Shymkent, a young veterinary virologist and her team detect a novel strain of an animal pathogen before it jumps to humans – stopping an outbreak before it starts. High in the Pamir mountains of Tajikistan, scientists and policymakers gather at a world-leading glaciology centre for an international conference on preserving glacier water quality and planning climate resilience. Unlike decades ago, when Central Asia's precious water and critical data were controlled by outsiders, today local experts lead research, negotiate on equal terms, and defend regional interests with confidence.

Our region has always been a meeting ground for people and microbes alike. We have coexisted with endemic infections like plague, brucellosis, and anthrax for centuries. Back in 2025, we carried some of the world's highest measles rates and a dangerous burden of antimicrobial resistance – tuberculosis, MRSA, Pseudomonas – thriving where misuse of antibiotics had long gone unchecked. And climate change hit us harder than most: over the last century, our average temperature rose by four degrees, while the global average rose by just one. Added to this was a deep crisis of trust, rooted in postcolonial trauma, civil wars, border conflicts, and migration.

Yet these challenges forged our resilience. By 2050, Central Asia is no longer a neglected corner within WHO Europe but an independent public health region – defined not by old struggles, but by scientific sovereignty and cultural pride.

This transformation began with how we govern and communicate. For too long, health policy was top-down: orders from distant capitals or advice from foreign sponsors who barely understood our daily realities. Real trust flows from local voices – elders, volunteers, community leaders who live what they teach. By training these trusted messengers and practicing empathy-based communication, we stopped dictating and started listening. Our traditional asar – neighbours building each other's houses – has evolved into a modern asar of building and protecting herd immunity together.

Equally critical is control of our own data. For decades, external donors owned the numbers; local scientists were sidelined or underfunded. Reliable, transparent, locally generated data became both our shield and our

lever. It freed us to make evidence-based policies, negotiate fairly, and stop relying on expensive consultants for solutions we could craft ourselves.

One concrete milestone by 2030 was the creation of the Central Asian Regional Centre for Infectious Disease Control – owned, funded, and staffed by our own experts. It unified surveillance for endemic and emerging diseases, coordinated antibiotic stewardship, set standards for water safety, and responded rapidly to outbreaks. Tied to a robust network of local laboratories and frontline health workers, it trained a new generation of virologists, epidemiologists, bioethicists, bioengineers, and science communicators – ensuring we no longer needed to "rent brains" from abroad.

By 2050, Central Asia is recognized not just for its ancient crossroads, but as a modern hub of resilient, people-centred public health – a region that turned endemic risk into shared strength, transformed mobility and migration into a source of adaptation rather than vulnerability, and safeguarded rivers and glaciers for generations to come.

In tomorrow's textbooks, students in Bukhara or Osh will read how we transformed endemic threats into community resilience. They'll see that herd immunity, clean water, and trusted health leadership were not gifts from abroad, but the legacy of a region that trusted its own people – and protected each child as its own.

Ruslan RAKHIMOV

A Tashkent-based specialist in medical technology and AI who tracks how robotics and algorithms reshape diagnosis and care.

May 1, 2050. I wake up in my apartment in Tashkent. In the morning, I receive a message from the medical AI, nothing critical, but it's time to take a quick test on my mobile device. I don't dismiss it like annoying spam; I know that rejecting technology is already dangerous. Back in the 2030s, many doctors argued, "Artificial intelligence? It will take our jobs!" But the truth is, without AI and robotics, medicine simply wouldn't have survived. The queues at clinics disappeared, not because they closed, but because robots and algorithms now do almost everything that used to take hours.

At the clinic where the AI directs me, I am greeted by a robot assistant – it doesn't look down on me or waste time. I undergo an examination: an autonomous device records an ECG, measures blood pressure and sugar levels, all quickly and almost painlessly. But the most important thing, the doctor I see

on the screen is not busy with paperwork, but discussing results with the AI and proposing a treatment plan. Doctors have learned not to fear technology but to use it as full partners.

No, I'm not describing a distant paradise where all diseases are cured. There are problems: not everyone trusts robots, not everyone has fast internet, and bureaucrats still cling to old schemes. But the main shift is the understanding that medicine is no longer just "the doctors' business," but the business of society, technology, and lifestyle.

In the evening, I walk through the streets – people of all ages are connected to their personal assistants, which remind them to take their medications, monitor vital signs, and even advise when it's best to go outside. These are not just gadgets; they are new members of our family.

Today's schoolchildren hear from parents and teachers not legends of the past, but a call to become the heirs of Avicenna's great legacy, those who manage medical robots and create diagnostic algorithms. Because the medicine of the future is not nostalgia, but a real challenge and an open path for everyone ready to create change and build a new tomorrow.

If someone had told me in 2025 that one day our AI would argue with a doctor about a diagnosis, I wouldn't have understood. But today, it's a fact. And it's these living, complex scenes that make our future not a fairy tale, but a real story.

8.5. Technology and Entrepreneurship

In the previous sections our authors have looked at Central Asia that has invested in its people, rebuilt social trust, and improved access to healthcare for all. In this section we are able to take a peek at possible futures of our region where all of this has already given fruit. Ecce artifices – behold the practitioners, who in this section walk us through how one could build a region up, say Central Asia, as a startup. Hint: it's armed with STEM and frontiered by developers who do not underestimate the power of community.

Oleg Puzanov offers us a three-pronged strategy of betting on education, entrepreneurship, and freedom of movement, which if invested in 2030 would yield Central Asia as a region that benefits from constant "brain gain" as opposed to "brain drain".

Kakajan Berdiyev offers a rare Turkmen voice focusing on hospitality as geopolitics told as a story of three Central Asian brothers-in-business whose business flourishes in the recently established Union of Central Asian States. He goes back to the shared history of the region and draws inspiration from it to advocate for this vision of a united Central Asia, one that builds on its past successes to create a second golden age.

Oleg PUZANOV

Kyrgyz serial tech entrepreneur with 20-plus years in IT; founder of several companies and mentor in programs such as "Dive into Silicon Valley" and "Unicorn From KG."

Central Asia 2050: a Region Nobody Leaves

Imagine the morning of 1 May 2050. You leave Bishkek, drop by Almaty to see friends, and then drive together to a startup conference in Tashkent. Not a single border, not one checkpoint. Education is flexible and distributed: school-children choose offline or online formats, join regional projects, and intern anywhere in Central Asia. Teams from Bangkok, California, and the "Osh Valley" – a new tech zone with tax incentives for deep-tech and logistics, create products together without thinking about borders.

Does it sound like science fiction? No. It became reality because, by 2030, we invested in three things: education, entrepreneurship, and freedom of movement.

By 2025 Central Asia preserved a high level of basic education. Near-universal literacy and solid skills in the exact sciences provided firm ground, yet one foundation was no longer enough. To stay competitive we invested in STEM, systematically, at scale, on every level. Robotics clubs, access to online courses, adult retraining, regional grants for engineering and IT, English-language

campuses spread across the region. Education became fashionable; children aspired to be scientists, engineers, biologists, architects as eagerly as they once dreamed of being TikTokers.

Entrepreneurs knew how to start from scratch, take risks, and operate in tough conditions, this was our strength. The West called it "skin in the game": people bore the consequences of their own decisions instead of shifting responsibility. Such people moved economies forward, as Nassim Taleb noted. Research showed that where resources were scarce, risk was viewed as part of the journey and failure as experience. In Central Asia, entrepreneurship became everyday life. An MIT Sloan study pointed to our strong knowledge base, willingness to experiment, and high potential for new technologies.

Entrepreneurs were always few, but we had more than average, and that was a point of pride. We turned this talent into systemic power through access to investment, protection of rights, and strong links to global markets. By 2030 we built a genuine startup ecosystem: accelerators, funds, techno parks with resources and mentors. Legal protection strengthened; administrative processes grew transparent. English became a mandatory element of educational policy across every state. For me as an engineer it made no difference whether you wrote code in Astana, Andijan, or Kochkor – if you had skills, discipline, and language, you were on the global market.

I once dreamed of a region without formal borders. Travel from Bishkek to Almaty and on to Tashkent happened without passports, without questions, without feeling you left "your" country–like within Europe. This proved more than convenience; it forged a new regional identity in which we complemented, not competed. Joint universities, laboratories, transport systems, and legal initiatives became the norm.

Central Asia in 2050 is not a utopia because we began building it in 2025. Education, entrepreneurship, and freedom of movement were the three levers that transformed our region, pulled not by distant governments or funds, but by us: young leaders, engineers, entrepreneurs, teachers, parents. We did not wait for outside help or approval.

We already had everything to become a region people long to return to. Here our children grow up free, intelligent, and able to change the world without leaving; and if they do leave, they return with new insights, horizons, projects, and partners.

Kakajan BERDIYEV
Co-Founder and Managing Partner of Maslahatçylar, an Ashgabat-based management consultancy.

The story of the three brothers Musa, Akramjon and Chingizbek in the Second Golden Age of Central Asia

…It is the 1st of May 2050. Musa, a 34-year-old Ashgabat native, began his day early this morning by picking up freshly baked baursak from a local bakery. After having breakfast in his Almaty office, he met up with his co-founders, Akramjon, 35, from Samarkand, and Chingizbek, 35, from Osh, to catch the first flight to Bishkek. These three partners, who all studied Computer Science at the University of Oxford, spent their flight discussing their strategy for expanding the operations of their IT company, Grand Yurt LLC, which they founded five years ago. Having already established a presence in all five Central Asian markets, Musa, Akramjon, and Chingizbek have now set their sights on entering the Eastern Asian markets…

…Throughout history, our shared homeland, Central Asia has been the cradle of powerful states, advanced civilizations, remarkable innovations, and diverse cultures. Today, in 2050, our Central Asian home has flourished, achieving remarkable full regional integration. This successful collaboration, initiated by the Presidents of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan thirty years ago as an annual Consultative Summit, has recently culminated in the formation of the Union of Central Asian States (UCAS). As a result, our region now stands as a global leader in economic development and a highly attractive destination for foreign investment.

Besides, in the middle of 2025 media outlets were pleased to report that Azerbaijan, Afghanistan, and Mongolia have submitted applications to become full members of our Union. Recent media reports indicate that decisions regarding these applications, along with other significant issues, are anticipated to be addressed at the upcoming Summit of Leaders in Dushanbe this October.

As we experience these hot summer days of 2025, the prospect of regional integration in Central Asia might seem distant to some, perhaps even an unattainable ideal. However, the recent significant developments in our region

suggest that this vision is indeed becoming increasingly feasible.

Over the past few years, my business and tourism travels have taken me to all the major cities of Central Asia. Across various interactions – from formal business meetings to casual conversations with politicians, entrepreneurs, traders, artists, civil servants, and everyday citizens – a consistent impression has emerged: a shared desire for greater regional integration. It is evident that individuals across Central Asia, in diverse professions, are placing unprecedented value on regionalism and cooperation more than ever before. An interesting trend is emerging: people are increasingly prioritizing trade in regionally produced goods; when new business opportunities arise, there is a growing inclination to collaborate with companies based in our region. Personally, my experiences throughout Central Asia have been remarkably positive. I have felt a strong sense of belonging in every city I visited. Considering the kinship, I felt with the people I met, it was natural to feel at home and among family.

Central Asia, our shared homeland, flourished during its First Golden Age from 800 to 1200 AD. This Era of Enlightenment positioned Central Asia as a global epicentre, leading advancements across diverse fields such as trade, governance, art, urban development, medicine, and astronomy. This Golden Age fostered an exceptional environment where numerous nations, each with distinct beliefs and identities, coexisted peacefully and collaboratively. During this initial Enlightenment period in our common history, our accomplishments in science, art, statecraft, and architecture significantly influenced the great empires and civilizations that arose in various parts of the world in subsequent centuries. Notable examples include the Ottoman Empire (1299-1922), the Timurid Empire (1370-1507), and the Mughal Empire (1526-1857). The achievements of Central Asia's First Enlightenment profoundly shaped the great empires established globally over the following millennium. Furthermore, the legacy of this four-hundred-year Golden Age in our shared past contributed to the European Renaissance (1400-1600) and provided foundational elements for the development of modern Europe and other Western nations.

Today, the descendants of our distinguished ancestors, the magnificent Sultan Alp Arslan, the brilliant Emir Timur, the wise Ismail Samani, the just Shams al-Mulk Nasr, and the strategic Ablai Khan, are diligently preparing to shape the future of our region. They dedicate themselves to acquiring knowledge and experience in leading global science, research, and innovation hubs. It is paramount that state authorities, public and private sector entities, and entrepreneurs in our region prioritize creating ample employment and life opportunities for these bright and energetic young individuals who possess a high-quality education that befits their potential.

I firmly believe that with increased opportunities, our younger generations will achieve remarkable global accomplishments, drawing upon our unique and rich cultural heritage, the entrepreneurial, and pragmatic spirit passed down from our forebears.

We are currently living through a significant historical period, as the global centre of influence appears to be shifting from West to East after roughly six centuries. Our region, Central Asia, possesses tremendous potential with its vast resources, a growing and vibrant young population, and a uniquely strategic geographical position. To fully realize this potential, achieving comprehensive regional integration must be our initial priority.

By 2050, upon successful completion of this full integration, Central Asia will be ready to enter a Second Enlightenment Period, approximately a millennium after its first. History has shown our region's capacity for profound impact, and in this new Golden Age, we can once again make substantial and positive contributions to the economic growth and prosperity of all regions, spanning from East to West.

It is remarkable how much easier it becomes to achieve something after a successful first attempt. Our ancestors demonstrated amazing success millennia ago by establishing Central Asia as a globally leading centre of development and power. Inspired by this rich history, I am confident that our youth will once again achieve tremendous success, ushering in a new era, the Second Enlightenment of Central Asia.

Indeed, in recent years, we have already witnessed a growing spirit of collaboration within the region. Our people are working together more closely, increasing regional cooperation with a shared vision.

The results of our collective efforts towards the full integration of Central Asia will be an invaluable legacy. This legacy will first and foremost benefit our young generations, the future of our region, and extend its positive influence to children worldwide. Until our paths cross again in 2050, during what I believe will be Central Asia's remarkable Second Golden Age, I wish everyone continued health and well-being.

8.6. Regional Integration and Trade

With the human potential of Central Asia at its summit on individual and community levels, what are some of the bigger changes that might happen in the region by 2050? The following three authors think the answer is in regional integration. And they are quite convincing!

For example, Anvar Rahmetov makes it clear that trade is not just about goods, it is about trust and social cohesion across borders. He imagines a future Central Asia we would love to live in – one, where flights from Tashkent to Tamchi are operated by Somon Air, where fintech platforms are developed by a Kazakh bank, co-owned by Turkmen and Tajik entrepreneurs.

Abdullo Ashurov invites us to picture a small family-run jewellery business in the Pamir mountains, who thanks to a common market, a shared legal framework, and a unified regional currency are able to ship overnight to Bishkek, Tashkent, and Ashgabat. This will require a concerted effort on behalf of the governments that will be asked to plan beyond their next election cycle and on ordinary citizens who will be asked to keep their minds open to each other and to their fellow Central Asians in order to develop regional pride that can pave the way to this unification.

Manuchekhr Salokhudinov offers us, like Morpheus once did in "The Matrix" two dreams, two futures – one in which environmental disasters compound the ever-worsening economic crisis that rips the region apart. And another in which the people, salt of the earth people of Central Asia, come together to forge a union for the benefit of the future generations, a categorical imperative of its own kind that forbade decisions that would diminish the choices of a child born seven generations further. And that changed everything.

Anvar RAHMETOV

Mid-career trade-policy professional from Uzbekistan with international experience who works to deepen Central Asian economic integration.

Many Asian nations trace their documented origins to references in Chinese archives. One such record refers to Dovon, a city-state in the Fergana Valley. Dovon was well known far beyond its borders for its legendary horses, so fast and resilient that they reportedly sweated blood. And just like that, among the earliest written records of my country is a reference to its competitive exports!

If you look at the history of Central Asia on the global stage, it is trade and exchange that made us famous – exports of horses to China, "exports" of intellectuals and knowledge during the Islamic Renaissance, the transit of goods, news and ideas along the Silk Road, "import" (welcome and acceptance) of famine-struck and deported Eastern Europeans in the 1930s and evacuated Leningrad physicists in the 1940s, and exports of cotton and gold today.

Just like its glorious past, the future of Central Asia also lies in trade – regional and global. But unlike in the past, when horses, silk, cotton, gold, and Nexias crossed borders, the future lies in the trade of knowledge, skills, and services.

Sure, we'll keep exporting commodities and merchandise. We'll also keep (and increase!) importing, despite concerns that may arise. But trade in knowledge and services will (and should!) play an ever-greater role. Uzbekistan and Central Asia better get ready.

We have already stepped-up service trade, even regionally. Think of Tashkent city's visitors from South Kazakhstan and Tajikistan, cross-border medical tourism from Afghanistan and Tajikistan, as well as transportation, logistics, marketing, financing, and engineering services embedded in the cars we export.

Combine this growth in services with a potential decline in agriculture and heavy industry: rising heat, shrinking water supplies, worsening air quality, and an increasingly skilled population will reshape our economy. Our agriculture and industry-reliant growth model will evolve, hopefully for the better.

I imagine waking up in Tashkent one morning in May 2050 to find my breakfast delivered after placing an order using an app developed by Kyrgyz programmers. I pay with my phone using a fintech platform developed by a leading Kazakh bank, co-owned by Turkmen gas and Tajik aluminium interests. My holidays are spent with the hospitable Turkmen in Avaza, the friendly Kyrgyz at Issyk Kul, and the warm-hearted Tajiks of the Pamirs. Flights from Tashkent to Turkmenbashi are operated by Air Astana, to Tamchi by Somon Air, and to Khorog by a public-private venture of American aviation enthusiasts, Tajik air control engineers, and Afghan pilots trained at Air Astana's flight school.

The airports were designed by Uzbekistan Airports in Tashkent, with minority ownership by Russian, Korean, and Turkmen investors. Interiors were styled by architectural dynasties hailing from Bukhara and Almaty. Cargo is handled by a Kyrgyz-Californian start-up that recently won a tender from the Central Asian Economic Commission to service all three airports. To celebrate its 25th anniversary, member states of the Commission granted it the procurement management rights for all three airports. Notably, the official seat of the start-up would be in California, far away from the region, but it would have been allowed to compete, nevertheless. Let the best and cheapest win!

The smart robotic systems managing cargo were engineered by polytechnic schools in Bishkek, Tashkent, and Tallinn. Eastern Europe and Central Asia are more connected than ever, thanks to Schengen visa-free travel for short visits, and e-visas for seasonal work, academic exchange, and business trips.

This future is possible. It is as desirable as it is realistic. This future, of integration, harmonization and elimination of services trade barriers, has historical precedents, under the Mongol and Ottoman Empires, under the unions of American states, Soviet republics and European coal and steel communities. It happened among the Helvetian tribes and the Arabian emirates, it happened offline, erasing physical borders and online, erasing linguistic barriers. It begins with a grand vision and small, practical steps that produce tangible, spill-over-generating results.

These steps are already underway. As we accede to the WTO and settle our border disputes and political differences, let us liberalize our services trade, allow foreign suppliers into our private markets, public procurement, capital ownership, and domestic operations. Let's remove residency barriers among Central Asians and treat regional investors as our own nationals in the establishment, operation, and income repatriation.

Today, a lot of good news is coming out of our region. We just need to stay the course, following the professional plans developed by our advisors and endorsed by our governments. Just like with economic development more broadly, regional integration isn't a sprint. It's a marathon. We've started strong and are on track. Let's keep pace and not slow down or stop.

Abdullo ASHUROV

Tajik journalist with fifteen years' experience telling stories that seek to unite and advance Central Asia.

What Central Asia could be in 2050?

When I was in high school, I remember reading a history textbook that described Central Asia in the XVII and XVIII centuries as "small khaganates warring among themselves." These words stuck with me because they reflected not only the past, but also a warning for the future. As a citizen of Tajikistan, one of the five republics of Central Asia, I dream of a different path for our region. I hope that by the year 2050, future history books will not speak of Central Asia as "five divided countries" but as a region united in purpose, prosperity, and shared identity.

I don't want the future of our region to be a newer version of the past, just with faster internet and taller buildings. My dream is that, by the year 2050, we are a region of free trade, free movement of capital, labour, and services, not divided by bureaucratic walls, but connected by shared opportunity. Not a slogan, but a challenge.

Start with trade, for example, a small family-run business in the Pamir mountains of Tajikistan that specialises in finely crafted jewellery that they themselves carve and polish out of semi-precious stones. Today, if they try to sell a necklace in Astana, they face border delays, customs documents in three languages, and the unpredictability of currency exchange. They might need to convert their earnings from somoni to dollars to tenge, paying a cut at every step. The result? They stay small, or worse, they shut down.

But in my version of 2050, they don't shut down. They expand. They ship overnight to Bishkek, Tashkent, and Ashgabat without hitting a single checkpoint. The buyer in Karaganda pays in a shared Central Asian currency, no conversion needed. The business grows, hires more workers, and upgrades its equipment, all because the system works with them, not against them.

This isn't abstract. A common market, a shared legal framework, and a unified currency are tools, not dreams. The European Union didn't stumble into integration – it built it, law by law, treaty by treaty. Central Asia can do the same, not by copying Europe, but by studying what worked and discarding what didn't.

Still, no policy can succeed if the culture stays fragmented. Right now, people in Dushanbe or Osh know more about Hollywood movies and Russian pop stars than about artists in their own region. That needs to change.

I want a teenager in Samarkand to be excited about a Kyrgyz actor. I want a Turkmen rapper to go viral across all five countries. I want film festivals that travel from city to city, where Uzbek directors win prizes in Almaty and Tajik documentaries draw applause in Bishkek. If a new Central Asian identity is going to form, it will be carried not just in treaties, but in songs, movies, jokes, and football matches.

This kind of regional pride won't appear magically. It will come from investment: in joint media platforms, language-learning programs, and regional exchange scholarships. A high school student in Bukhara should be able to study in Osh or Khujand without worrying about visas, language barriers, or legal status. If we can ship goods freely, why not ideas? Why not students?

Of course, many will say this is naïve. They'll point to the differences in politics, language, or economic priorities. But I'd argue the opposite. The real naivety is thinking small, thinking that five medium-sized countries, acting alone, will somehow compete with China, the EU, or India. Cooperation isn't idealism. It's survival.

This doesn't mean erasing differences. Kazakhstan will never be Tajikistan, nor should it be. But we can build mechanisms that make cooperation profitable, legal systems that make trust reliable, and schools that make understanding natural.

Our population will be young. That is both a blessing and a pressure point. Young people need jobs, hope, and purpose. If we don't create room for them, they will look elsewhere, or worse, fall into disillusionment. But if we do this right, they will become the entrepreneurs, engineers, filmmakers, and mayors of the new Central Asia.

This future isn't guaranteed. It depends on what we build, what we tolerate, and what we dare to imagine. It depends on people in government offices willing to plan beyond the next election. And it depends on people like us – students, parents, business owners, who are tired of hearing that borders are more important than futures.

I don't want history in 2050 to describe our era as a lost chance. I want it to say: "In the early 21st century, five nations looked at their shared past, not to repeat it, but to overcome it."

That story hasn't been written yet. We still have time to decide how it ends.

Manuchekhr SALOKHUDINOV
Senior Advisor at the OSCE Parliamentary Assembly; A Tajik professional with master's degrees in Global Economics and Public Administration, he previously advanced democratization, elections, and security-sector reform at the OSCE Programme Office in Dushanbe.

Communities That Rescue Themselves

I wake to silence.

Copper haze sheets my Dushanbe window, turning dawn sickly. My phone, down to its last flicker, spits headlines: "Mudslide buries Garm," "Panj breaks levees," "Bakery rations cut." Drone footage shows the Vakhsh swirling past stalled Rogun turbines, now the river is a scar of mud. Roofless villages slide into ravines. Power's out. Water gone.

I heat yesterday's tea on a camp stove and sprint to Shohmansur – queues already coil round shuttered windows. Beside me, little Saodat, the baker's niece, clutches two ration coupons and asks, "Will it be enough?" Diesel fumes mix with the smell of unbaked dough; chinar trees stand skeletal, leaves whitened by salt. Another sandstorm moves toward us from the south, darkening the sky.

Saodat, slowly disappearing into the haze, tugs my sleeve. "Why did you do this to us?" she whispers. Her voice drifts off with the dust.

I open my eyes again.

It is still 1 May 2050. But the world outside glows with peach-coloured dawn. Birdsong floods the room. Rose-gold light dances across smart glass; rooftop turbines purr. My phone, fully charged, shows a weather alert, clear skies across the Varzob valley for the week ahead. Behind the window, the river runs clean between reed terraces; an electric train hums toward Almaty.

Shohmansur's market thrums under solar awnings as farmers unload crates of Pamir Red tomatoes. Children scan bracelets at bread stalls; low-sugar apricot flatbread rises in geothermal ovens. I breathe the sweet

air, still tasting distant dust, and feeling relieved from my dream.

Back in the early 2030s, Central Asia had become the world's new production zone – cheap labour, cheap power, newly discovered rare earths. Major companies flocked in. Dams rose across valleys. Solar fields spread fast. Wind turbines climbed the Kyrgyz ridges. Regulations lagged behind. Each country chased its own growth targets, siloed and short-sighted.

Then came 2033. A spring heatwave melted glaciers early. A stalled jet stream parked dust storms over the Fergana. Rivers lurched from flood to trickle. Markets panicked. The grid flickered. Hospitals overflowed. People called it Soli Khushk – "the Dry Year" – though it brought more mud and flood than drought.

As systems buckled, responsibility flowed downward. While ministries argued over spreadsheets, jamoats, mosque committees, and student unions stepped in. In Khatlon, farmers opened a phone-based water auction, voting on canal gates by SMS. In Sughd, teenage coders-built apps to track pasture stress using satellite data. Communities didn't wait for rescue – they rescued themselves.

Elders and youth recalled this land had always thrived through cooperation. Caravanserais once welcomed strangers with bread and salt. Soviet canals spanned borders. Poets wrote in many tongues. Our strength, they said, lay in shared imagination – *andesha* (thought) joined with *khamkorii* (co-work), binding minds across valleys.

Then came the "Seven Generation Accord." Signed by all 5 countries. Just one clause: "No decision today may diminish the choices of a child born seven generations hence." No fines. Just a moral veto. But it changed everything. Every law, every budget faced a single test: how will it read to that child?

National agendas began to bend toward shared ones. Governments coordinated seasonal flows, power peaks, and dust forecasts. Grid interconnectors multiplied. Trade corridors greened. Cross-border universities launched twin campuses. Education shifted from rote to resilience, from memorizing answers to designing new ones.

Saodat, the girl from my dream, is now a student preparing for the regional high school science fair. Her project uses glacier runoff data to help orchard cooperatives plan seasonal harvests. She hopes to study quantum agronomy one day, pairing AI soil models with traditional moon-phase

planting. This morning, she boards the turquoise train with her uncle, headed to Bishkek to present her prototype. In two hours, she'll be onstage beside students from Karakalpakstan and Osh.

By nightfall, she'll ride home across a border she barely notices, as Ramadan begins under shared stars. Risk remains, glaciers still retreat, and dust still prowls the Kyzylkum. But the land once carved by walls now chooses bridges. Investing in future generations proved wiser than betting on extraction. The returns compound daily – in power, in trust, in hope.

I'm still at my window when a butterfly lands on the sill – black-veined wings trembling in the sunrise. Like the man who dreamt he was a butterfly, I wonder: which world is real? All I know is this: our choices keep both dreams alive.

8.7. An Ecological Future

But just as beautiful and inspiring humanity can be at its highest potential, the effects of the Anthropocene on the planet cannot be overlooked. In this final section the authors take us to futures both dreadful and amazing, where problems of today are either existentially exacerbated or overcome.

We start with Shahzada Stamova, who tells a story of a boy that refuses to draw a yellow sun in a future where the sky is always grey. It is a dystopia of air pollution taken to an extreme that is lived by people that feel achingly familiar.

Akylai Tenizbaeva then takes us on a walk through a city that remembers what it means to breathe – exactly what the reader will need after Stamova's piece. It's lush, precise, and socially sharp, laying out the path to a green future that is built step-by-step with community hands.

We finish this section with Dilobar Yuldosheva's beautiful meditation on a future where AI meets ancestral logic, where women are at the forefront of technological progress both as innovators and inventive users.

Shahzada STAMOVA

Project manager from Kyrgyzstan who pairs a love of structure and organisation with quick learning, humour and curiosity across both technical and humanities fields.

Bishkek, Spring 2050

"I remember the bright yellow sun. I remember how it scorched our fields in the summer. That heat was everywhere – there was no hiding from it, not even in the darkest corner of the house. That's why all of us kids would gather during the day and splash water on each other. And above us was a blue sky," Grandma used to say often.

Nurdin tried in vain to imagine a bright yellow sun and a blue sky. No matter how tightly he shut his eyes or strained every curve of his imagination, the image refused to form. All he could see was darkness turning into thick fog, and the sun hovered like a black dot in the sky. He knew he could imagine anything he wanted, but today the weather was especially gloomy, and this vision wiped out all else.

Sighing, he looked down at his drawing: a black sun, grey sky, brown houses, and the same-coloured fields and cars. The blue and yellow pencils lay unused, abandoned to the side.

"Five minutes until the end of class, so sign your drawings and hand them in," the teacher's voice rang out, too loud for Nurdin, who had been deep in thought. He flinched. Around him, the other kids rustled paper and started getting ready. A lingering cough could be heard from the back of the room.

"Nurdin, where's your sun? Why is your sky so grey?" asked his classmate Adilet in surprise. For a split second, fear flashed in Adilet's eyes – he quickly masked it.

The whole class turned at his loud voice. Nurdin felt uneasy under their stares, as if he'd done something wrong, as if he was trying to deceive everyone. The feeling confused him even more. Why did he feel guilty, and more importantly, guilty for what? For telling the truth?

"I drew what I see. We were told to draw the sky, and I did." Nurdin's voice trembled, which made him angry. To prove his point, he sharply threw his hand toward the window, where the same old grey sky and thick fog loomed.

“The sky is gray. Always. Where do you see a yellow sun?! Where?!”

He didn’t realize he had stood up and was nearly shouting. Now fear was plain in all his classmates’ eyes. Silence settled over the room. Everyone waited for the teacher to act. Only the persistent cough from the back seats remained.

Nurdin scanned the faces of his classmates, none of them moved. Some even looked away. In their hands were sheets coloured bright blue with a yellow circle in the centre. Everyone had drawn the same thing. Everyone was pretending.

As Nurdin searched for support and tried to wrestle with the sudden wave of disgust, a hand, Azamat Turatbekovich’s, the art teacher’s, rested on his shoulder.

“Just don’t lie to me too,” Nurdin thought desperately.

The teacher sighed heavily. Azamat Turatbekovich knew exactly what was going on in the head of this black-haired boy. Unlike these kids, he had once seen the sun, the blue sky, even the gentle orange sunsets. It was one of his favourite memories. That’s why he had turned to art, he missed those sunny days terribly and wanted to see them somewhere, somehow, even if only in his drawings. Today he had just wanted to share his favourite memory with the children, but he hadn’t expected this. He didn’t know what to say to them now, didn’t know how to soothe the pain flickering in Nurdin’s eyes, but he understood that longing all too well.

“How can he miss something he’s never even seen?”

“It used to be that way,” the teacher paused for a few seconds, as if lost in thought, and then added bitterly, “and it was so warm you could feel it on your skin.”

The students flinched, none of them had felt warmth in a long time. Though the calendar said spring, winter had long since settled not only outside but deep within people’s hearts, growing colder with each day.

There was something familiar in the teacher’s tone. Nurdin realized it was the same way his grandmother spoke. Every evening, and then every spare moment, she spoke only of that, because it was the only thing that still brought her joy, that distracted her from her endless dry cough and chest pain. The memory of her softened his anger a little, but the disgust

remained.

Nurdin shrugged the teacher's hand off with irritation and left the classroom. No one stopped him. Quietly slipping his jacket from the coatroom, he wandered toward the exit. On his way, he passed drawings on the walls – students' works meant to "decorate" the corridor. It was clear they were made by different classes, some were scribbles, others quite decent, but what united them all was this: every single one depicted the same thing – a clear sky and a yellow sun. The closer Nurdin got to the exit, the newer the drawings became, and the darker. The blue, once warm and springlike, turned cold and icy; the yellow sun grew duller with each picture. By the time he reached the end, Nurdin thought his drawing would fit perfectly here – the final stroke in this gradient of human faith and hope. A bold black dot.

Outside the school, Nurdin put on his respirator, tightened his goggles, which sealed around his eyes, and decided to walk the streets for a while before visiting his grandmother at the hospital. Whether it was the gloomy weather or what had happened in art class, something had stirred in him, a kind of anxiety. And in moments like these, he went to his grandmother. In this gray swamp, she was the only solid patch of ground, something steady and comforting.

A thick fog enveloped everything around, its soot settling on the tongue even through the respirator, but the residents had already grown used to it, simply spitting or swallowing. Coughs echoed from all sides: relentless and wild, tearing throats and causing pain.

Nurdin glanced around.

Bishkek. A small city in a basin at the foot of the Ala-Too mountains, the centre of the Chui Valley. A city of a million inhabitants a quarter century ago, when it all began here. Back then, Bishkek had barely reached that mark, but it was precisely those people who pulled the lever that diverted the tracks of the future in a completely different direction.

Akylai TENIZBAEVA

Kyrgyz researcher focused on human rights, social equity and sustainability, advocating for economic and environmental justice.

Dawn in 2050: A Breathable, Walkable Bishkek

The sun rises slowly on the first of May 2050, spilling over the Ala-Too mountains and casting a golden sheen on the rooftops of southern Bishkek. From the window of my home, a low-energy, solar-cooled apartment tucked into a dense, leafy neighbourhood – I watch the city awaken not with honking horns or choking smog, but with the soft hum of electric trams and the chatter of children biking to school. I lace up my shoes and join the quiet procession of morning walkers heading to nearby cafés, co-working spaces, and market stalls. The air smells faintly of apricot blossoms, not diesel.

This city, my city, feels radically different from the one I grew up in. It's not just cleaner. It's fairer. In Bishkek and across Central Asia, the cities of 2050 are no longer divided by who owns a car or who lives near the centre. We live in what planners now call "equity zones" – neighbourhoods where all essentials, from healthcare to education to fresh produce, are within a fifteen-minute walk. The model, once dismissed as utopian, has become the foundation of post-Soviet urban governance.

The transformation wasn't easy. In the 2020s, Bishkek teetered under the weight of its contradictions: gleaming downtown banks shadowed by informal settlements lacking sewer systems; environmental pledges undermined by the destruction of century-old trees; smog seasons that forced children indoors, while climate policy remained a donor-driven afterthought. Cars outnumbered common sense. We fought hard against the erasure of public transport, the felling of urban forests, and the widening of roads at the expense of parks. It wasn't nostalgia – it was a demand for dignity.

Our turning point came in 2030, when public pressure, galvanised by the "Asar for the City" movement, finally tipped the scale. Drawing on the ancient Kyrgyz tradition of collective aid, asar, thousands came together to push through reforms that remade Bishkek from the ground up, literally. A citizens' council was established, made up of community elders, urban youth, scientists, and janitors alike, tasked with co-designing mobility plans and land use. One of their first acts was reviving the electric trolleybus system, not just as a mode of transit, but as a symbol of local stewardship.

Cities across Central Asia followed suit. Dushanbe launched a "Green Roof" initiative, Ashgabat turned its marble-clad boulevards into pedestrian corridors, and Astana rewilded its outskirts, replacing speculative real estate with

public agroforestry parks. Tashkent, always a cultural giant, became a laboratory for climate-smart architecture that now draws students from Mali to Mongolia.

In Bishkek, every child in 2050 learns how to plant and care for trees as part of the core curriculum. The tree canopy is mapped, monitored, and cherished. Where once old oaks fell to make way for highways, today urban forests are protected by law and celebrated as commons. The city's lungs are no longer metaphorical.

But we didn't just build better infrastructure, we rewrote the social contract. New regional trade models tied to green energy have reshaped labour and migration, reducing dependency on extractive industries and allowing young people to thrive without leaving home. The diaspora, once a brain drain, became a bridge. Engineers in Berlin helped design clean heating systems for Osh; policy graduates in Toronto returned to co-write municipal budgets in Karakalpakstan.

A small but decisive step that made this future possible was passed in 2030: the Regional Environmental Justice Accord, signed by all five Central Asian republics. It mandated minimum urban air quality standards, protected public green spaces from privatisation, and tied infrastructure funds to participatory planning. It forced us to collaborate, not just across ministries, but across identities.

Today, when I stop at a local café, I overhear a teenager animatedly explaining to her grandmother how she coded a sensor that tracks particulate matter in school courtyards. Nearby, two elderly women swap seeds from their balcony gardens, discussing which grew better this spring. We still debate. We still disagree. But we breathe the same air and walk the same streets.

This vision was not the product of a single leader or a five-year plan. It came from people who chose not to accept the inevitability of pollution, inequality, and disconnection. It came from those who remembered the old ways of care – asar – and applied them not to harvests, but to housing, transport, and trees.

We cracked open a new chapter not by erasing the past, but by rewriting what it means to share space, to move, and to breathe. May 1, 2050, is not a utopia. But it is proof that when communities act with clarity and care, even smog can give way to blossoms.

Dilobar YULDOSHEVA
Uzbek media and project-management specialist skilled in gender-sensitive reporting, fact-checking and strategic communication.

Central Asia 2050: AI-Enhanced Water Stewardship for a Resilient Community

The Central Asian sun, silent arbiter of life and scarcity, watches over a region where water is both blessing and burden. For millennia, our rivers, born from ancient glaciers, whispered tales of prosperity. Yet, today, the Syr Darya mirrors retreating glaciers, its flow diminished. Our energy grids groan under division's weight. By 2050, this critical covenant with nature and each other can be reaffirmed, not through passive hope, but active collaboration. I envision a future where shared rivers weave a tapestry of resilience, reinforced by smart data, equitable practices, and ancestral wisdom.

It is dawn on May 1, 2050. The Aral Sea, once a symbol of ecological devastation, now glistens under twin solar farms. Fisherwoman Aisulu, a Kazakh elder, checks her smart dastarkhan woven with water sensors. Her catch, azure-finned sturgeon, is monitored by Tajik hydrologists via the AI-powered "Silk Water Grid." I still remember the dusty, windswept shores from my childhood; this reborn sea is a dream come true.

In Bukhara, 14-year-old Zarina codes climate-resilient crop algorithms using open-source data from Kyrgyz glaciers and Turkmen energy logs. Her school's permaculture garden thrives on karez canals, revived by her mother's women-led cooperative. Once-parched fields bloom with drought-resistant saffron, irrigated by transboundary water credits traded on CAWEX – the regional exchange. Here, Kazakhstan's wind surplus funds Tajikistan's cloud-seeding drones. The cacophony of competing national interests has dissolved into the hum of collaborative turbines.

This happened when we realized that Central Asia's salvation lay buried in its deserts: the ancient karez tunnels. These subterranean marvels sustained Silk Road oases through communal water stewardship – a tradition we needed to resurrect, not merely replicate. My gender-sensitive journalism training illuminated a crucial point: "women manage 90% of house-

hold water" yet hold "0% of decision-making seats in basin authorities." This disparity highlighted a critical leverage point for change.

Central Asia's ancient karez water systems started being transformed through modern technology. AI sensors embedded in these underground channels mapped aquifers and transmitted data to Uzbekistan's "E-Justice" satellite network, creating comprehensive water monitoring. Women like Zarina's mother were trained as "Water Mothers" to maintain solar-powered equipment, combining traditional knowledge with modern tools while creating sustainable livelihoods and empowering women as water custodians.

The region had to abandon Soviet-era "use it or lose it" water quotas that encouraged waste. With glaciers retreating at one percent annually, adaptive water rights indexed to glacier loss rewarded conservation and fostered shared responsibility. This approach had already worked before – Afghanistan's restored karez systems using similar principles increased crop yield by seventy percent, proving that integrating traditional infrastructure with modern management can create tangible benefits.

By 2030, the Central Asian Water-Energy Credit Exchange (CAWEX) launched as a blockchain-powered platform enabling resource trading across borders. Kyrgyzstan could sell hydropower to Turkmenistan for solar-desalinated water, while Uzbekistan trades carbon credits from drip-irrigated cotton for Kazakh wind technology. Built on Kazakhstan's 2027 green bonds and funded by a fifty-million-dollar World Bank program, CAWEX aimed to reduce energy poverty by forty percent by 2035 and eliminate Syr Darya water conflicts through cooperative resource management. And it did manage that.

Dawn of May 1, 2050, in Central Asia is a testament to a covenant renewed. It marks a deliberate choice to transform a region of scarcity into one of resilience, collaboration, and abundance. The Aral Sea's shimmer, the hum of collaborative turbines, and the saffron blooming in once-parched fields are the tangible dividends of foresight and courage.

The path to 2050 holds challenges. Political will must remain unwavering, transboundary trust must deepen, and mindsets must evolve. Retreating glaciers are a stark reminder of urgency. Yet, our blueprint is clear, and initial strides like CAWEX and modernized karez show palpable momentum. The convergence of ancient wisdom with cutting-edge technology, championed by a new generation like Zarina, holds the key. Empowering women as water managers promises a more equitable and sustainable future.

Our grandchildren, standing on a revitalized Syr Darya, will judge us not by treaties, but by shared rivers, thriving communities, and pervasive peace. They will witness a future where karez echoes meet smart grids, where prosperity links to ecological integrity, and where Central Asia thrives. Let the Syr Darya carry not just water, but our collective courage and profound hope for a future where water becomes the currency of peace and prosperity. This vision is within our grasp, if we choose to reach for it together, today.

AFTERWORD

The horizon sketched within the essays we have selected shimmers with art, algorithms, and shared purpose, yet a mirage fades without firm footprints. Oil still fills our coffers; water already slips through our fingers. If creativity is to eclipse the crude, we must fund studios and labs with the same resolve once reserved for pipelines. If digital clinics are to guard our health, budgets, data, and local talent must anchor every line of code.

Queues can teach patience, but civic muscle grows only when laws shield speech and power bends to audit. A common market will not bloom from slogans; it demands treaties that survive tariff disputes and election cycles. One history textbook can heal wounds only when each nation concedes it did not journey alone. Regional integration can truly work only when it is underpinned by a common legal framework and an efficient and trustworthy judicial system.

Let the song of minarets and server rooms continue, but let it share the stage with ledgers, hydrological charts, and visa stamps. Vision becomes the future when numbers balance, engineers stay, and leaders trade a measure of control for a larger commonwealth.

Hold the dream aloft; weigh it with stone. Only then will Central Asia step from bright collage to living, breathing landscape.

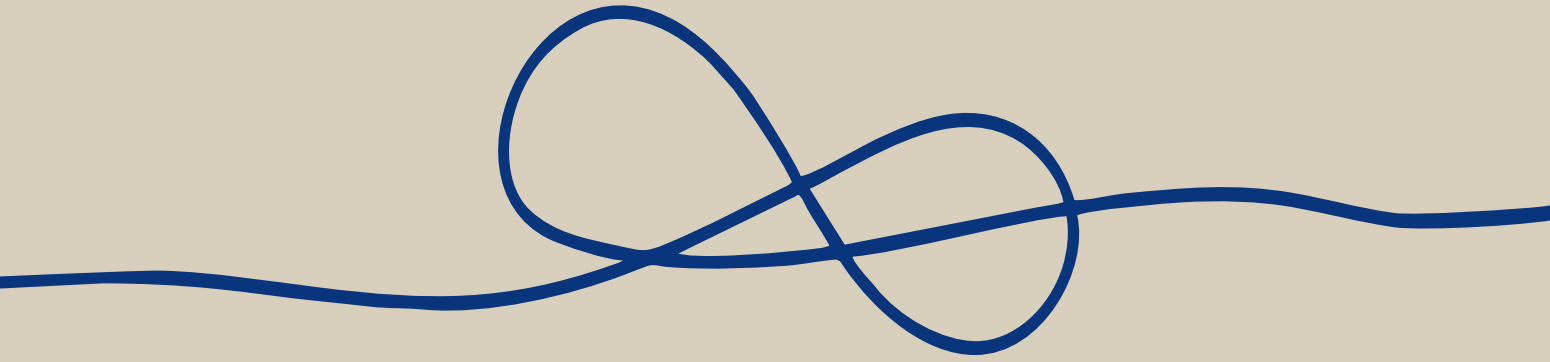
This is unreservedly a starting point for dreaming up our common future. Some of the visions may be naive and romantic, or not quite fleshed out,

lacking in details and exact pathways – but that was not the idea. Our goal with this publication was to put together an ideal image that we can have in front of our eyes as we gear up to making even 15 percent of all this real. This will require immense effort, discipline, and ability to not lose hope when things go wrong. Getting there will also mean constant negotiations with ourselves, our communities, our leaders, and those of our neighbour countries. As many of the authors suggested – this is not the time nor is it the place for waiting for something to be developed and given to us top-down, but rather a vision that each of us could incorporate in our own personal and professional lives by being a little more curious about what is happening in the other countries, learning more in depth about each other's history and culture, choosing to spend our holidays within Central Asia, or to do business in the region.

It is easy to be cynical, or to be narrow-mindedly patriotic about one's own country, clans, kins. Everything happening in the world at large and right outside our doors seems to be pushing us deeper and further into the darkness of egoism and indifference. It is much harder to imagine everything turning out to be alright. This edition shows we still have dreamers in Central Asia, who believe in the common good, in our ability to transcend borders, and to strive for a better future for all of us.

CHAPTER 9.

CENTRAL ASIA 2050: REGIONAL COOPERATION MILESTONES



The milestones outlined in this chapter build on proposals raised during the regional dialogue, reflecting a shared ambition to deepen cooperation and advance Central Asia's long-term development. They are intended not as a definitive roadmap, but as a forward-looking reference to help translate the ideas exchanged into concrete regional priorities, guide the sequencing of joint initiatives, and inform the setting of milestones towards 2040 and 2050. Their ultimate value will lie in the ability of countries across the region to refine these proposals together, establish shared objectives, and turn a common vision into coordinated action.

	I. Transport Connectivity and Trade	
1	Establish an integrated regional transport network	Identify priority cross-border infrastructure, coordinate national investment plans, and develop a unified transport corridor linking East–West and North–South routes towards 2040.
2	Reduce barriers to regional trade	Advance a Central Asian Single Customs Area through simplified border procedures, harmonised customs standards, and more efficient cross-border movement of goods.
3	Establish a regional infrastructure financing mechanism	Develop a Regional Infrastructure Development Fund to mobilise public, private, and international financing for priority cross-border projects.
4	Introduce a regional connectivity and performance framework	Establish an Infrastructure Coordination Council and a Regional Transport Connectivity Index to align investment priorities, monitor performance, and address implementation bottlenecks.

	II. Energy Security and Integration	
5	Build a more resilient regional energy system	Develop strategic gas storage, strengthen backup capacity, and improve coordination to manage seasonal fluctuations in energy supply and demand.
6	Advance towards an integrated regional energy market by 2040	Harmonise technical standards, strengthen cross-border electricity and gas networks, and establish mechanisms for coordinating national regulators and system operators.
7	Accelerate the transition towards efficient and low-carbon energy	Scale up energy-efficient technologies, renewable energy infrastructure, and digital solutions for energy planning and system management.

8	Institutionalise regional energy cooperation	Establish an Energy Council of Central Asian States and joint research initiatives to support long-term planning, innovation, and coordinated investment.
III. Water Security and Climate Resilience		
9	Strengthen regional cooperation on transboundary water resources	Improve coordination between upstream and downstream countries, develop mechanisms for joint planning and investment, and engage Afghanistan in regional water dialogue.
10	Integrate water and agricultural planning	Coordinate agricultural and water policies, promote less water-intensive crops, and improve the efficiency of water use across the region.
11	Establish a shared regional water and climate intelligence system	Develop interoperable platforms for hydrological data exchange, climate forecasting, early warnings, and monitoring of water use and aquatic ecosystems.
12	Build regional capacity for climate adaptation and ecosystem restoration	Establish a Central Asian Climate Centre, develop a joint programme on greening and combating desertification through 2050, and strengthen cooperation on water governance and environmental standards.
13	Create a regional centre of competence for water management	Connect research institutions, policymakers, and practitioners to develop evidence-based solutions and accelerate the adoption of water-efficient technologies.
IV. Social and Human Development		
14	Facilitate the movement of people, goods, and services	Advance towards a common Central Asian social and economic space by 2040 through mutual recognition of qualifications and identity documents, greater portability of social entitlements, and interoperable digital systems.
15	Strengthen regional identity through shared cultural and social initiatives	Protect traditional crafts and intellectual property, expand regional cooperation in sports and digital competitions, and promote healthy lifestyles and active ageing.
16	Expand opportunities for regional cultural and economic exchange	Develop joint marketing, education, and export initiatives that connect local producers, artisans, young people, and communities across Central Asia.

Implementation Principle

These milestones should be pursued through **coordinated national strategies, prioritised cross-border investments, shared data and monitoring systems, and clearly defined institutional responsibilities.** Progress should be assessed against agreed regional targets, with implementation sequenced according to feasibility, financing, and the expected benefits for regional connectivity, resilience, and prosperity.

APPENDIX: COUNTRY OVERVIEWS

KAZAKHSTAN

Demographic Changes in Kazakhstan

Kazakhstan, the world's ninth-largest country by area, has seen significant population growth over the past three decades. Since 1992, its population has grown by 23 percent, reaching 20.3 million at the start of 2025, driven primarily by natural increase. This growth is linked to a total fertility rate of 3.0 and a declining mortality rate, both of which have contributed to a notably young population structure.

The country's average age is 32, with nearly one-third of its population made up of children, and another third aged 10–24. At the same time, the older age cohorts (aged 60–64 and 70+) have already doubled in size, signalling the onset of population ageing. By 2050 the share of the population over 65 is expected to rise from 8 percent to nearly 15 percent.

Demographic Dividend

The Government of Kazakhstan is working to turn demographic trends into a source of competitive advantage, chiefly through investment in human capital–improving the quality of healthcare, education, and workforce skills. A young population opens a "window of opportunity" as large cohorts of children and adolescents move into working age.

Realising this demographic dividend will require:

1. Minimising unemployment as far as possible;
2. Increasing the share of youth and women in the overall workforce;
3. Increasing both the volume and effectiveness of investment in human capital.

Population growth has been concentrated mainly in the southern and western

provinces, and in the major cities of Astana, Almaty, and Shymkent, while the northern provinces are seeing population decline. This has direct economic consequences: economic activity is contracting in the north even as southern regions and major cities face labour surpluses, and their infrastructure is under strain. The result is a clear demographic imbalance between a sparsely populated, ageing north, and a densely populated, youthful south and west.

The urban population accounts for 63 percent of Kazakhstan's total population, with the remaining 37 percent living in rural areas concentrated mainly in the south. Among external migrants (roughly 226,000 people), 92 percent arrive from CIS countries, with ethnic immigration being a significant factor.

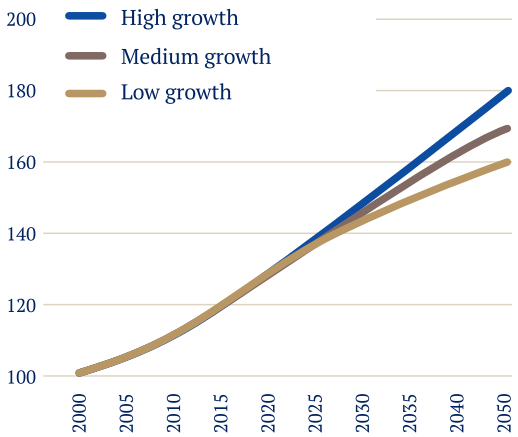
Kazakhstan has 61 dependents (children and elderly people) for every 100 people of working age–above the global average of 55. This means that for a working-age population of over 12 million, there are approximately 7.5 million dependents (5.8 million children aged 0–14, and 1.7 million people over 65).

Regional and Subnational Disparities

Across Kazakhstan's vast territory, there are significant differences in population size, density, and age-sex composition, reflected in the varying levels of economic development, climatic conditions, and vulnerability to emergencies.

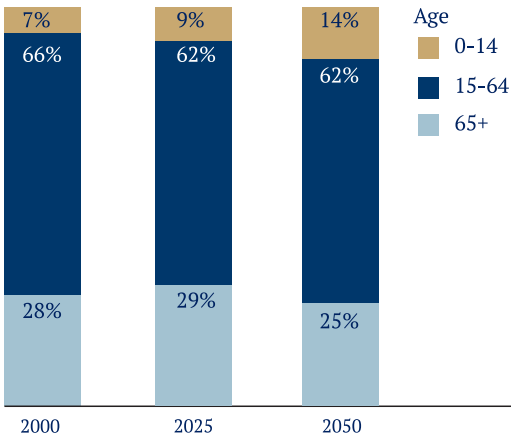
Incorporating demographic data into national and regional development planning is critical. Mapping areas prone to natural disasters, or those that are sparsely populated, allows for more effective resource allocation and strengthens regional resilience.

Actual and projected population growth scenarios (2000–2050)



Population in 2000 = 100. UNFPA calculations based on UN DESA Population Division estimates (2000–2025) and projections (2025–2050).

Actual and projected shares of age groups (2000, 2025, 2050)



UNFPA calculations based on UN DESA Population Division estimates (2020), medium-growth projection (2025, 2050).

KYRGYZSTAN

Demographic Changes in Kyrgyzstan

At the start of 2024, Kyrgyzstan's population stood at 7.2 million, with 65 percent living in rural areas and 35 percent in urban areas. Between the 2009 and 2022 censuses, the population grew by 29.3 percent (31.8 percent in urban areas and 28.1 percent in rural areas) being likely the fastest growth rate in the country's history.

According to UN projections, the period of fastest population growth still lies ahead over the coming 25 years–the population is expected to exceed 9.6 million by 2050. Sustained high birth rates have driven steady growth for decades, despite significant migration outflows in the 1990s, and economic migration between 2000 and 2010.

The total fertility rate has eased slightly since 2019, averaging 2.7 children per woman aged 15–49 in 2023. That same year, 31,500 deaths were recorded, down 5.4 percent from 33,300 in 2019, with the crude death rate falling to 4.4 per 1,000 (from 5.1 in 2019).

According to the 2022 census, women outnumber men by 78,100, though the sex ratio remains fairly stable at 978 men per 1,000 women (compared with 974 in 2009). A significant gap emerges with age: women over 80 are nearly twice as numerous as men.

In 2023 the population breakdown was: children and adolescents (below working age), 35 percent; the working-age population (women 16–57, men 16–62), 57 percent; and the elderly (over 65), 8 percent.

The emigration of people of reproductive age and skilled workers, particularly the young, has significantly impacted the country's economy and demographic structure. Most labour migrants are aged 18–45, and often leave together with their families. Roughly 53 percent of migrants are women, who frequently face difficulties securing fair employment and social protection abroad–underscoring the gendered dimension of migration-related vulnerability.

The average life expectancy in Kyrgyzstan rose from 69.1 years in 2009 (65.2 for

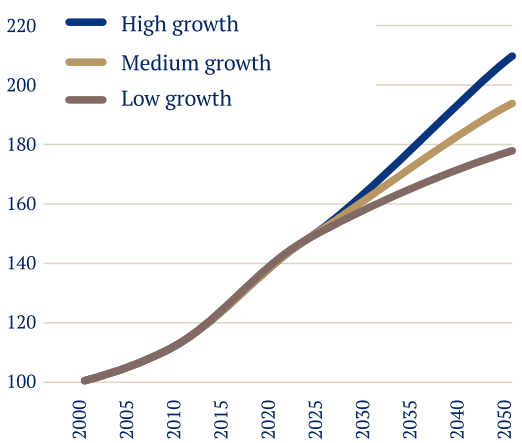
men, 73.2 for women) to 71.9 years in 2022 (68.0 for men, 76.3 for women). Although the share of the population over 65 remains relatively low, at 5.7 percent, it is projected to rise to 10 percent by 2050 according to UN DESA's medium-variant projection.

Demographic Dividend and Youth Employment in Kyrgyzstan

According to 2023 data, 47.5 percent of young people aged 15–28 were part of the labour force. Male participation reached 63.1 percent, compared with just 30.9 percent for women. Overall unemployment in this age group stood at 9.3 percent–lower among men (7.6 percent) than women (12.9 percent).

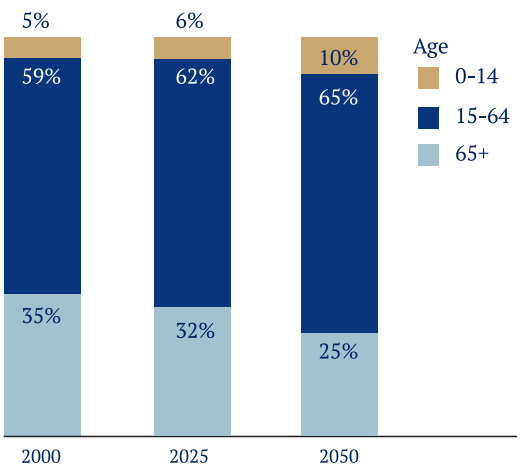
This gender gap in labour force participation is driven largely by young women leaving work after childbirth, or not entering the workforce at all, owing to a shortage of childcare–reflected in a preschool enrolment rate of just 25 percent. In addition, 19.1 percent of young people aged 15–24 are not in education, employment, or training (NEET), being a rate 2.4 times higher among young women (27.3 percent) than among young men (11.3 percent). The main drivers of youth unemployment are a shortage of decent jobs, low and unappealing wages, and a lack of professional experience and training.

Actual and projected population growth scenarios (2000–2050)



Population in 2000 = 100. UNFPA calculations based on UN DESA Population Division estimates (2000–2025) and projections (2025–2050).

Actual and projected shares of age groups (2000, 2025, 2050)



UNFPA calculations based on UN DESA Population Division estimates (2020), medium-growth projection (2025, 2050).

Additional Considerations

Kyrgyzstan's current development trajectory, with a projected economic growth of 5.8 percent in 2024 and continued investment in social infrastructure, creates real opportunities for sustainable socioeconomic development. Strategic steps to diversify the economy, including expanding energy production, improving transport and trade links, and advancing digitalisation and innovation, will further strengthen the country's capacity for job creation and human capital growth.

APPENDIX: COUNTRY OVERVIEWS

TAJIKISTAN

Demographic Changes in Tajikistan

Tajikistan's population has doubled since the nation gained its independence, from roughly 5 million in 1991 to over 10 million in 2024, and is projected to reach 15 million by 2050. This growth is driven by a high but gradually declining fertility rate (with a total fertility rate of approximately 3.5), a falling mortality rate (4.6 per 1,000 in 2023), and a rising life expectancy, now at 71 years.

Despite a persistently high birth rate (26.1 per 1,000 in 2023), population growth is gradually slowing. Between 1991 and 2023, natural increase totalled approximately 5.2 million people. Net migration remains moderate: in 2023, the rate stood at -1.9 per 1,000, equivalent to a net outflow of 19,999 people.

The population skews towards young people, with 36 percent being under 15, and 60 percent being of working age (15–64). The elderly (65 and over) make up just 4 percent of the population today, but this share is expected to nearly double by 2050, reaching 1.1 million people (7.7 percent). The working-age population is projected to grow from 6.2 million in 2024 to 9.8 million by 2050. Women make up 49.4 percent of Tajikistan's population.

Urbanisation remains low, with 71.2 percent of the population living in rural areas. Regional disparities are significant: the Sughd and Khatlon regions together account for 65 percent of the population, while the Gorno-Badakhshan Autonomous Region, covering 45 percent of the country's territory, is home to just 2.3 percent of its population.

Demographic Dividend and Challenges in Tajikistan

Tajikistan is entering an early demographic dividend phase: by 2050, its working-age population is expected to grow by 3.6 million. The dependency ratio has fallen from 90 dependents per 100 working-age individuals in 1991 to 67 in 2023, and continues to decline. At the same time, even as the child dependency ratio falls, the share of elderly dependents is gradually rising–an early sign of popu-

lation ageing. With timely and well-targeted investment, this demographic shift could become a driver of rapid economic growth, innovation, and poverty reduction.

Challenges around human capital persist, however. Despite a low official unemployment rate of 1.9 percent, Tajikistan's labour force participation remains low–at 31.8 percent for women and 51.3 percent for men in 2024, both below the regional average. These figures point to significant missed opportunity, and untapped economic potential. According to 2024 World Bank data, roughly 36 percent of youth aged 15–24 are not in education, employment, or training (NEET), with a marked gender gap: 25 percent of men, compared to 47 percent of women. Overall, one in five young people remain an untapped economic resource.

Tajikistan's World Bank Human Capital Index stands at 0.50, being the lowest in the region, and 111th out of 174 countries globally. Effectively realising the country's demographic potential will require:

> Expanding access to quality education and building skills;
>
> Promoting job creation for youth and women;
>
> Investing in accessible, quality healthcare, including sexual and reproductive health services;
>
> Strengthening systems for ageing and social protection.

Additional Considerations

Tajikistan's demographic future is shaped not only by its birth and ageing rates, but also by migration, urban-rural inequality, and shifting gender norms. Job creation in the nation has yet to keep pace with labour force growth, making labour migration a critical part of socioeconomic life: more than half a million citizens work or live abroad, primarily in Russia, with remittances accounting for nearly 45 percent of the nation's GDP ($5.9 billion in 2024).

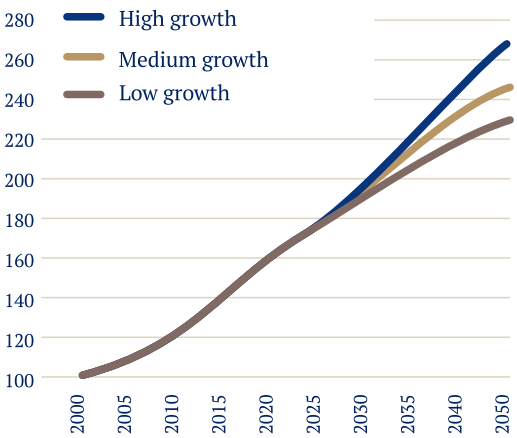
Significant disparities persist between urban and rural areas in terms of access to education, healthcare, and employment. Early marriage and gender inequality continue to limit women's and girls' full participation in social and economic life.

The country also faces recurring natural disasters and climate impacts, such as

floods, landslides, drought, and earthquakes, particularly in mountainous and rural areas. These events heighten vulnerability and pose risks to development. They carry both immediate and long-term consequences for livelihoods, infrastructure, and well-being, especially in affected regions.

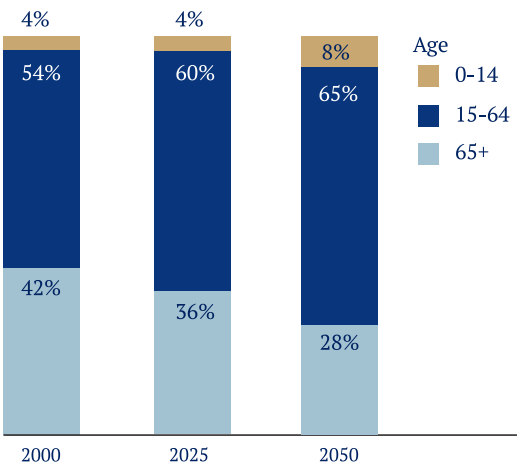
At the same time, Tajikistan is advancing its digital transformation, for the purpose of improving its governance, service delivery, and inclusivity. Expanding digital infrastructure and literacy, particularly among youth and rural populations, could help narrow development gaps and open new avenues for participation in the digital economy. However, progress remains constrained by limited infrastructure, low digital skills, and a persistent urban-rural digital divide.

Actual and projected population growth scenarios (2000–2050)



Population in 2000 = 100. UNFPA calculations based on UN DESA Population Division estimates (2000–2025) and projections (2025–2050).

Actual and projected shares of age groups (2000, 2025, 2050)



UNFPA calculations based on UN DESA Population Division estimates (2020), medium-growth projection (2025, 2050).

TURKMENISTAN

Demographic Changes in Turkmenistan

Turkmenistan's population stands at approximately 7 million, and has shown slowing growth in recent years as birth and death rates converge. The population is almost evenly split between men and women.

According to the 2022 census, 57 percent of the population is of working age, 34.9 percent is below working age, and 8.1 percent is above it. The average age is around 30, and the dependency ratio stands at 39.7 percent.

According to UN data, average annual population growth between 2010 and 2015 was around 1.3 percent. The latest figures for 2023 show annual growth reaching 1.8 percent, with a birth rate of 22 per 1,000, and a mortality rate of 6 per 1,000. Life expectancy at birth is approximately 70 years, and net migration in 2023 totalled 14,646.

Current demographic forecasts suggest that these trends will persist: a period of relatively slow growth will give way to a moderate decline, bringing the population to roughly 9 million by 2050. With the fertility rate having fallen from 3.2 to 2.6 over the past decade, the working-age population is nonetheless expected to grow by nearly 1 million, exceeding 5.2 million by 2050.

The share of the population under 15 is expected to gradually shrink, reflecting the declining birth rate, while the share over 65 will double – from around 8 percent today, to nearly 15 percent by 2050.

Demographic Dividend and Socioeconomic Aspects

Turkmenistan's potential demographic dividend rests on the fact that 57 percent of its population is of working age, according to the 2022 census. In that year the nation's official unemployment rate stood at 5.4 percent, split almost evenly between women (5.5 percent) and men (5.4 percent).

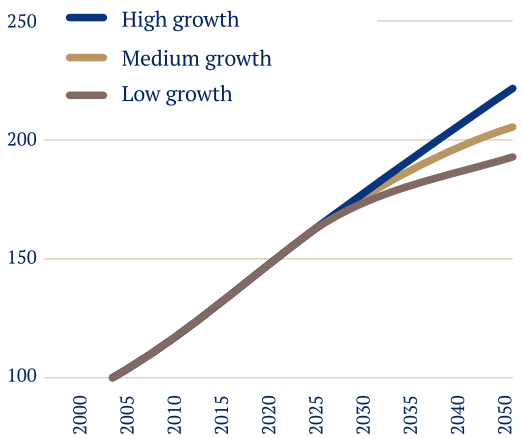
Employment patterns show that 87.1 percent of the working population is em-

ployed in their place of residence, 5.3 percent in other regions of the country, and 7.63 percent abroad.

In 2023, the NEET rate among young people aged 15–29 reached 14.9 percent, being above the average for the Europe and Central Asia region (13.1 percent), and with a particularly high share among young women.

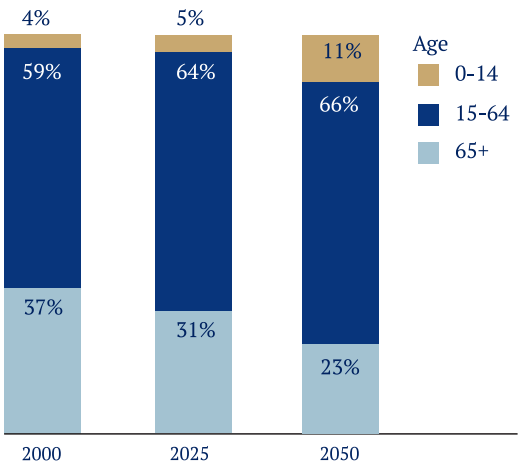
The 2022 census also captured data on self-employment: 31.9 percent of self-employed people worked without hired staff, 51.2 percent of them being women–these statistics underscore the need for targeted measures to better engage this part of the working-age population. On a more positive note, the share of women entrepreneurs reached 32.5 percent in 2022.

Actual and projected population growth scenarios (2000–2050)



Population in 2000 = 100. UNFPA calculations based on UN DESA Population Division estimates (2000–2025) and projections (2025–2050).

Actual and projected shares of age groups (2000, 2025, 2050)



UNFPA calculations based on UN DESA Population Division estimates (2020), medium-growth projection (2025, 2050).

UZBEKISTAN

Demographic Changes in Uzbekistan

According to national data Uzbekistan's population reached 37.4 million in 2024, being nearly half of Central Asia's total population. The country is undergoing significant demographic change, driven by high birth rates, migration, and the early stages of population ageing. The population is projected to exceed 40 million by 2030, and to reach 52 million by 2050.

In 2024 the annual population growth remained high at 2.0 percent, being nearly double the global average, driven by a consistently high birth rate (926,422 newborns) and a total fertility rate of 3.35. These patterns reflect prevailing social norms, particularly in rural areas where early marriage and large families remain widely valued.

Although Uzbekistan remains a young country, with 55 percent of its population being under 30, its demographic profile is gradually ageing–the median age is projected to rise from 29.3 in 2024 to 35.0 by 2050.

As healthcare quality and social support continue to improve in Uzbekistan, it is expected that life expectancy will lengthen accordingly. The fastest-growing age group will be those over 65, rising from 2.2 million in 2024 to 6.1 million by 2050. The number of people over 85 will grow from 80,000 to 660,000–necessitating reform across healthcare, education, social protection, employment policy, and other areas of public life.

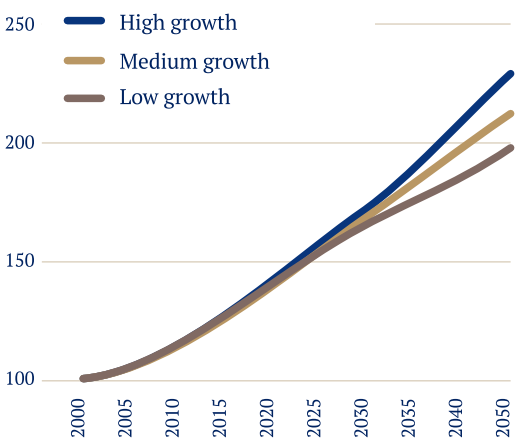
Demographic Dividend

Uzbekistan's working-age population (aged 15–64) is projected to grow from 23.9 million in 2024 to over 33 million by 2050, remaining a key driver of economic growth. Over the next 25 years, net annual growth in the working-age population is expected to average around 346,000 people: roughly 780,000 will join the workforce each year, while 434,000 will exit due to

retirement (the retirement age is currently set at 60 for men and 55 for women). This favourable age structure creates substantial opportunity for rapid economic development.

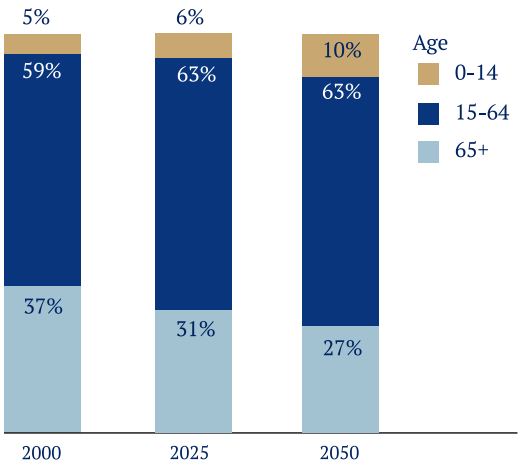
This demographic dividend could be further strengthened through greater gender equality: women could, in principle, make up nearly half the workforce (an estimated 49.5 percent), though in 2024 their actual share stood at 43.6 percent. Among youth aged 15–25, 20 percent of women are NEET, compared with 10 percent of men. The gender pay gap remains substantial, at 31.7 percent in 2022 (based on average wages), which is well above the global average of 20 percent. These disparities are compounded by prevailing gender norms, in which women spend an average of 5.27 hours per day doing unpaid care work.

Actual and projected population growth scenarios (2000–2050)



Population in 2000 = 100. UNFPA calculations based on UN DESA Population Division estimates (2000–2025) and projections (2025–2050).

Actual and projected shares of age groups (2000, 2025, 2050)



UNFPA calculations based on UN DESA Population Division estimates (2020), medium-growth projection (2025, 2050).

APPENDIX: ENERGY PORTFOLIOS

This section examines key aspects of energy security and regional trade for the five Central Asian countries, through two illustrative scenarios which track the development of their energy systems from 2025 to 2050:

> A low-carbon development scenario – reflecting a transformation aimed at reducing emissions and expanding the share of renewable energy.
>
> A baseline scenario (without emissions reduction) – demonstrates the development of energy systems without targeted emissions reduction.

The actual future situation will likely fall somewhere between these two scenarios. Comparing them helps identify synergies between the countries, and clarify key elements for strategic planning.

Key Indicators:

• **Primary energy production** – the extraction and production of energy from natural sources before conversion into another form, measured in petajoules (PJ).

• **Share of renewable energy sources** (RES) – the percentage of biomass, hydropower, solar, and wind energy within the total primary energy supply.

• **Net import dependency** – the extent to which a country depends on energy imports, calculated as the share of net imports within the total primary energy supply. Positive values indicate a net importer, while negative values indicate a net exporter.

KAZAKHSTAN

Currently the region's energy export volume is roughly equal to its domestic consumption, but global shifts in the energy sector could significantly reduce future opportunities for fossil fuel exports.

Low-Carbon Development Scenario:

> The volume of energy exports relative to domestic supply could fall by as much as three-quarters (Figure 10.1, right-hand graph, orange lines).
>
> At the same time, new opportunities will emerge for exporting "green" electricity to neighbouring countries, given Kazakhstan's high potential for wind and solar energy generation.

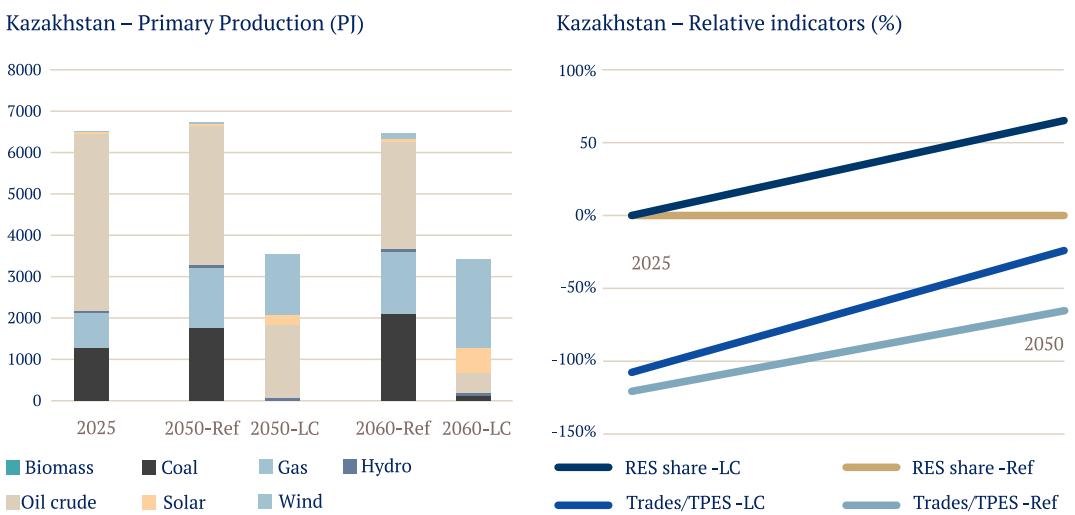


Figure 10.1. *Kazakhstan: energy security and regional electricity trade. Source: World Bank energy system model. Note: Ref: reference scenario; LC: Low Carbon Scenario. RES share: share of renewable energy sources in total energy supply. Trade/TPES: net import dependency. Where net import dependency is negative, the country is a net exporter.*

APPENDIX: ENERGY PORTFOLIOS

Global Low-Carbon Ambitions:

Efforts to achieve global carbon neutrality after 2050 could sharply constrain opportunities for natural gas and crude oil exports and production alike (Figure 10.1, left-hand graph).

Growth in the Share of Renewable Energy:

> RES could rise from nearly 0 percent of the energy supply today to over 60 percent by 2050 (right-hand graph, green lines).
>
> This would help secure sustainable energy security, and support the country's Net Zero goals for 2060.

Kazakhstan's Energy Transformation:

The shift toward a low-carbon system will substantially reduce both the demand for and production of coal in the national energy sector (Figure 10.1, left-hand graph).

KYRGYZSTAN

Electrification and "Green" Energy Exports:

The country has the potential to fully electrify its domestic market, and reduce imports of petroleum products.

Surplus renewable electricity could be exported to neighbouring countries.

This would allow Kyrgyzstan to move from importing roughly 40 percent of its energy today, to becoming a net exporter by 2050 (Figure 10.2, right-hand graph, orange lines).

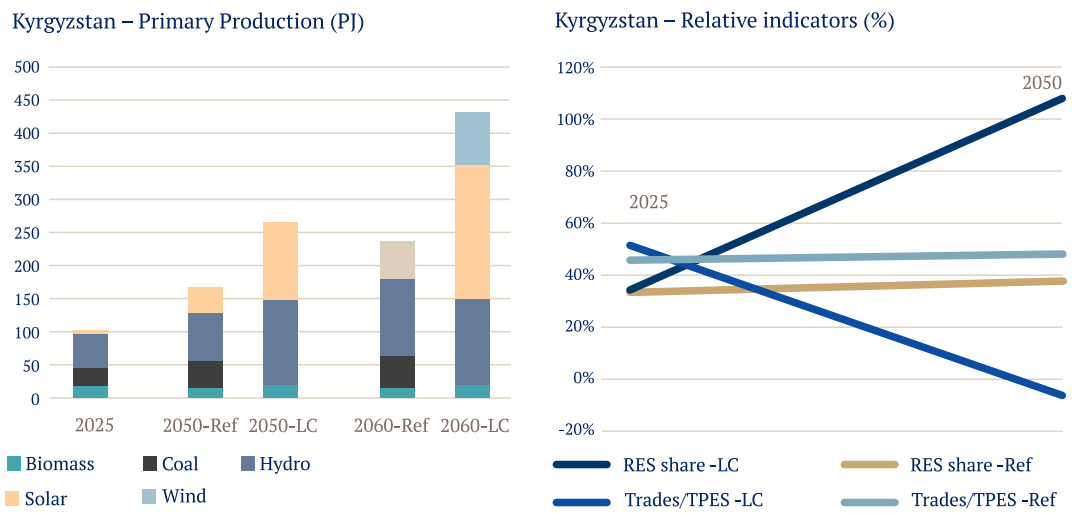


Figure 10.2. *Kyrgyzstan: energy security and regional electricity trade. Source: World Bank energy system model. Note: Ref: reference scenario; LC: Low Carbon Scenario. RES share: share of renewable energy sources in total energy supply. Trade/TPES: net import dependency. Where net import dependency is negative, the country is a net exporter.*

APPENDIX: ENERGY PORTFOLIOS

Reducing Coal Use:

Economically viable coal reserves could be exhausted within 10 to 15 years.

Reducing coal consumption aligns with 2050 Net Zero goals, and would reduce air pollution caused by coal combustion.

Developing Renewable Energy:

The potential of solar projects could match that of hydropower.

Plans call for expanding hydropower capacity by more than 4 GW by 2050, including expansion of the Kambarata-1 hydropower plant.

Under a low-carbon trajectory, domestic renewables could supply 100 percent of the energy balance by 2050 (Figure 10.2, right-hand graph, green lines).

TAJIKISTAN

Electrification and Green Energy Exports:

The country could supply a large share of its domestic energy market through renewables.

Imports of petroleum products could fall by roughly 75 percent from baseline levels.

Surplus renewable electricity could be exported to neighbouring countries.

This would allow Tajikistan to shift from being a net energy importer (currently around 20–30 percent) to a net exporter by 2050 (Figure 10.3, right-hand graph, orange lines).

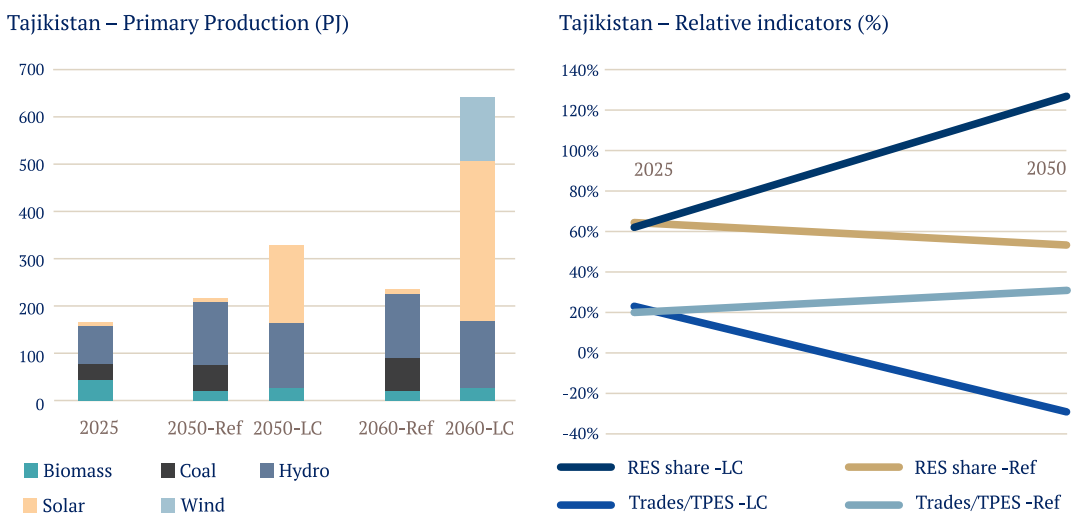


Figure 10.3. *Tajikistan: energy security and regional electricity trade. Source: World Bank energy system model. Note: Ref: reference scenario; LC: Low Carbon Scenario. RES share: share of renewable energy sources in total energy supply. Trade/TPES: net import dependency. Where net import dependency is negative, the country is a net exporter.*

APPENDIX: ENERGY PORTFOLIOS

Reducing Coal Consumption and Air Pollution:

Transitioning to a low-carbon system could eliminate domestic coal demand entirely by 2050.

Air pollution from coal-based heating would be reduced accordingly.

Development of Hydro and Solar Power:

Solar potential could match or exceed hydropower capacity by 2050.

Meeting these goals requires renewables to reach 100 percent of the supply mix (Figure 10.3, right-hand graph, green lines).

TURKMENISTAN

Exports and Domestic Consumption:

Energy exports today run at roughly double the domestic consumption.

Global shifts in the energy market, alongside a transition to renewables and greater reliance on domestic sources, could reduce long-term export opportunities.

Turkmenistan's natural gas will likely remain part of the global market through 2050, even under Low Carbon Scenario adopted by major importing countries (Figure 10.4, right-hand graph, orange lines).

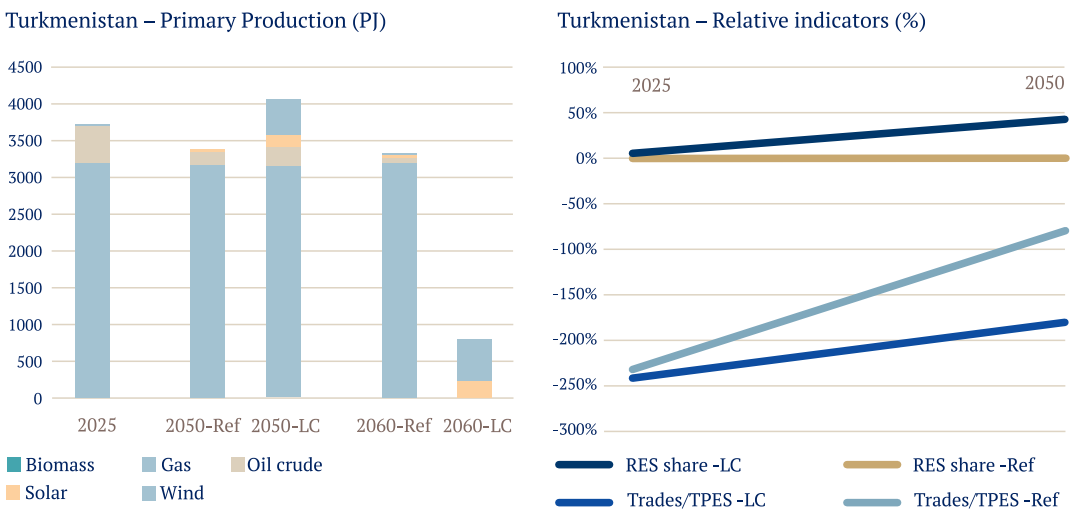


Figure 10.4. *Turkmenistan: energy security and regional electricity trade. Source: World Bank energy system model. Note: Ref: reference scenario; LC: Low Carbon Scenario. RES share: share of renewable energy sources in total energy supply. Trade/TPES: net import dependency. Where net import dependency is negative, the country is a net exporter.*

APPENDIX: ENERGY PORTFOLIOS

The Impact of Global Low-Carbon Ambitions:

After 2050, gas exports and production will likely face significant pressure as major economies achieve carbon neutrality (Figure 10.4, left-hand graph).

Development of Renewable Energy:

RES could grow from almost 0 percent of the energy supply today, to more than 50 percent by 2050.

This growth is essential if the country is to meet its low-carbon goals (Figure 10.4, right-hand graph, green lines).

UZBEKISTAN

Import Dependence Without Emissions Reduction Targets:

If current approaches continue unchanged, import dependence could reach approximately 80 percent by 2050 (compared with 10 percent in 2025), even with substantial domestic gas production and large import volumes.

The Impact of Renewable Energy Development:

Under a low-carbon development path, import dependence would fall below 20 percent by 2050, driven by growth in electricity generation from domestic renewables (Figure 10.5, right-hand graph, orange lines).

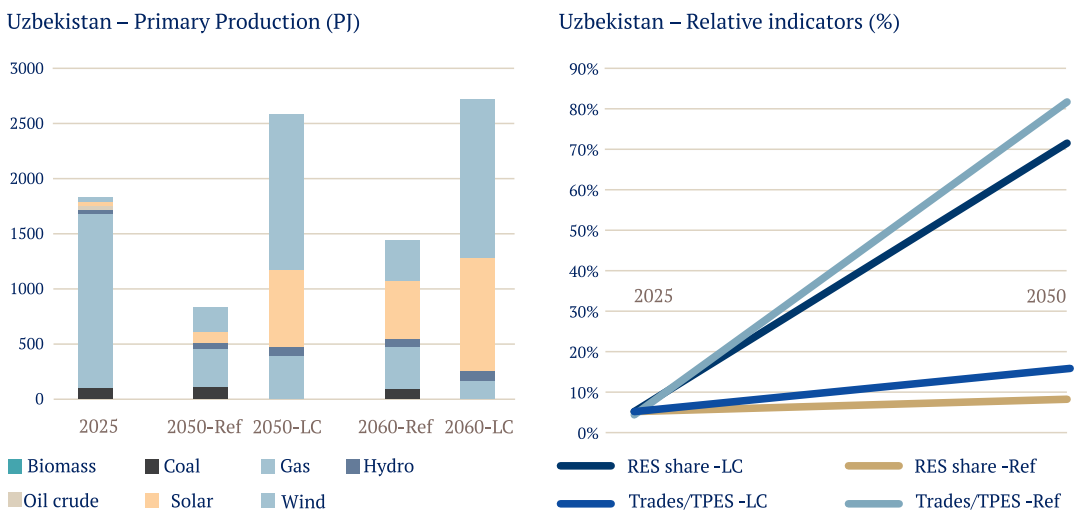


Figure 10.5. *Uzbekistan: energy security and regional electricity trade. Source: World Bank energy system model. Note: Ref: reference scenario; LC: Low Carbon Scenario. RES share: share of renewable energy sources in total energy supply. Trade/TPES: net import dependency.*

APPENDIX: ENERGY PORTFOLIOS

Natural Gas Extraction and Long-Term Constraints:

Projected gas extraction levels are consistent with the Low Carbon Scenario through to 2050.

After 2050, domestic gas production will need to be constrained to meet near-zero emissions targets, as demand shifts toward cleaner alternatives – both renewable energy, and a sustainable centralised heat supply (Figure 10.5, left-hand graph).

The Need to Expand RES Capacity:

Meeting low-carbon targets will require a substantial increase in solar and wind generation – over 2,000 PJ by 2050–2060.

Nuclear power could serve as a partial alternative to renewables (Figure 10.5, left-hand graph).

RES could grow from nearly 0 percent of the energy supply today to over 70 percent by 2050, being a crucial step towards achieving the country's low-carbon goals (Figure 10.5, right-hand graph, green lines).

New Opportunities and Markets for Clean Energy in Central Asia

The adoption of targeted state policies and roadmaps in the energy sector is opening broad opportunities across households, industry, and services, through investment in efficient, clean technologies. These opportunities fall into several key areas:

1. Energy Security – expanding regional gas and electricity trade, and reducing dependence on fossil fuels through the active rollout of renewable energy.

2. Increasing Competitiveness – building human capital through greater energy efficiency, modern technology adoption, training, and professional development, all contributing to productivity gains across enterprises and services.

3. Reducing Consumer Costs – reducing energy consumption and lowering household expenses, through the adoption of high-efficiency technologies such as solar panels, heat pumps, electric vehicles, and modern public transport.

4. Creating "Green" Jobs – training specialists at universities and colleges, and generating demand for their employment in installing and maintaining solar, wind and hydroelectric plants, heat pumps, and electric vehicles.

By 2050, the region's clean energy market is set to grow dramatically: electricity generation is expected to more than quadruple, with installed RES capacity potentially reaching 655 GW in a Low Carbon Scenario.

Solar capacity could grow nearly thirtyfold by 2050, led by Uzbekistan and Kazakhstan. Wind power could grow more than fifteenfold, with Kazakhstan and Uzbekistan being the main hubs. Hydropower (most notably the Rogun and Kambarata projects) will remain critical for the region, with energy generation from this source increasing more than elevenfold. By 2030 it is expected that battery storage systems will help balance the grid,

particularly in countries with limited water resources such as Uzbekistan and Turkmenistan.

Electric vehicles and heat pumps are expected to become widespread – by 2050, Central Asia could have up to 20 million electric vehicles, with more than half of households using heat pumps. Improving energy efficiency is expected to be a key goal, with energy consumption expected to fall by up to 30 percent, and final consumption by roughly a third. This greater energy efficiency can be achieved through improved technological standards, modernisation, investment in new technology, and greater public awareness.

It is expected that the labour market will also change accordingly. The energy sector is already one of the world's largest employers, providing jobs for 67 million people in 2023. In Central Asia, it is expected that strengthened energy security and market integration will create new jobs through boosting trade volumes, improving supply reliability, and modernising enterprises. Job losses in traditional coal, oil, and gas sectors will be offset by growth in renewables – a sector which has already seen a 15 percent increase in jobs in recent years, and now accounts for roughly half of all energy-sector employment in Central Asia.

Taken together, Central Asia's energy transition is expected to not only strengthen the region's security and competitiveness, but also create new markets, jobs, and opportunities for sustainable development.

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ACKNOWLEDGEMENTS

This book is the result of a collective endeavour, built on a shared belief in Central Asia's potential and the importance of thinking together about its future. It brings together the ideas, expertise, and commitment of people and institutions who contributed to a common ambition: to look beyond immediate challenges, explore the region's long-term prospects, and help shape a more connected, resilient, and prosperous Central Asia. We are deeply grateful to everyone who believed in this vision and supported its realisation at every stage.

The idea of convening a regional foresight dialogue and developing this book emerged in the context of the far-reaching reforms undertaken under ***the leadership of Shavkat Mirziyoyev, President of the Republic of Uzbekistan****. We express our sincere gratitude to the President for his strategic vision, personal engagement, and continued support for initiatives that encourage open dialogue, strengthen analytical thinking, and foster a forward-looking approach to policymaking. This commitment created an important foundation for bringing together diverse regional perspectives and exploring the future of Central Asia as a shared endeavour.*

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A publication of this kind is never the work of a single institution or individual. It emerges from a shared commitment, sustained through many contributions – intellectual and practical, institutional and personal. We are grateful to everyone who helped turn the initial idea into a regional conversation and, ultimately, into this book. We hope it will serve not as the conclusion of that conversation, but as a starting point for further reflection, deeper cooperation, and collective action towards the future Central Asia seeks to build.

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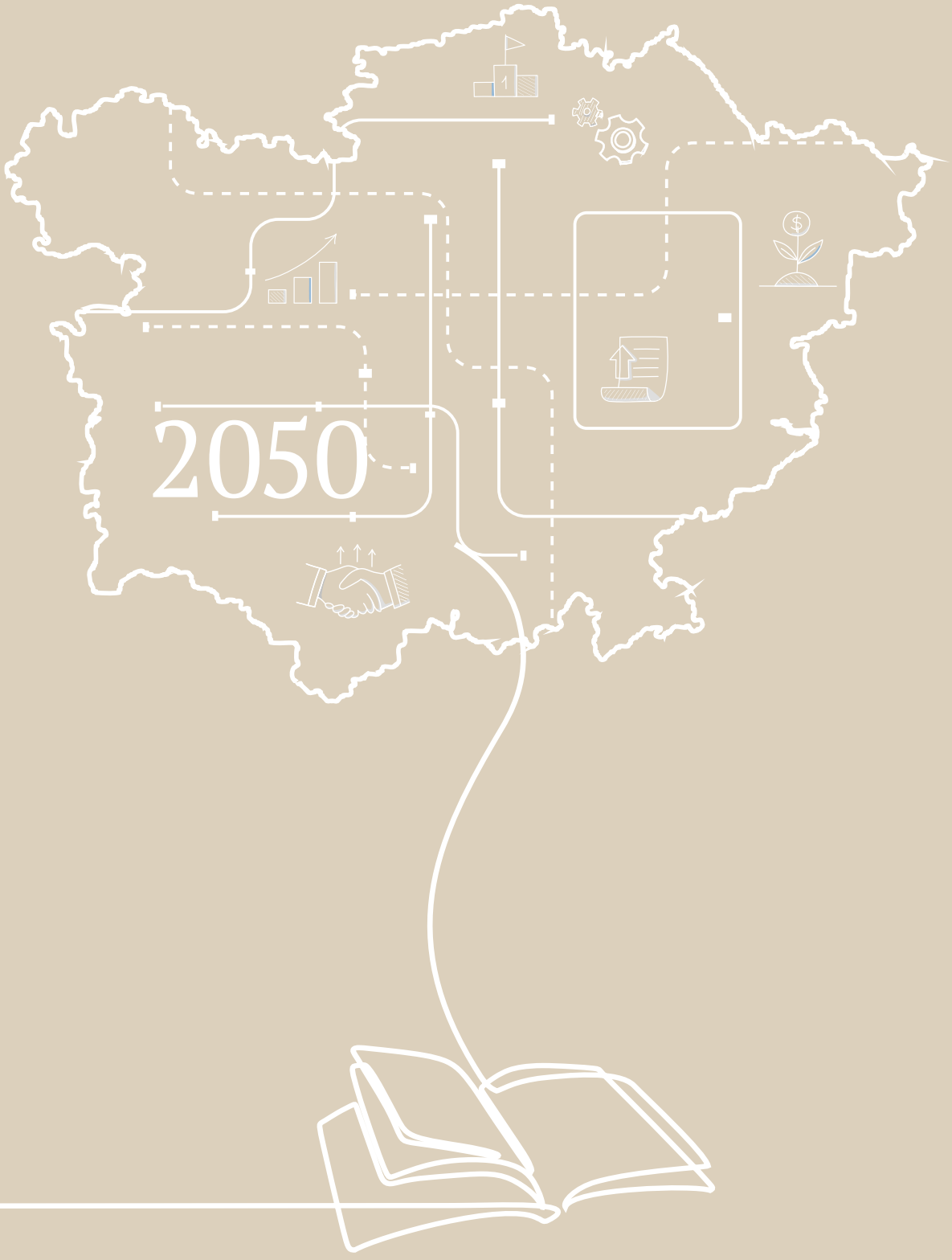
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