

## **Regional Stakeholder Consultations on Energy Connectivity and Sustainable Energy 12-13 June 2024**

Venue: Radisson Hotel Astana  
Sary Arka Street 4, Astana

UNECE and ESCAP convened 2-day consultations with regional stakeholders across Central Asia and the Caucasus to inform the implementation of the [ESCAP – UNECE Programme on Energy Connectivity in Central Asia and the Caucasus](#). The expert-level discussion was designed to provoke an honest and informed technical dialogue amongst representatives of the ministries of energy, international financing institutions, development agencies, industry, academia and NGOs to identify what concrete actions should be taken to enhance regional energy connectivity and energy security.

Enhancing regional energy connectivity and fostering energy trade through cooperation is a critical factor for bolstering energy system resilience and energy security in Central Asia and the Caucasus. An integrated and interconnected energy system that encompasses electricity and gas grids and facilitates the transport and trading of low-carbon and green hydrogen, can enhance the reliability, affordability, and sustainability of energy supply. This integrated approach facilitates a more efficient integration of scaled renewable energy capacity in the region's existing energy systems, thereby fostering a more robust regional energy ecosystem, and paves the way for deep decarbonization.

UNECE and ESCAP are implementing a set of projects under the umbrella of the joint [ESCAP – UNECE Programme on Energy Connectivity in Central Asia and the Caucasus](#). The 2-day regional expert-level discussion informed about the progress on the current projects' implementation and identified further directions in preparation for political dialogues on energy connectivity in Central Asia and the Caucasus planned at [COP29](#) in Azerbaijan in November, at the SPECA Economic Forum in Tajikistan in November and at the [Thirteenth International Forum on Energy for Sustainable Development Taking Action for Just Energy Transition](#) in Bangkok in December.

The programme includes three technical projects:

- **Project on Energy Connectivity in Central Asia**, led by UNECE. The key activity includes development of scenarios and a roadmap for a regionally interconnected energy system in Central Asia.
- **Project on energy connectivity for sustainable development – Enabling renewable energy resource sharing across borders**, led by ESCAP. The key activity includes development of a roadmap to develop the proposed Economic Cooperation Organization Regional Electricity Market (ECO-REM), to enable the establishment of multilateral power trading linked to sustainable cross-border trade of renewable energy resources.
- **Project on enhancing energy security and energy system resilience through energy connectivity**, co-led by ESCAP and UNECE. The key activities include technical

workshops on building policy design capacity for resilient and connected energy systems in Kazakhstan and Uzbekistan.

Key takeaways from the dialogue on the **Project on Energy Connectivity in Central Asia** that focused on the development of scenarios and a roadmap for a regionally interconnected energy system in Central Asia

- Context:
  - Central Asia is a diverse region rich in natural resources and with vast potential to develop large scale renewable energy projects. However, despite a positive trend and increasing renewable energy capacity, the region still heavily depends on fossil fuels. Coal and natural gas still dominate the regional electricity generation mix and will continue meeting increasing regional energy demand for the foreseeable future. Nevertheless, the forecasted increase in regional electricity demand presents a significant challenge to the region, particularly in light of the strain it places on fossil fuel reserves.
  - In addition, the regional energy system in Central Asia is connected largely as a legacy of Soviet-era planning and investments. However, despite the existing infrastructure in place, the current system is not ready for integration of large-scale renewable energy capacity and real-time power trading. Significant investments are needed to enhance the reliability and sustainability of the regional electricity and gas grid. In addition, the countries in the region are prone to develop their national strategies in isolation failing to take into account the economic and environmental benefits of regional cooperation.
- Highlights from preliminary modelling results:
  - Stockholm Environment Institute (SEI) presented preliminary results from the modelling exercise and depicted the dynamics and pathways for improved energy connectivity across Central Asia.
  - The model on energy connectivity in Central Asia is designed to simulate four distinct energy connectivity scenarios:
    - *Self-sufficiency scenario*: electricity transmission within Kazakhstan and between Kazakhstan and Uzbekistan only. In this scenario low-carbon generation on the back of solar, wind, hydro, and nuclear is expected in the long run; but coal generation is also expected to grow (2.7x by 2050) because most countries do not have stringent long-term decarbonization targets. Hot, dry climate impedes hydropower production across the region, particularly in Amu Darya Basin
    - *Regional connectivity scenario*: electricity transmission within Central Asia only. In this scenario carbon leakage becomes a significant problem. Growth in coal generation is expected in Tajikistan and Kyrgyzstan, which do not have deep decarbonization requirements. Climate change is expected to create stress on water reserves and there is greater competition with other water demands, hence increased energy demand is expected to be met by coal, unless more stringent climate mitigation policies are introduced.

- *Full connectivity scenario*: electricity transmission within Central Asia and between Central Asia and the neighboring countries. This scenario depicts a similar structural change with regards to the energy mix compared to the Regional connectivity scenario. It also shows increased overall power generation compared to Regional connectivity due to exports to third countries.
- *Unlimited connectivity scenario*: unlimited electricity transmission within Central Asia, same assumptions as Full for transmission between Central Asia and third countries. This scenario expects even greater carbon leakage<sup>1</sup> than in other transmission scenarios.
- Key commonalities for all scenarios include:
  - Full realization of national plans for hydropower development and agricultural expansion
  - Implementation of unconditional NDCs and national clean energy plans but excluded the net-zero by 2060 strategy in Kazakhstan
  - Adoption of national plans for water efficiency (including irrigation upgrades, new crops and cropping patterns, water-efficient equipment)
  - High climate change – hot, dry future climate (SSP5-8.5, INM-CM5 model’s CMIP6 projection)
  - Population projections from UN *World Population Prospects*
  - GDP projections from IMF (TKM), World Bank (all other countries)
- The comments and suggestions from the participants covered various issues including that:
  - There are discrepancies between the Kazakh carbon neutrality by 2060 strategy and sectorial plans.
  - There is no alignment with carbon neutrality targets in NDCs across the region.
  - There is need for more harmonized cross-regional decarbonization assumptions to be integrated into the model.
  - The electricity exports opportunities to the neighboring countries; namely from Turkmenistan to Iran and Afghanistan, need to be further explored and better understood in the context of regional connectivity.
  - Improved connectivity across Central Asia lowers electricity production costs, but unless more stringent climate mitigation policies are introduced, the carbon emissions are expected to grow across the region.
  - Driven by cost advantages, new renewable power (in particular, solar, wind, and hydro) is likely to play a major role in meeting the region’s growing demands for electricity.

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<sup>1</sup> Carbon leakage occurs when there is an increase in greenhouse gas emissions in one country as a direct result of an emissions reduction by another country. This typically happens when industries relocate their production to countries with less stringent climate policies or when increased imports from such countries offset the reductions achieved.

- Although hydro is the dominant source of renewable power in the region today, in the long run it will likely provide a smaller share of electricity generation as the penetration of solar and wind energy grows and climate change creates greater pressure on water resources across the region.
- Increased solar and wind power can be integrated by leveraging energy storage (reservoir hydro, batteries), transmission, and flexible thermal generation, among other options.
- Enhanced electricity transmission connectivity has the potential to lower electricity system costs, but it also risks carbon leakage if decarbonization plans are uneven across the region.
- In contrast to renewable energy resources, nuclear power's potential in the region appears more limited due to its relatively high costs.

## Key takeaways from the dialogue on **the project on Energy connectivity for sustainable development – Enabling renewable energy resource sharing across borders**

- ESCAP presented a draft roadmap under the project “Energy connectivity for sustainable development – Enabling renewable energy resource sharing across borders” aimed at facilitating energy connectivity development among ECO countries, and launched a peer review process to gather expert opinion on the draft document and further project implementation.
  - The project covers the ten ECO member states: Afghanistan, Azerbaijan, Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Türkiye, Turkmenistan, Uzbekistan. Each country faces its own particular context with regard to energy production, distribution, and cross-border connectivity.
  - The report introduces the analysis of power sectors in the ECO member states, their current and perspective cross-border connectivity activities, and a roadmap with proposed actions for developing the ECO-REM
  - The roadmap contains a set of targeted, actionable recommendations for policy and regulatory reforms that would enable the establishment of multilateral, multidirectional power trading among countries linked to renewable energy resources.
  - Multilateral power trade and the establishment of competitive markets play key roles in facilitating the integration of higher shares of renewable energy by enabling the exchange of power across borders. At the 77th Session of the Commission in 2021, ESCAP Member States endorsed the regional road map on power system connectivity. The roadmap contains a vision, a set of principles, and 9 strategies to support increased power system integration and sustainable development.
- The comments and suggestions from the participants covered various issues including:
  - Updated information about infrastructure projects in Tajikistan and current collaborations between Afghanistan and Pakistan were provided. Also, participants discussed increasing role of hydrogen development in the region and possible consideration to include it in the roadmap development.
  - Market structure and division into zones were discussed, including existing initiative of market development in Central Asia. Clear regulation rules, harmonization of electricity legislation and balancing market development were indicated as priority areas.
  - It was suggested to include neighboring countries which are not a part of the ECO-REM initiative into the roadmap’s development.
  - Kyrgyzstan raised concerns about tariff/pricing aspects including affordability and cost recovery.
  - Data collection and management as well as data transparency and sharing rules were discussed, a mechanism for central data compilation and exchange was proposed.
  - The financial aspect of further development of the initiative was discussed.
  - Participants suggested establishment of a working group for the implementation of the roadmap.

## Key takeaways from the dialogue on **Development of tools and fostering multi-stakeholder partnerships for a resilient and interconnected power systems in Kazakhstan and Uzbekistan**

As part of a wider UN Development Account (UNDA) Project, UNECE and UNESCAP have joined forces with UNECLAC, UNESCWA and UNECA, to help member States increase their policy design capacity to enhance energy security and energy system resilience through energy connectivity. This project enhances global collaboration and policy support for designing resilient energy systems by establishing a global stakeholder network, developing policy guidance, disseminating knowledge, and fostering multi-stakeholder partnerships. Kazakhstan and Uzbekistan are two out of five beneficiary countries<sup>2</sup> that are being assessed under this project to improve capacity-building and knowledge-sharing on how to leverage connectivity as a tool to help design and build resilient energy systems.

Central Asia is a diverse region rich in natural resources and with vast potential to develop large scale renewable energy projects. For example, Uzbekistan's significant dependence on gas, accounting for 88.0% of electricity production, and for 86% of total energy supply in 2021, underscores the urgency for diversification. This is especially the case given that Uzbek natural gas reserves are predicted to be depleted before 2040. Investing in renewable energy sources can therefore provide a sustainable solution to bolster energy security by alleviating natural gas demand whilst also mitigating the environmental impact associated with fossil fuel consumption.

In Kazakhstan, coal constitutes the most significant energy source accounting for 49% of total energy supply and 59% of total electricity generation in 2021. Consequently, given Kazakhstan's ambitious nationally determined contribution aiming to achieve a 25% reduction in greenhouse gas emissions by 2030 and carbon neutrality by 2060, the Kazakh government aims to reduce coal-based power and heat generation by 50% by 2030. Nevertheless, electricity demand is expected to increase by roughly 75% by 2035, meaning that alternative energy sources, notably renewables, must be scaled up to fill the gap. Thus, by effectively scaling renewable energy the region can not only meet its growing energy needs but also reduce its dependence on finite and carbon intensive fossil fuel resources.

During the stakeholder discussions, the following perceived challenges and potential benefits from the development of connectivity projects have been identified:

1. Investment into infrastructure and low-carbon power generation, transmission, and distribution infrastructure to ensure system reliability.
2. Adoption of advanced technologies, diversification of energy mix and modernization of the grid to enhance the system efficiency and sustainability. The grid needs to be able to handle higher loads and integrate higher capacity of renewable energy.
3. Enhancement of demand management and promotion of energy saving practices for more improved system energy efficiencies.
4. Introduction of tariffs gradually to avoid sudden financial burden on consumers and allow to adjust budgets. It includes also ensuring the stakeholder engagement and transparent communication when designing the tariffs.

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<sup>2</sup> Beneficiary countries include Georgia, Kazakhstan, Uzbekistan, Costa Rica and Panama.

5. Development of a clear regulatory framework to derisk and attract investments and protect consumers' interests.
6. Engagement of all relevant stakeholders to ensure broad support to develop and implement comprehensive and forward-looking energy policies and planning frameworks. There is a need for a regional hub or a regional regulatory body.