



# Energy Transition in Central Asia

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THE WORLD BANK

# Outline

**01** Regional context



**02** Energy sector overview



**03** Status quo &  
Decarbonization targets



**04** Energy transition in Central Asia  
& World Bank support



# 1. Central Asia – Overview



## Countries

Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, Uzbekistan



## Area

4,003,451 km<sup>2</sup> (1,545,741 sq mi)



## Population

77,039,830 (2022)



## GDP (nominal)

\$446 billion (2023)

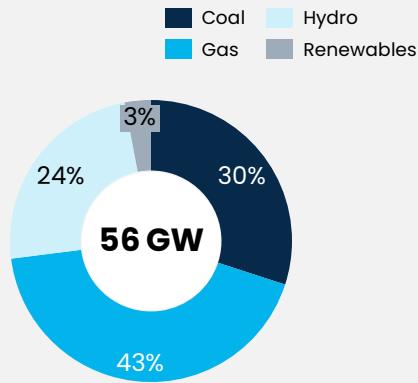


## GDP per capita

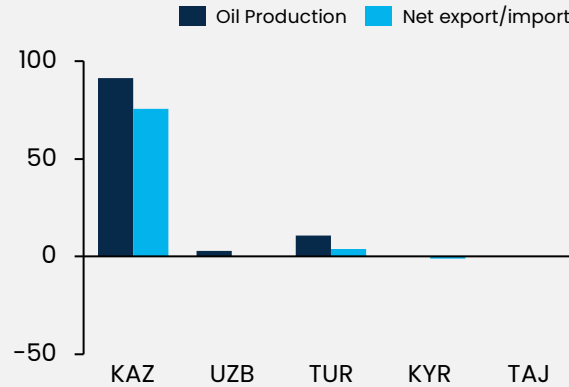
\$5,900 (2023; nominal)  
[\$1,200–\$11,000]

# 2. Central Asia – Energy Sector

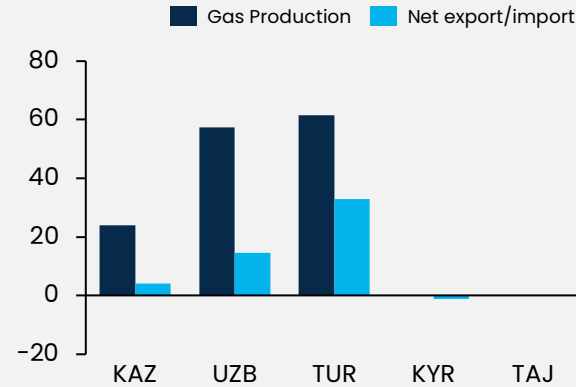
Electricity Capacity Mix (%)



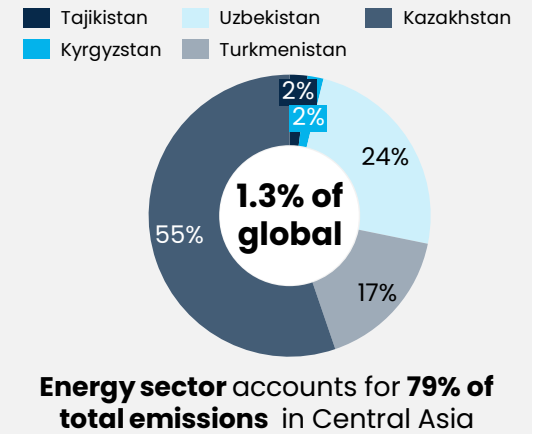
2018 Oil production and export (Million tons)



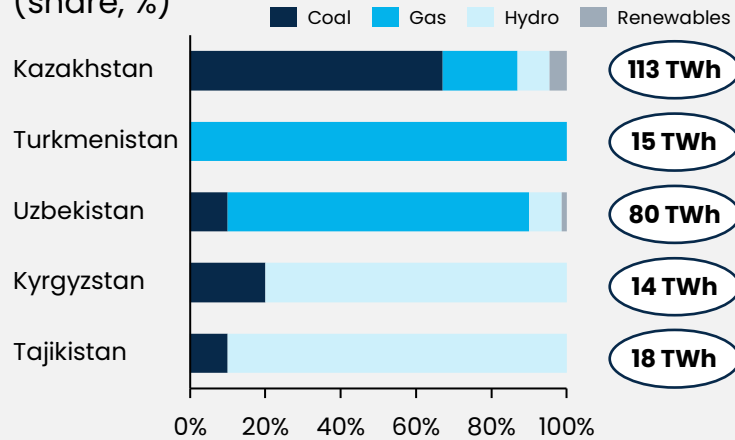
2018 Natural Gas production and export (Bcm)



CO2 emissions, share in %

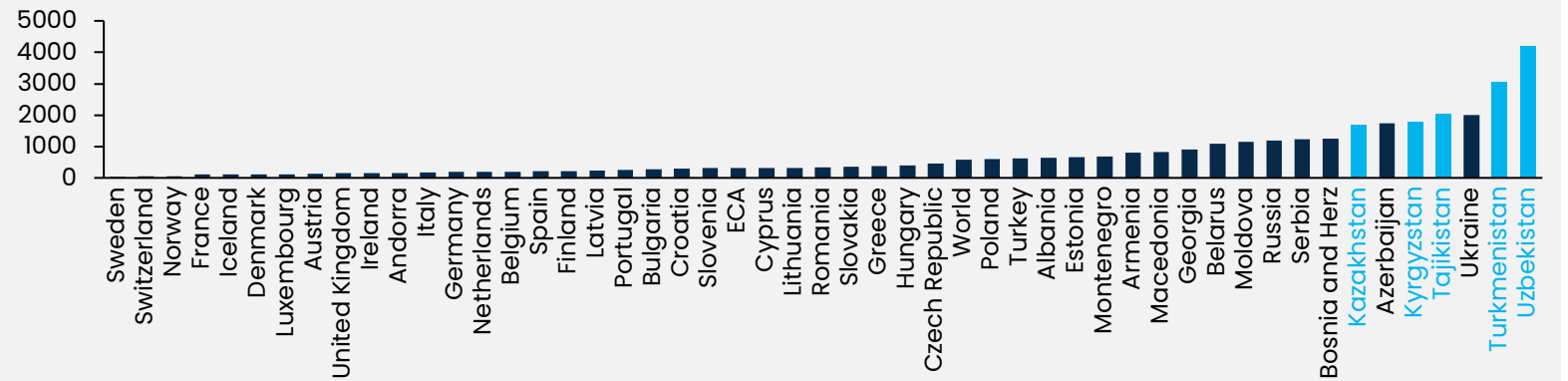


Electricity mix in Central Asian countries (share, %)



Emissions intensity of ECA economies

tco2-e per \$ million GDP



Source: CAIT, 2018



# 3. Current Context & Decarbonization Aspirations

Energy sectors fuel economic growth but considering budget burden making energy security as a critical issue across the region

Electricity demand is expected to at least double by 2050 across the region, especially when considering low carbon development targets



- Electricity generation is fueled by domestic coal (69%) and gas (20%). Increasing risk of supply-demand deficit (especially winter)
- High system losses (20%). Expensive electricity imports from Russia.
- Subsidy at US\$4.3 billion 2021 (or 2% of GDP).
- Low supply mix diversification (natural gas >80%)
- High electricity and gas losses (20%)
- Tariff only 66% cost recovery.
- Quasi fiscal deficit of 6.2% of GDP (power and gas): 1.5% of GDP for power only in 2022 due to tariff gap.
- Increasing risk of supply-demand deficit (especially winter)
- Tariff only 65% cost-recovery
- Total system losses 18%
- Quasi Fiscal Deficit amounted at KGS14 bln (2% GDP) in 2021 for power sector only. Widening sector debt (20% of GDP).
- Hydropower plants meet 90% of demand in the country
- The Quasi Fiscal Deficit is estimated at TJS 18.4 billion (4.4 % of GDP) in 2021 with the sector debt amounting to TJS 26 billion.
- Increasing risk of supply-demand deficit (especially winter)
- High system losses (21%)
- Tariff only 60% cost recovery.
- Low supply mix diversification (100% natural gas)
- About 50% of produced natural gas exported
- Untapped RE and EE potential

- 2060 Carbon Neutrality Goal.
- NDC targets: GHG emissions reduction by 15% by 2030.
- RE target: 15% by 2030 (predominantly wind and solar). 50% alternative energy share by 2050.
- NDC: GHG emission reduced by 35% by 2030 compared to 2010 level.
- Preparation of Long-Term Emission Reduction Strategy.
- Tariff cost recovery 86%.
- Energy intensity reduction by 30% by 2030 (50% by 2050) from 2008 level.
- Renewables target: 8 GW by 2030 (100 MW in 2021).
- Cutting energy intensity of economy by 20% by 2026.
- 2050 Carbon Neutrality Goal.
- NDC: GHG reduction of 16.63% by 2025 (15.97% by 2030).
- Diversification: 700 MW solar by 2030 (Master Plan).
- Large and small hydro deployment.
- NDC: GHG reduction by 30-40% (40-50% with international support) by 2030 compared to 1990 levels.
- Increase (clean) generation capacity from 6 GW to 10 GW.
- Diversification: 10% renewable share target (500 GWh/yr).
- "At a certain international support, zero growth in emissions and even their decrease until 2030" (NDC).

# 4. Energy transition & World Bank support in Central Asia



## Major Investments

to increase the share and penetration of RE and improve EE

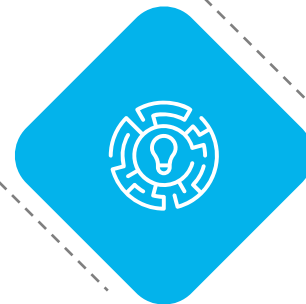
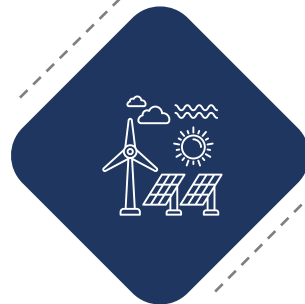


## Regional Power Trade

drawing on the complementarity of energy resources in the region

## Energy Sector Reforms

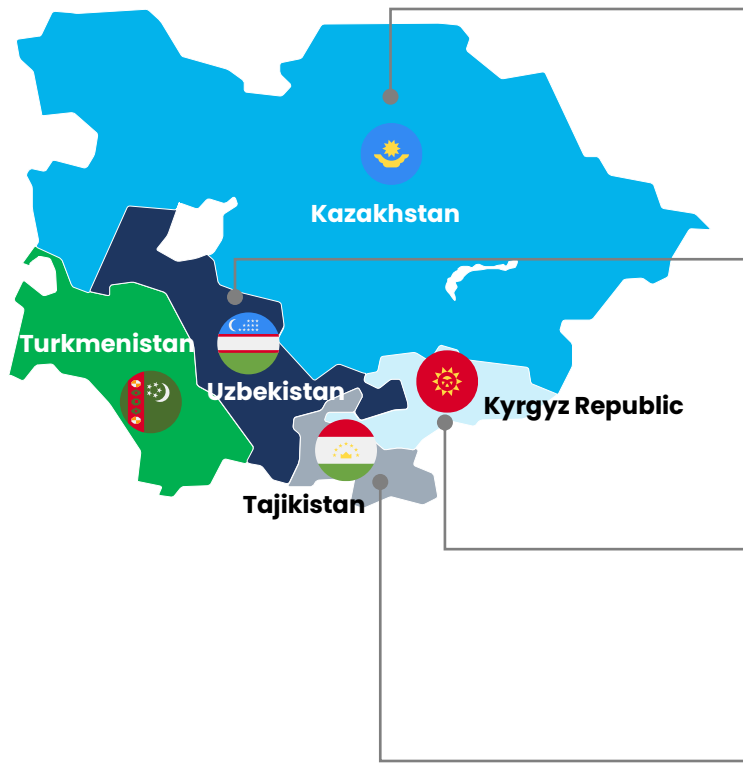
to increase energy security at domestic level and attract private investments



## Address the challenges of Water/Energy nexus

# 4.1. Accelerate the deployment of RE at scale, maximizing private sector financing

## Large scale investments to scale-up clean energy sources



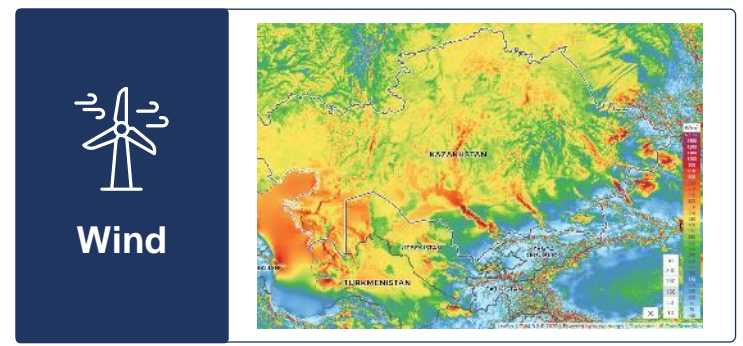
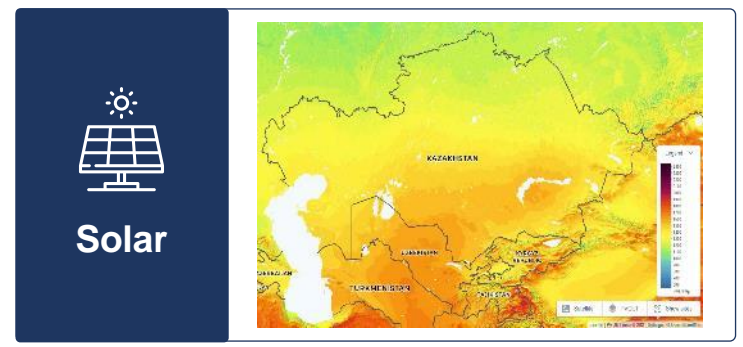
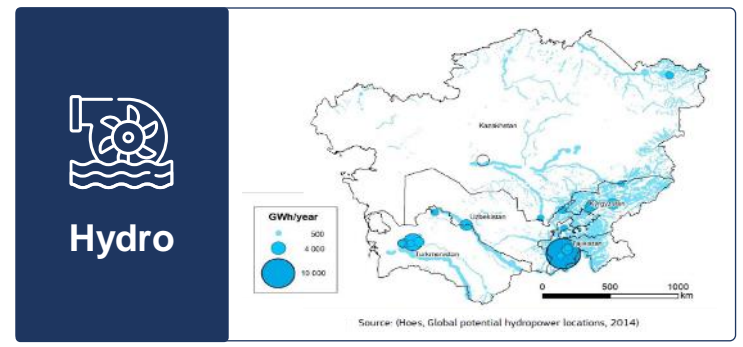
- Wind Energy Program (400MW)
- Renewable Energy Grid Integration Program
- Hydropower Modernization Program (Almaty and other Hydro Cascades Modernization)

- Renewable Energy Grid Integration Program
- Electricity Distribution Efficiency Improvement Program
- Uzbekistan Scaling Solar Program

- Kambarata-1 Hydro Power Development Project
- Hydropower Modernization Program
- Pilot Solar Project

- Rogun Hydro Power Development Project
- Pilot Solar Project

## Tremendous renewable potential



## 4.2. Promote Energy Sector Reforms: CA countries have initiated strong policy measures to enable clean energy transition

Improve energy efficiency through standards and programs



Tariff Reform



**Market and Regulatory Reforms**



Optimize Utility Operation models



Remove technical and regulatory barriers to RE scale-up (RE auctions)

**Kazakhstan**



- 2GW of RE in 2021
- Subsidy reform initiated

**Uzbekistan**



- First large-scale solar (100 MW) in 2021
- Above 4 GW of solar and wind PPPs concluded to be commissioned by 2026

**Kyrgyz Republic**



- First grid-scale solar power plant of 100MW under preparation
- Hydro projects being prioritized

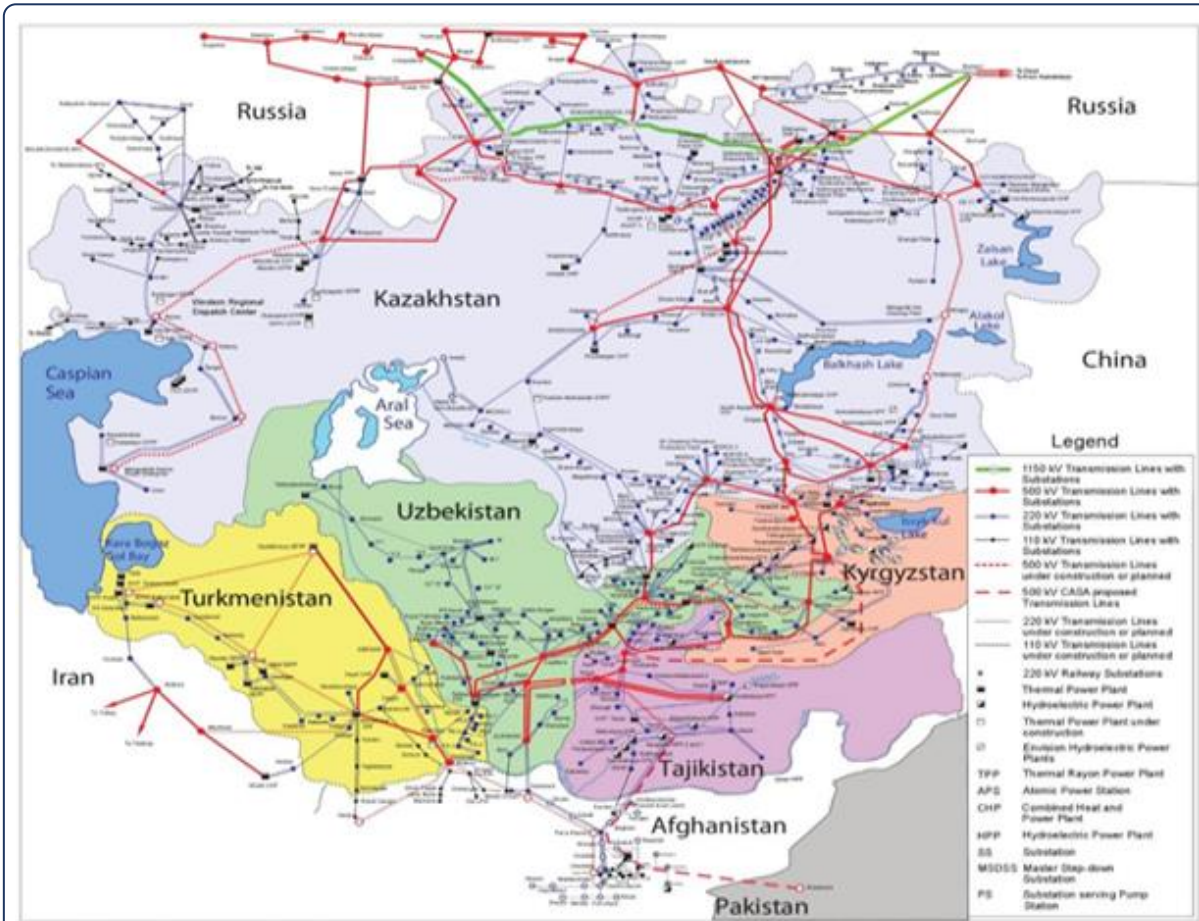
**Tajikistan**



- First grid-scale solar power plant of 200MW under preparation
- Hydro projects being prioritized



## 4.3. Central Asia electricity trade today is also underutilized



**Current Central Asia Power System – CAPS**  
[established in 1970s]

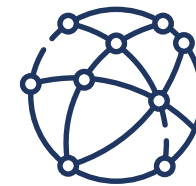
**Lack of regional market and low exploitation of available potential**



**2.5%**

**Demand met through trade is very low**

No short-term commercial trade instruments available



**40%**

**Utilization of interconnections**

Power market increased the use of interconnections to ~85–90% in Europe

## 4.3. World Bank support through establishment of a regional electricity market, financing critical infrastructure and strengthening institutions



Efficient water and energy management



Sustainable economic growth



Carbon neutrality by mid-century

# WB Support to Central Asian Countries Based on Their Energy Transition Priorities

**Contributions of decarbonization to national agendas**



Better Air Quality



Jobs Creation



Improved Living Conditions



Security of Supply



Higher Competitiveness

## KEY AREAS OF INTERVENTION FOR A DECARBONIZED ENERGY SECTOR IN ECA

### Strategy Pillars

**Project Examples**

**Net Zero Emissions Pathways**



**Scaling Up Renewable Energy**



**Improving Energy Efficiency**



**Building the Hydrogen Economy**



**Creating Enabling Environment**



**Kazakhstan**



CCDR 2022

Geothermal energy study

Building Energy Efficiency Project

...

...

**Uzbekistan**



CCDR 2023

Scaling solar projects plus BESS\*

Industrial and Building EE Projects

Roadmap for low carbon and green hydrogen development

Pilot Carbon Finance/Trade Project

**Tajikistan**



CCDR 2024

Large hydro and pilot solar projects

...

...

Power Utility Financial Recovery

**Kyrgyz Republic**



CCDR 2025

Small hydro and solar projects

Heating Supply Improvement

...

Energy Sector Financial Recovery

**Central Asia**



...

...

...

H<sub>2</sub> potential (prod, use, export) study

Regional Connectivity and Market

**Country Climate & Development Reports CCDR**

**Interplay between climate and development**



Connecting climate and development



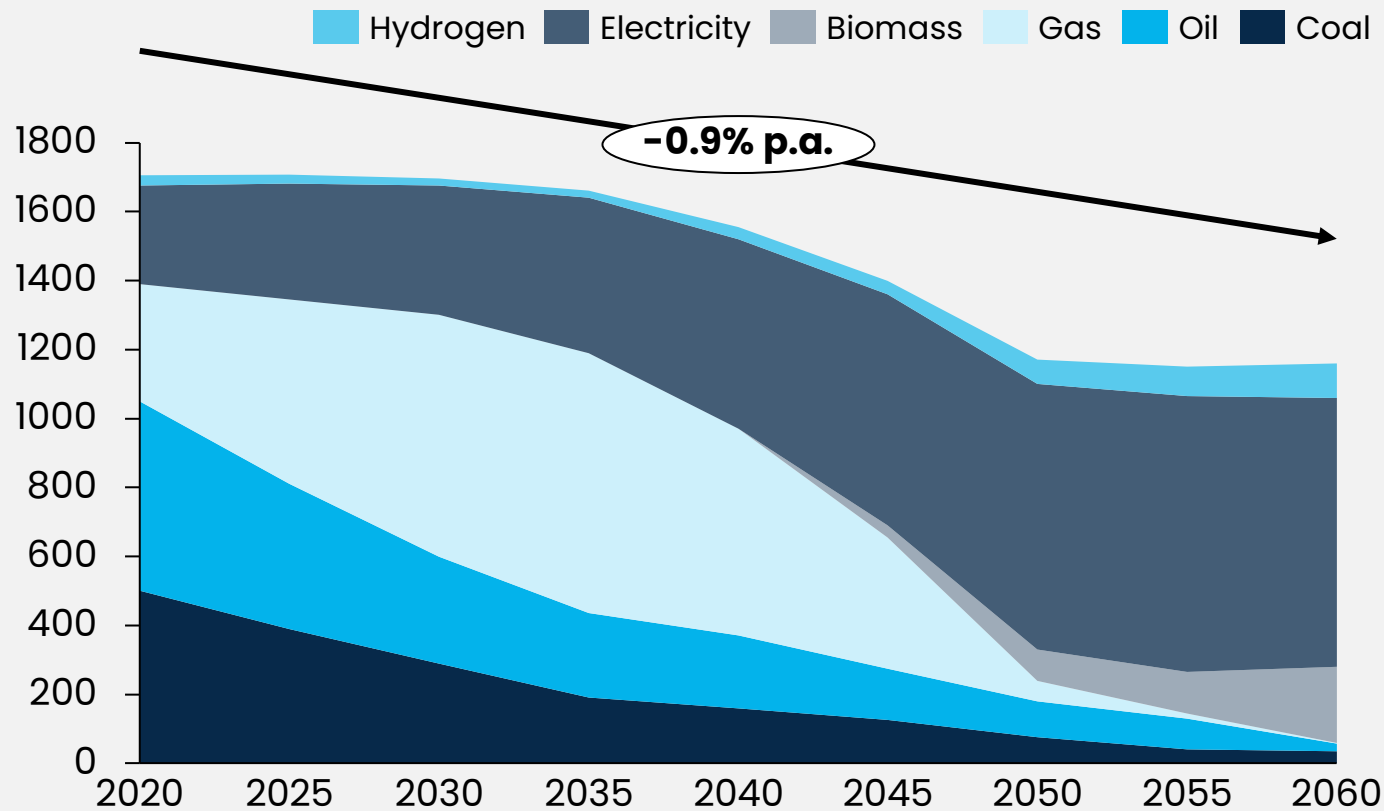
Consistency



Cross-country benchmarking

# Climate and Development: The Kazakhstan Climate Change and Development Report outlines pathways for decarbonization & benefits and costs of Net Zero 2060 targets

**NZE Final energy consumption, EJ**



Falling productivity and growth reveal limits of the fossil fuel-dependent model

**Net Zero 2060** transition can increase output by 1.3% from 2040

**Net Zero 2060** requires gov. spending of 1.1% of GDP pa.

In the absence of the energy transition GDP to decline by 2-2.5%

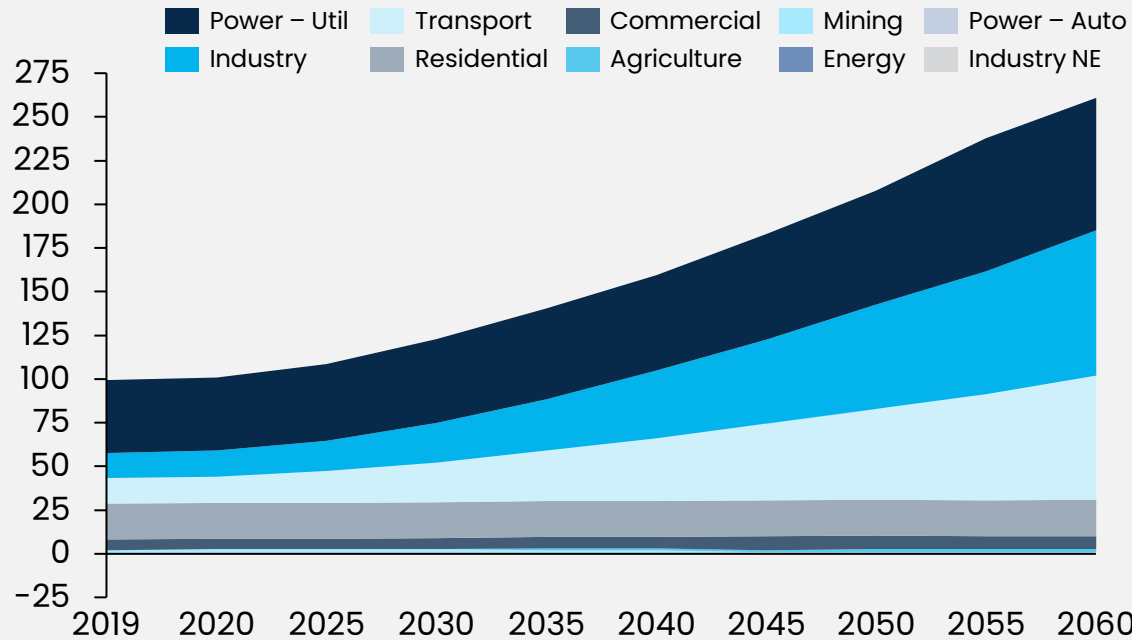
Just Transition in coal monotowns can prevent the costs of transition from falling on the vulnerable



# Climate and Development: Decarbonization pathways for Uzbekistan – strong energy security rationale

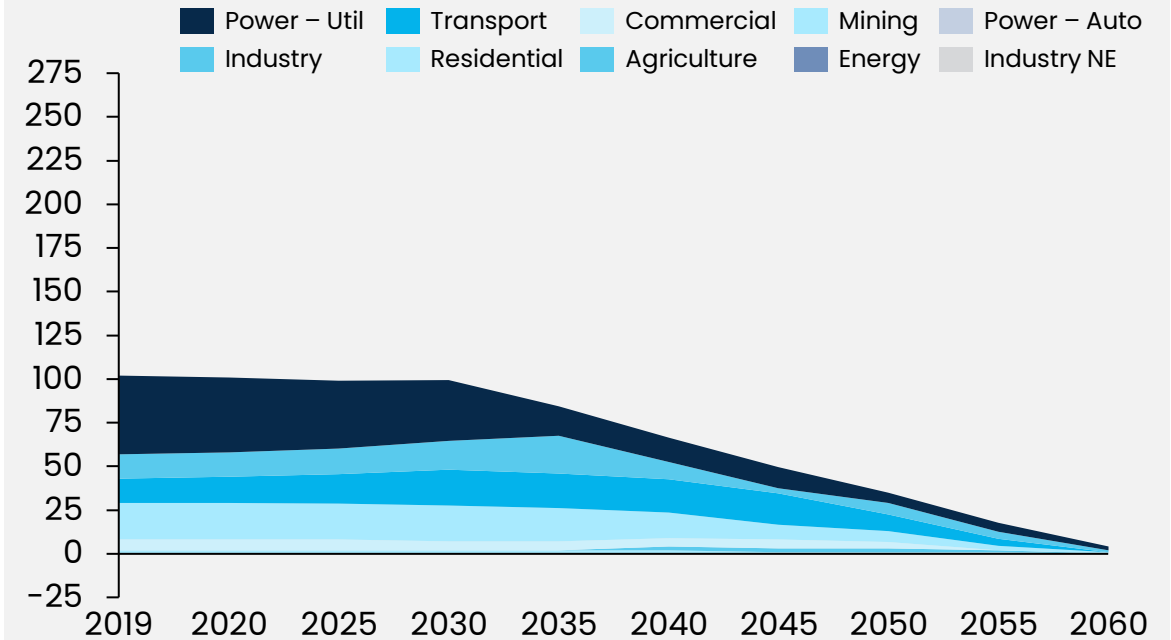
## Reference Scenario

MtCO<sub>2</sub>/yr

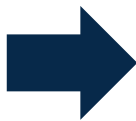


## Net Zero 2060 Scenario

MtCO<sub>2</sub>/yr



Net Zero 2060



Least-cost path for the energy sector to achieve peak emissions before 2030 (more emission reduction than 2030 NDC target)

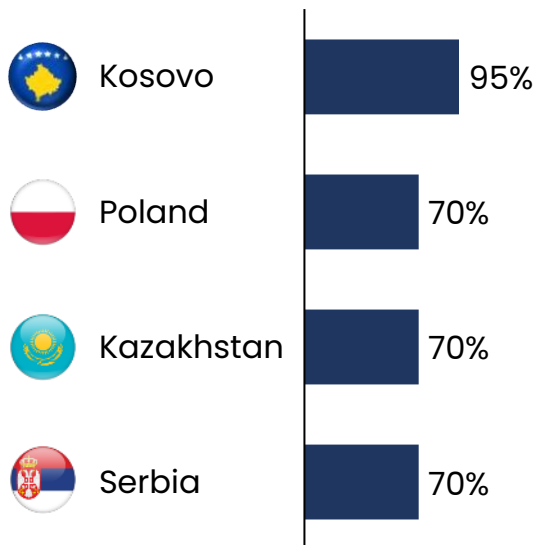
Power sector reaches almost full decarbonization by 2050 (commercial buildings reach net zero before 2050, residential buildings by 2055, industry and transport by 2060)

# Just Transition Comprehensive Approach in Heavily Coal-dependent Countries

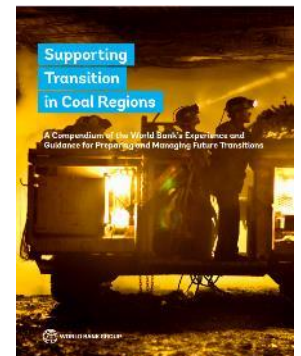
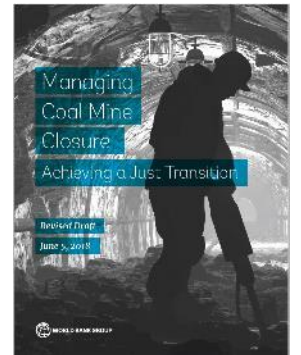
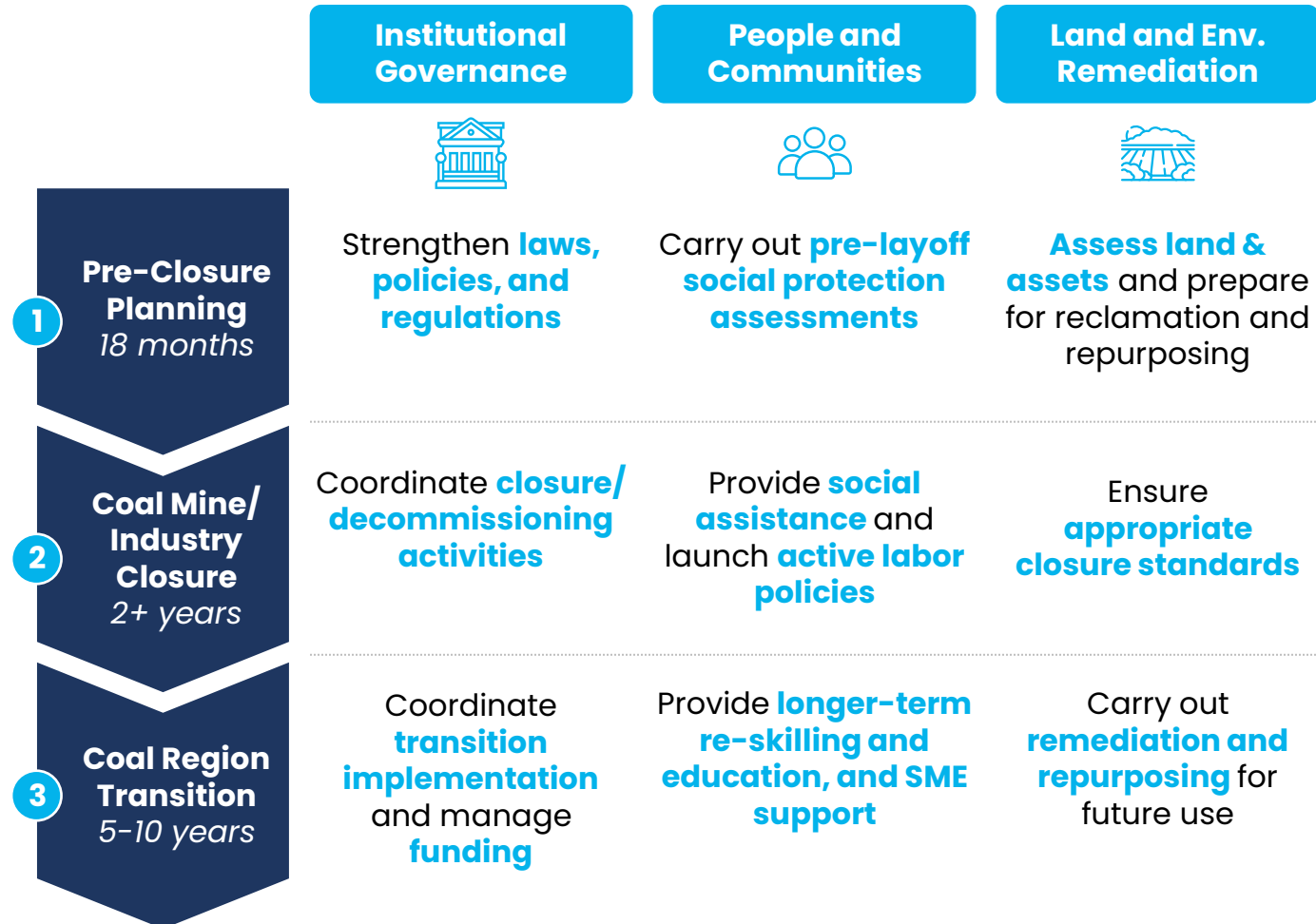
## Dependency on coal

Europe and Central Asia region accounts for about **9% of global coal consumption**, but it includes several **countries with a strong dependence on coal** (12 out of 23 countries with >25% share of coal in total energy supply)

### Share of coal in power mix, %



## Just Transition in Coal Regions and ECA experience



# Policy, Legal, Regulatory, Institutional Framework:







## Key preconditions and success factors for RE bankability

- 
- Transparent legal and regulatory frameworks (RE Laws, secondary regulations)
  - Capable agency with clear mandate
  - Planning for renewable expansion – long-term targets (signaling)
  - Stable investment environment for private sector financing
  - Grid access and pricing regulations (tender, auction, FiT)
  - Transparent and competitive procurement
  - Bankable PPAs, GSA/IAs, adequate risk allocation
  - Risk mitigation instruments (political, commercial, payment, loan guarantees)
  - Sector financial viability and utility / off-taker creditworthiness
  - Removal of fossil fuel subsidies and cost recovery tariffs
  - Institutional and capacity development, building of good track record

# Enabling Environment: World Bank Group support

## Six Pillars for Renewable Deployment in Central Asia

### Renewable Energy Development in Uzbekistan

<b>Institutional reforms</b> 	<b>Sector Planning</b> 	<b>Legal and Regulatory</b> 	<b>Financial Sustainability</b> 	<b>Competitive PPP Projects</b> 	<b>PPP capacity building</b> 
<ul style="list-style-type: none"> <li>• Establishment of Ministries of Energy (UZ, KR)</li> <li>• Unbundling of utilities (<i>genco &amp; disco separated for PPP</i>) [UZ, KR, TJ]</li> <li>• Establishment of PPP units (UZ, KR)</li> </ul>	<ul style="list-style-type: none"> <li>• Least Cost Expansion Plan</li> <li>• Solar, wind &amp; hydro targets by 2030</li> <li>• Investments in grid / sector assets</li> </ul>	<ul style="list-style-type: none"> <li>• RE Law</li> <li>• PPP Law</li> <li>• RE &amp; Grid Codes</li> <li>• New Electricity Laws</li> <li>• Market reforms</li> </ul>	<ul style="list-style-type: none"> <li>• Tariff reforms</li> <li>• Offtaker financial recovery</li> <li>• IFRS transition</li> <li>• WB Credit enhancement and guarantee instruments</li> </ul>	<ul style="list-style-type: none"> <li>• 2,500 MW solar &amp; wind in Uzbekistan</li> <li>• 500MW pilot solar in Kyrgyzstan</li> <li>• 200 MW pilot solar in Tajikistan</li> </ul>	<ul style="list-style-type: none"> <li>• Gov't energy PPP Working Group</li> <li>• Gov't tender commission's PPP procurement capacity enhanced</li> </ul>

World Bank Group support (WB, IFC)





*Thank  
you*

