Clean Energy Integration
Advancing Regional Power Trade in Asia-Pacific:
CAREC Program

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Central Asia’s power system is characterized by vintage technology and aging energy infrastructure.

![Installed capacity in Central Asia*, by year built](chart)

*Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
Central Asia’s power system is characterized by vintage technology and aging energy infrastructure.

Installed capacity in Central Asia*, by year built

~65% of installed capacity is built before 1990.

*Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
~35Gw of renewable energy capacity planned installed by 2030; equivalent to around 50% of the total installed capacity as of 2023

Installed capacity in Central Asia*, by year built

*Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
Substantial ambitions to modernize the power sector through investments in renewable energy. - **Intermittency is a problem!**

Theoretical summer day in Uzbekistan in 2030, output from Solar Energy

Domestic solar in Uzbekistan

Please note: this graphic is purely for demonstrative purposes
Substantial ambitions to modernize the power sector through investments in renewable energy. - **Intermittency is a problem!**

Theoretical summer day in Uzbekistan in 2030, output from Solar Energy

- Potential curtailment

Domestic solar in Uzbekistan

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Substantial ambitions to modernize the power sector through investments in renewable energy. - **Intermittency is a problem!**

Theoretical summer day in Uzbekistan in 2030, output from Solar Energy

- Domestic solar in Uzbekistan
- 7 GW of capacity needs to be balanced within a few hours

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More dynamic tariffs are needed to create a demand response: better aligning demand load with generation supply.

Theoretical summer day in Uzbekistan in 2030, output from Solar Energy

Old demand

Demand response

Domestic solar in Uzbekistan

Time of the day

Please note: this graphic is purely for demonstrative purposes
Better interconnectivity in the region can advance overall regional clean energy integration.

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...spreading local intermittency over a larger area, enhancing grid resilience and flexibility. And improving overall resource allocation.

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Theoretical summer day in Uzbekistan in 2030

- Hydropower: Tajikistan/Kirgizstan
- Wind: Kazakhstan
- Solar: Turkmenistan
- Domestic solar in Uzbekistan

...lowering risk for curtailment (wasted energy)

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ultimately creating a more flexible power grid capable of handling a larger share of intermittent RE, resulting in lower CO2 emissions overall
Theoretical summer day in Uzbekistan in 2030

- Regional integration can make the overall power system more efficient, more resilient, more robust and more sustainable!

Please note: this graphic is purely for demonstrative purposes.
Northern Europe power flow (EUR/Mwh)
June 4, 2024 at 7:27PM

https://www.statnett.no/for-aktorer-i-kraftbransjen/tall-og-data-fra-kraftsystemet/#nordisk-kraftflyt
Strong regional collaboration with a common goal for improved regional interconnectivity is required to succeed

✓ Continue to invest in physical infrastructure such as regional transmission lines and substations.
✓ Create a regional clearing and security center.
  ✓ Short term: differentiate (domestic and regional) prices between morning, mid-day, afternoon, evening and night
  ✓ Longer term: Day ahead prices on an intra hourly basis.
✓ Develop clear market rules with common terms.
✓ Enable transparency in data
CAREC and CAREC Energy Program Overview

CAREC (Central Asia Regional Economic Cooperation)
- Established: 1997, comprising 11 member countries including Afghanistan, Azerbaijan, China, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan
- Objective: Promote regional cooperation in transport, trade facilitation, energy, and trade policy
- Secretariat: Hosted by the Asian Development Bank (ADB)
- Achievements: Mobilized nearly $51.02 billion in investments for regional projects

CAREC Energy Program
- Enhance energy security and sustainability
- Promote renewable energy and energy efficiency
- Facilitate cross-border electricity trade
- Integrate regional energy markets