Climate Change and energy sector development in central Asia

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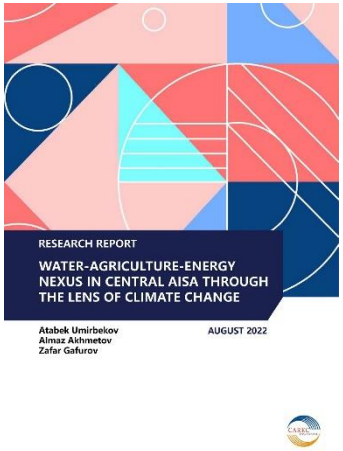
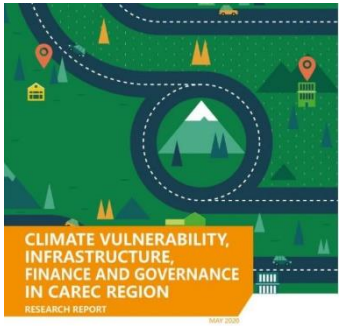
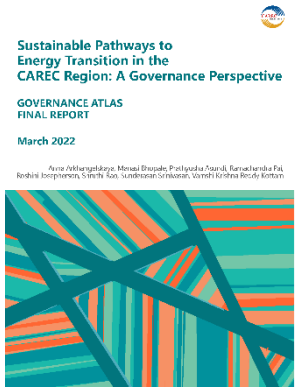
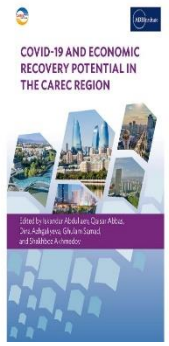
FINDINGS ARE BASED ON:

- **Research** since 2019-2023
- Series of **Policy dialogues** on climate-water and energy (CAREC Institute E-Learning-Learn More with Online Courses from CAREC Institute)
- **Think-Tank and Fellowship** Grant Programmes
- **Capacity Building** and Training series





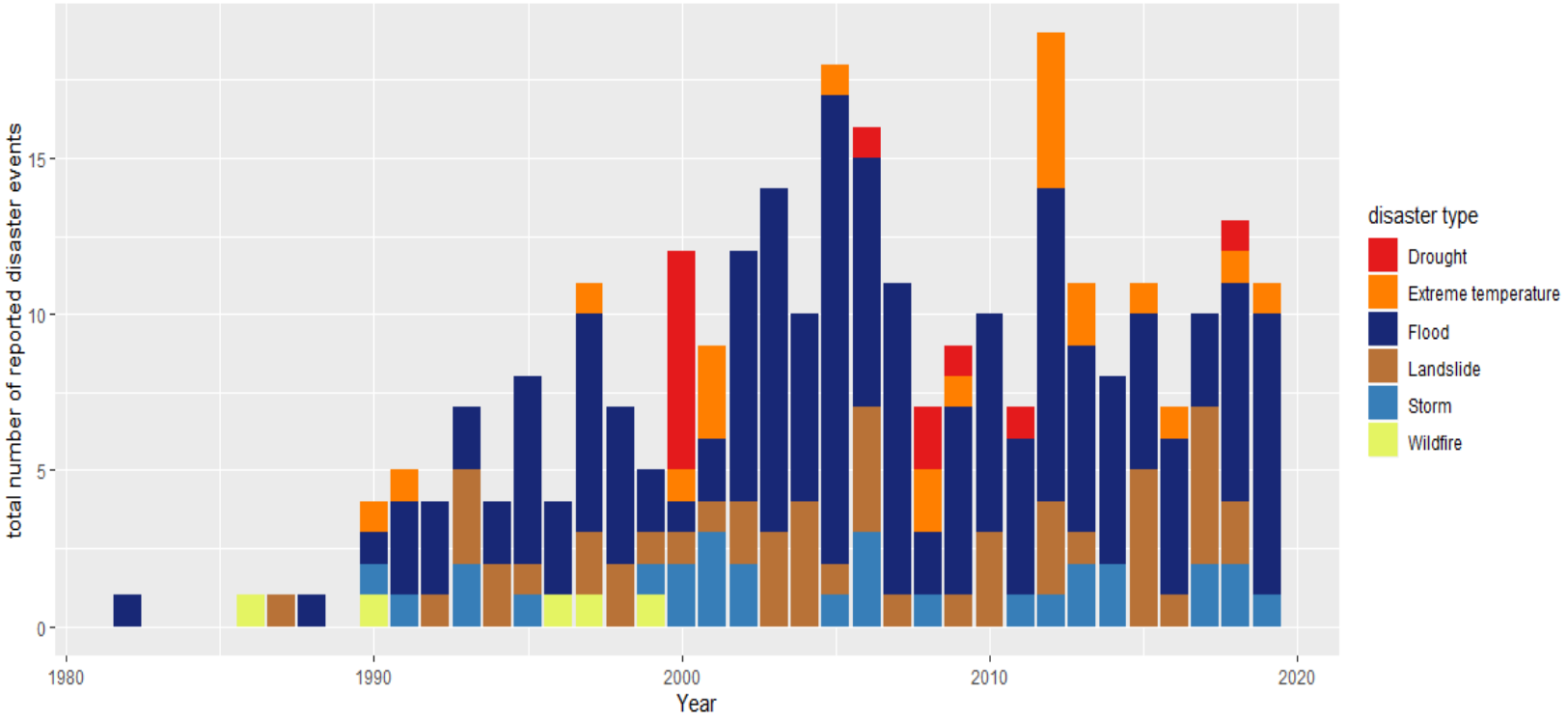




Climate change in Central Asia

- Central Asian countries exhibited much **higher rates of temperature growth** compared to the global averages over the past hundred years
- The Central Asian region reported an increasing frequency of adverse **natural disasters** of a wide spectrum
- Magnitude of future **rise of temperature and shifts in the precipitation patterns** in the region will likely exceed the scale of the observed historical changes
- Climatic change in the region will cause **significant changes in annual volume and seasonal patterns** of rivers` run-off

Climate change in Central Asia



Climate change in Central Asia

Costs of reduced water flow in 2100

- 1.2 billion for Afghanistan
- 103 million for the Kyrgyzstan
- 177 million for Tajikistan

Costs of natural disasters in 2100

- 50 million for Afghanistan
- 23 to 60 million for Kyrgyzstan
- 280 million for Tajikistan

Climate change in Central Asia

- **Climatic change**
  - Economic losses in Central Asian countries- highest in agricultural sector
  - Prioritize **investment strategies** in the future.
  - Suitable **mitigation and adaptation mechanisms** -reduce environmental externalities, vulnerability of population, especially in rural areas
- Suitable **adaptation and mitigation** mechanisms :
  - increase water use efficiency
  - establishment of early warning systems for climate related extreme events
  - implementation of no-till technologies and crop diversification, afforestation, improved crop management
  - regional cooperation is a must for effective adaptation
- **Financial tools and mechanisms**:
  - credit, insurance, subsidies
  - carbon market and taxation
  - suitable financial mechanisms- yet underdeveloped in the region, except few cases and countries

ENERGY IN CAREC REGION

- **CAREC region**:
  - 2-4% annum increases in demand for the energy
  - Additional 192,000 MW by 2050

- **Demand**:
  - industries, residential use, and increased volatility of energy supply due to climate change
  - search for new energy sources and regional energy trade

- **Energy sector** of CAREC countries:
  - heavily state-owned, subsidized
  - based on none-renewables.

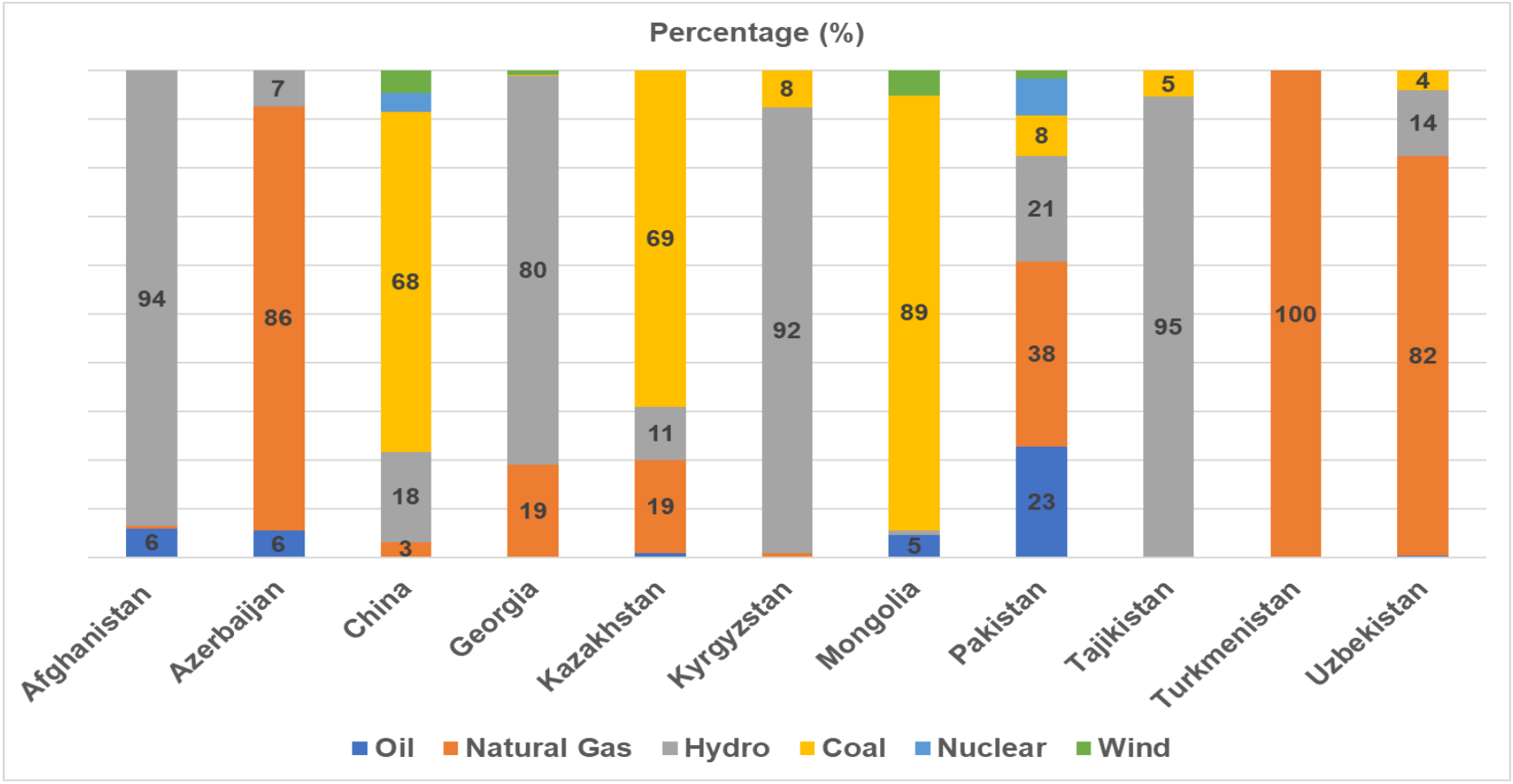
- **Key issues** of the energy sector:
  - low energy efficiency
  - limited regional interconnectedness of energy systems
  - limited private financing

ENERGY IN CAREC REGION

- Demand for **investments of energy** sector:
  - around 300 billion USD by 2030
  - only government investments are and will not be sufficient
  - share of the renewables in energy balance are negligibly low in the countries of CAREC region
  - Accessibility, investments, and resource efficiency are key areas of CAREC programmes recently adopted energy sector strategy

- Energy **mix**:
  - Coal and oil -from 15 to 75% of energy production in CAREC countries
  - High share of fossils in energy mix adversely effects energy security as affordability dimension becomes vulnerable.
  - Overall, oil, gas, coal and other mineral resources in both trade and energy in the region are very important.
  - GDPs of Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan are dependent on price to these mineral resources.
  - Only 4 countries of CAREC region out of 11 are having high share of hydro energy in the energy balance.

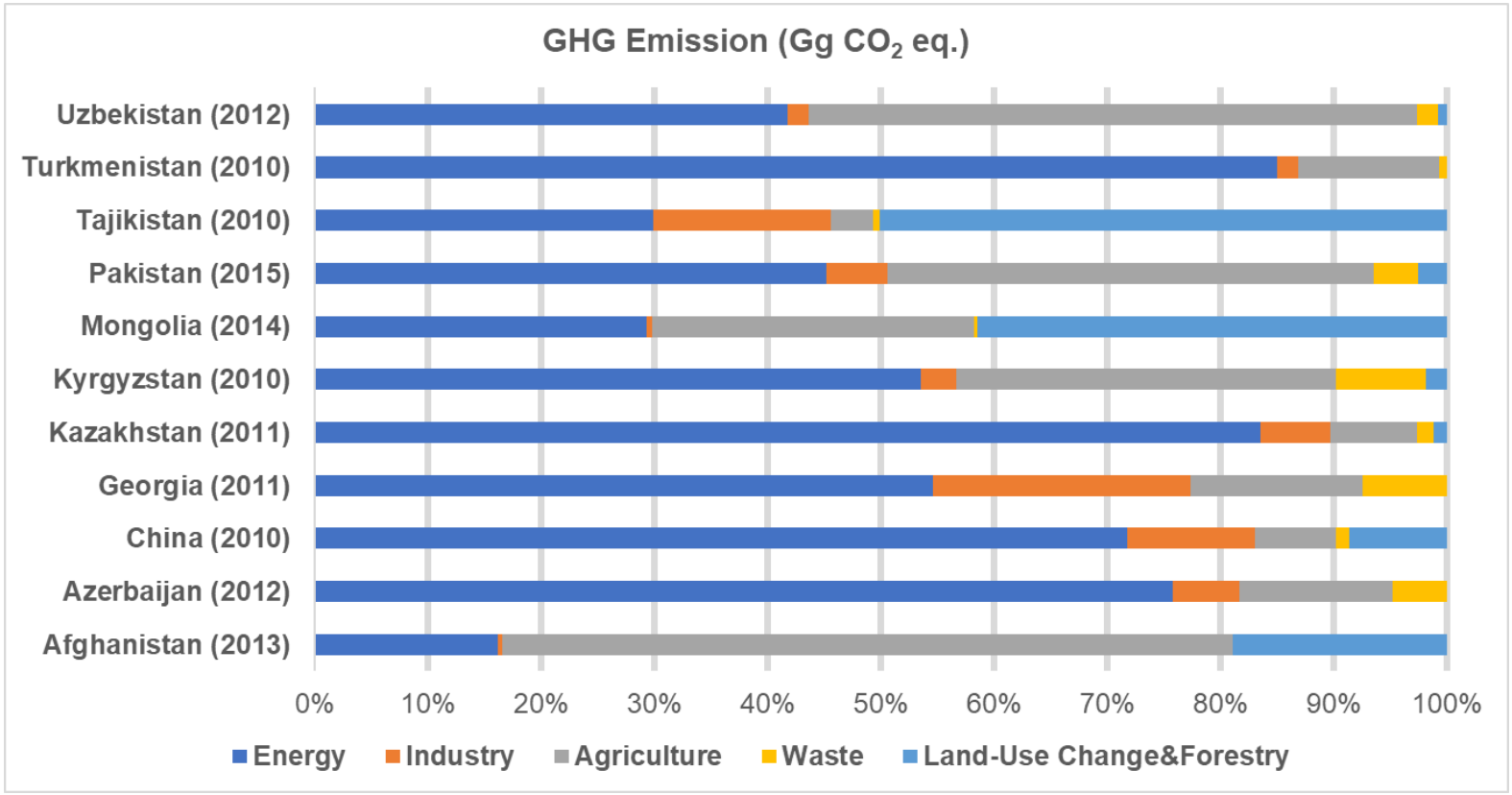
Energy production by sources



ENERGY IN CAREC REGION

- **Water- Energy linkages**:
  - Water for energy and energy for water
  - Hydropower: > 80% of electricity in Afghanistan, Georgia, Kyrgyzstan, and Tajikistan
  - Water for Environment
- **Energy production**:
  - Natural gas: > 80% of electricity in Azerbaijan, Turkmenistan, and Uzbekistan
  - Coal - primary source of electricity generation in China, Kazakhstan, and Mongolia
- **Energy efficiency***:*
  - High levels of energy footprint
  - Losses and low deliver efficiencies
  - Irregular supply and payment discipline

GREENHOUSE GAS EMISSIONS IN CAREC REGION



GREENHOUSE GAS EMISSIONS IN CAREC

- CAREC governments **recognize**:
  - Importance of renewable energy
  - economy's carbon intensity
  - strengthen energy security by diversifying its energy mix through increased investments in renewable energy sources

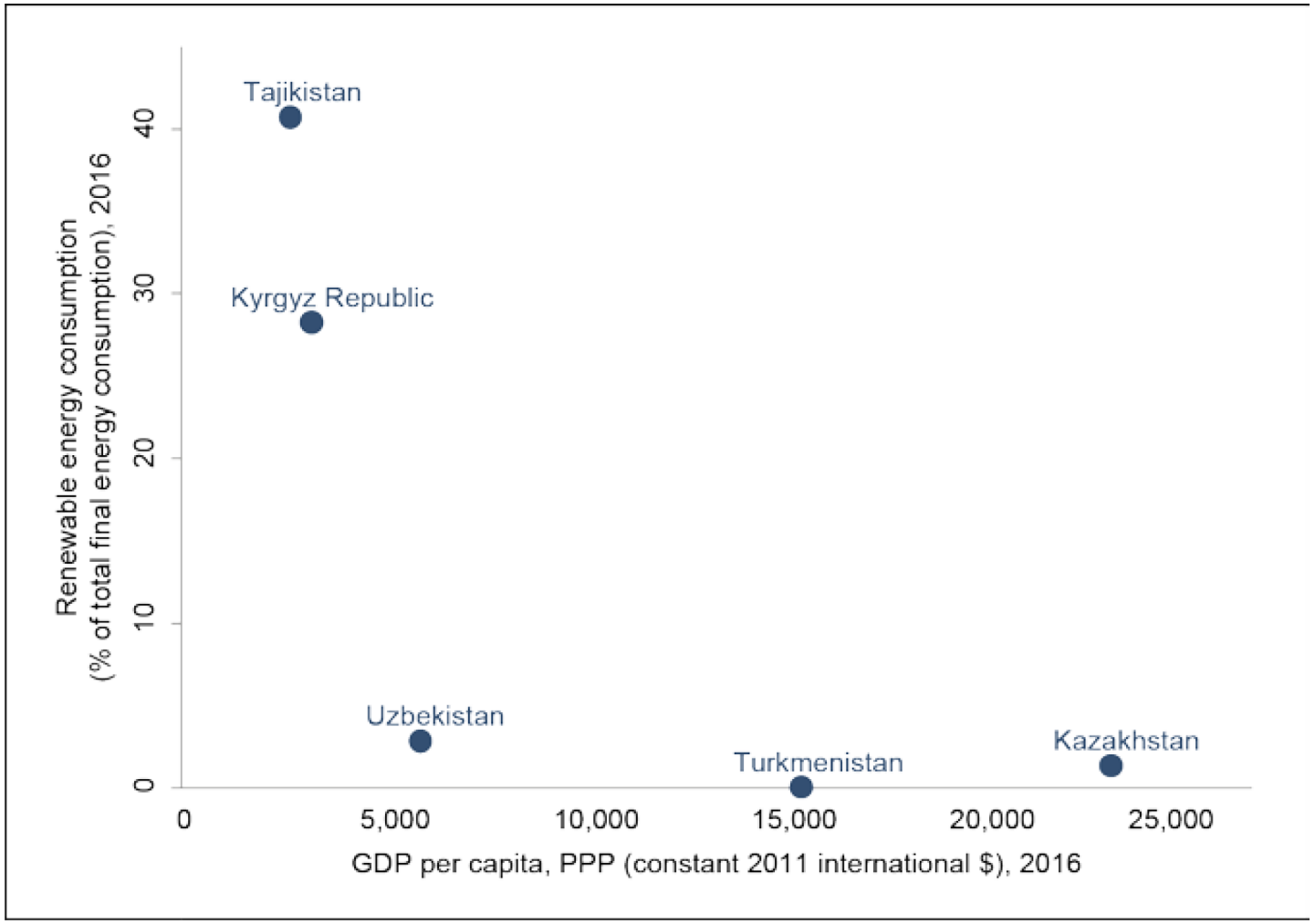
- **Current state:**
  - Enabling environment is in nascent
  - Modern renewables- small fraction in electricity generation
  - China and Mongolia - 4% and 3% in electricity generation.
  - Green economy - absence of practical proof of a paradigm shift

- **Next steps**:
  - New renewable projects (Kz, UZ)
  - FDI into the energy sector targeting renewables
  - Knowledge and technology exchange

Green Energy Potential

- Adequate renewable – green energy resources availability across the region
- Commitments to curtailing GHG emissions
- Renewable Energy deployment- part of the energy sector transition
- Slow transition:
  - abundant fossil fuel availability,
  - dependence on low marginal cost hydro power,
  - Infrastructure investment demand to upgrade old ones or new projects

Renewable energy vs. Income



Renewable energy development

- Share of non-hydro renewable resources is modest in fossil fuel-rich economies of Central Asia
- Central Asian economies face a deficit of energy, aging infrastructure and increasingly inefficient and unreliable energy-generating facilities
- Adding new capacities from enormous potential for all kinds of RE sources will improve reliability and cover energy demand for future
- Energy rich countries are increasingly active in developing new Renewable energy resources , gradually developing standard principles and practices such as electricity market deregulation and adoption of specific legislation
- Energy-poor countries are not financially equipped and mainly targets the international grants and external financing of their development.

Energy development and regional cooperation

- Central Asian nations have a choice between enhanced marketization of energy and improving energy efficiency
- The marketization-oriented approach is more suitable for economies with a relatively developed energy sector and with the necessary market institutions in place
- The development-oriented approach: national government needs greater external support and expertise to overcome the major institutional and structural inefficiencies in the national economy,
- Energy sector in meanwhile addressing the most essential developmental needs in the energy sector through the enhancement of small-scale HPP, solar, wind, and other renewables.
- In Central Asia sets a need for regional (and international) cooperation is in great demand. The regional cooperation target:
  - technical, financial, and other forms of coordinated activity directed toward rehabilitation of existing and construction of new intra- and interregional energy-generating facilities and infrastructure.
  - Harmonization of standards for the renewable energy policies and the exchange of best practices on policymaking and policy implementation

CENTRAL ASIA REGIONAL ECONOMIC COOPERATION (CAREC) INSTITUTE

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