



Powering Progress: Exploring Energy Transition in the CAREC Region through the Lens of China's Success Story



Energy outlook for the CAREC region

Central Asia and its neighboring countries need more energy to fuel their development, but climate change means they must significantly cut carbon emissions and accelerate the transition to clean energy. Energy outlook for the CAREC region highlight five key points:

1. Energy demand in the CAREC region (excluding the PRC) will grow by more than 30% by 2030

- In 2020, energy demand in CAREC countries was 204 million tons of oil equivalent (toe), without including the PRC. This is projected to go up to 254 million-290 million toe or by around 32% by 2030, with electricity as one of the biggest sources of consumption.
- If the PRC is included in the projection, energy demand is expected to rise from 2.3 billion toe in 2020 to 2.4 billion–2.7 billion toe in 2030. Ultimately, demand growth will depend on energy policies, economic growth, and the implementation of energy efficiency measures.



Energy outlook for the CAREC region

2. Modernizing transmission and distribution infrastructure

- Several CAREC countries that continue to use aging energy infrastructure from the Soviet Union era are currently ranked among the 20 least energy-efficient economies in the world. In the electricity sector, energy losses can go as high as 20%.
- Upgrading transmission and distribution infrastructure in the CAREC region is estimated to cost from \$25 billion to \$49 billion excluding the PRC, and \$768 billion-\$901 billion with the PRC.

3. Wind and solar are becoming highly competitive

- Hydropower is currently the largest source of renewable energy in the CAREC region with more than 380 gigawatts (GW) of installed generation capacity as of 2019, including PRC. Indeed, Tajikistan, the Kyrgyz Republic, and Georgia mostly rely on hydropower for electricity.
- Yet, wind and solar are also shaping up to be viable investments, with development costs dropping by over 80% and 35%, respectively, since 2010.



Energy outlook for the CAREC region

- Currently, wind and solar energy comprise only 6% of installed capacity in the region. The region needs large-scale public investments to realize the enormous potential of wind and solar, but private sector participation — which can be encouraged through regulatory reforms and incentives, among others — is also crucial.

4. The CAREC region (excluding the PRC) needs around \$340 billion in energy investments

- Given the CAREC region's large market size and need for infrastructure modernization, its energy investments needs are estimated at \$136 billion–\$339 billion by 2030 (excluding the PRC). If we include the PRC in this calculation, the region's investment needs are valued at \$2.9 trillion–\$3.8 trillion. These include investments in power generation and energy efficiency.
- The region can further enhance its energy security through cross-border infrastructure such as the Central Asian Power System, which interconnects Central Asian countries at different voltage levels and enables regional power trade.



Energy outlook for the CAREC region

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5. CAREC countries are taking action to cut their energy-related carbon emissions

- CAREC countries have committed to reducing their energy-related carbon emissions to help mitigate climate change. These commitments, known as Nationally Determined Contributions or NDCs, vary among the countries. Under certain scenarios, emissions are expected to decrease by 18% or 30% by 2030 compared to a "business-as-usual" scenario.
- CAREC countries, including the PRC, are also working to reduce their overall emissions by 30% by 2030 compared to 2020 levels. To achieve these reductions, the countries are increasing their use of renewables and nuclear energy, shifting from coal to gas, and implementing energy efficiency measures. The PRC, in particular, is aiming to reach peak carbon dioxide emissions before 2030.



Energy outlook for the CAREC region

Renewable energy consumption (% of total final energy consumption)						
Country	2014	2015	2016	2017	2018	2019
Afghanistan	18.93	17.53	19.92	19.21	17.96	18.51
Azerbaijan	2.12	2.33	1.94	1.91	1.93	1.62
China	11.94	12.18	12.56	13.13	13.71	14.45
Georgia	31.34	28.15	27.64	28.03	27.94	25.22
Kazakhstan	1.34	1.72	2.07	2.02	1.88	1.7
Kyrgyz Republic	26.6	23.3	21.92	24.55	23.21	27.88
Mongolia	3.34	3.55	3.39	3.19	3.26	3.32
Pakistan	47.22	45.88	43.69	42.09	43.3	43.36
Tajikistan	45.89	48.11	41.16	41.69	39.47	38.56
Turkmenistan	0.05	0.05	0.05	0.06	0.06	0.06
Uzbekistan	1.4	1.71	1.61	1.75	1.49	1.57
CAREC REGION	17.29	16.77	16.00	16.15	15.84	16.02



Energy outlook for the CAREC region

Energy Capacity/Transition Index measures the availability, sustainability and efficiency of power sources. It is composed of the use of and access to energy, losses in distribution and renewability of energy components and sources, and includes the GDP generated by each unit of oil to further highlight the importance of optimal energy systems.

Energy Productive Capacities (Transition) Index						
Country	2014	2015	2016	2017	2018	Trends
Afghanistan	25.49	25.56	25.60	26.08	26.57	
Azerbaijan	29.93	29.92	29.92	29.64	29.58	
China	30.90	30.89	30.89	30.97	31.05	
Georgia	28.79	29.01	29.01	28.97	29.00	
Kazakhstan	33.59	33.58	33.58	33.58	33.58	
Kyrgyzstan	24.20	24.42	24.42	24.37	24.39	
Mongolia	28.52	28.51	28.51	28.65	28.77	
Pakistan	24.53	24.54	24.54	24.69	24.75	
Tajikistan	24.25	24.32	24.32	24.63	24.66	
Turkmenistan	33.95	33.95	33.95	34.07	34.18	
Uzbekistan	29.63	29.62	29.62	29.58	29.54	
CAREC Region	28.525	28.574	28.578	28.658	28.734	



CAREC Energy Strategy 2030

CAREC Energy Strategy 2030 provides a new long-term strategic framework for the energy sector of the CAREC region. It is inspired by the vision of achieving a reliable, sustainable, resilient, and reformed energy market

Pillar 1

Better Energy Security
through Regional
Interconnections

Pillar 2

Scaled-Up Investments
through Market-Oriented
Reforms

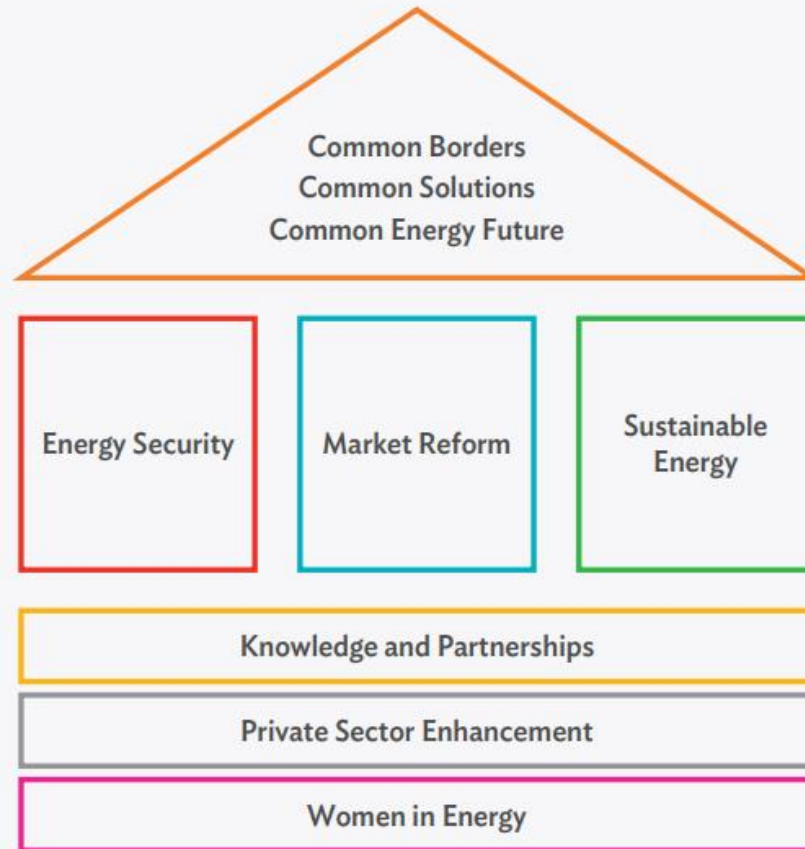
Pillar 3

Enhancing Sustainability
by Greening the
Regional Energy System



CAREC Energy Strategy 2030

CAREC 2030 Strategy Pillars and Crosscutting Themes



CAREC = Central Asia Regional Economic Cooperation.

Source: ADB.



Sustainable Pathways to Energy Transition in the CAREC Region

CAREC Study outlines that:

- The absence of advanced institutional and regulatory frameworks is still a cause for concern among investors and might continue to deter investments into individual countries within the CAREC region.
- Some of the energy sector objectives could therefore be met through regional coordination and effective management of demand and supply patterns, which would lead to enhancing efficiencies of asset use while minimizing market and regulatory risks faced by prospective investors.
- Electricity demand in the CAREC region is projected to rise on the back of expanding electricity based services, uptake of electric transportation and shared mobility, and following low and medium temperature heat applications.



Sustainable Pathways to Energy Transition in the CAREC Region

- Electricity demand is projected to grow in the CAREC region excluding China from an index value of 100 in 2015 to an index value of 228 in 2050, representing a compound annual growth rate (CAGR) of 2.4 percent over this time period.
- Assuming that the fleet of generating assets were to continue to operate at efficiency factor levels close to efficiency factors observed in 2018, and if each country were to attempt to attain self sufficiency in generation, the region would require the addition of an estimated 192,000 MW in incremental capacity by 2030 to replace some 80,000MW of fossil fuel fired generation.



China's Experience of Energy Transition

13th Five-Year Plan, 2020 represented a major chance to take stock of China's progress on its energy goals, which centre around the country's long-term efforts to ensure economic development, energy security, and technological modernization

Completion Status for 13th Five-Year Plan on Energy Development

■ binding target

Indicators	Unit	13th FYP Target ¹	2020 Figure ²
Primary energy production	Billion tons of standard coal	4	4.1
Total installed capacity	GW	2000	2200
Energy consumption	Billion tons of standard coal	<5	4.98
Coal consumption	Billion tons of coal	<4.1	4.04
Power consumption	TWh	6800-7200	7511
Share of non-fossil energy (renewable and nuclear) in total installed capacity	%	39%	43%
Share of non-fossil fuel in power generation	%	31%	32%
Share of non-fossil fuel consumption	%	>15%	N/A
Share natural gas consumption	%	10%	N/A
Share of coal consumption	%	<58%	57%
Reduction in energy intensity	%	15%	16%
Reduction in carbon intensity	%	18%	18.2%*

*End of 2019 data released by Ministry of Ecology and Environment³.

Source: 13th Five-Year Plan for Energy Development and National Bureau of Statistics, 2021



China's Experience of Energy Transition

China's 14th five-year plan outlines the list of projects for a new energy system. It includes the construction of eight large-scale clean energy centers, coastal nuclear power, electricity transmission routes, power system flexibility, oil-and-gas transportation, and storage capacity.

Completion Status for 13th Five-Year Plan on Electricity Development

■ The 13th FYP targets highlighted in red were not met in 2020.

Indicators	Unit	13th FYP Target ⁴	2020 ⁵
Regular hydro installation	GW	340	370.2
Pumped-hydro installation	GW	40	
Nuclear installation	GW	58	49.9
Wind installation	GW	>210	281.5
Solar installation	GW	>110	253.4
Share of fossil fuel installation	%	61%	57%
Share of coal power installation	%	55%	49%
Coal power installation	GW	< 1100	1080.5
Gas power installation	GW	>110	N/A

Source: 13th Five-Year Plan for Electricity Development and China Electricity Council, 2021



China's Experience of Energy Transition

China's 14th five-year plan sets target framework for energy policy between 2021-2025

- Reduce carbon intensity per unit of GDP by 18% from 2020 levels (the 13th Five-Year Plan target was 18%)
- Reduce energy intensity per unit of GDP by 13.5 % from 2020 levels (the 13th Five-Year Plan target was 15%).
- Increase the share of non-fossil sources in total energy consumption to 20% (the 13th Five-Year Plan target was 15%)
- Continued promotion of what the document terms “clean and efficient use of coal” and Energy security
- Discontinuation of a five-year GDP growth target



Implications/Suggestion from CAREC Energy Study

- Devising a long-term strategy along with complimenting policies in the short-run (i.e China 14th plan)
- **Energy Governance framework** is imperative to implement energy strategy 2030, i.e Dedicated regulator framework/body, Tariff regulation, Transforming State owned corporate body, Prevailing/amended laws on energy, Laws on participation of private equity investors, Cross border trade Cost recovery/balance between social objectives of the Government and viability of services Adoption of energy efficiency policies.
- Market base emissions control system for energy transition. i.e Carbon trading markets. Global institutions would also considers consumption based/trade adjusted emissions reduction for China amid higher share in global exports.
- Creating a more favorable investment climate across the region could include the advancement of stronger regional coordination to try and exploit economies of scale and scope, and the rollout of stable governance frameworks to facilitate such coordination.
- Effective management of demand and supply patterns could lead to enhancing efficiencies of asset use while minimizing market and regulatory risks faced by prospective investors.



Implications/Suggestion from CAREC Energy Study

- Assuming that the fleet of generating assets were to continue to operate at efficiency factors observed circa 2018, and if each country in the region were to attempt to attain self-sufficiency in generation, the region would require the addition of an estimated 192,000MW in incremental capacity by 2030 to replace some 80,000MW of fossil fuel fired generation and to meet emission reduction commitments.
- Meeting regionwide aggregated demand necessitates the addition of about 153,000MW of non-hydro RE options.
- In this scenario, China is presumed to serve as the ultimate residual consumer and supplier, absorbing surpluses and bridging deficits in the region, thereby preempting the build-up of large storage capacity on the one side and the construction of peaking plants on the other.
- Regionwide institutions would be required to achieve regionwide optimization. Real-time matching of regionwide demand and supply would be expected from the regional load dispatch center. A specially constituted regional counterparty could facilitate and implement the RE procurement and contracting processes and execute emission reduction contracts. This entity could then serve to distribute accruing emission reduction revenues to help subsidize the vulnerable sections of populations across the region.



Thank you!

