OSCE ACADEMY in Bishkek

Norwegian Institute of International Affairs

POLICY BRIEF

#106

Climate Change and Electricity Demand: Empirical Evidence and Forecasts for Kyrgyzstan

by Anna Arkhangelskaya and Akylai Muktarbek kyzy

DECEMBER 2025

© 2025 OSCE Academy in Bishkek. All rights reserved.

The views expressed and the conclusions reached in this report are exclusively those of the authors and are not necessarily shared or endorsed by the OSCE Academy in Bishkek and the Norwegian Institute of International Affairs.

Extracts of this report may be quoted or reprinted without special permission for academic purposes provided that a standard source credit line is included. Academy Publication Guidelines are available on-line at https://www.osce-academy.net/upload/file/OSCE_AiB_Publication_guidelines.pdf.

This report became possible with financial support from the Norwegian Ministry of Foreign Affairs via the Academy’s Cooperation with the Norwegian Institute of International Affairs.

OSCE ACADEMY in Bishkek

NUPI Norwegian Institute of International Affairs

POLICY BRIEF

106, DECEMBER 2025

Climate Change and Electricity Demand: Empirical Evidence and Forecasts for Kyrgyzstan

by Anna Arkhangelskaya and Akylai Muktarbek kyzy

Executive summary

Climate change is intensifying energy security risks in Kyrgyzstan, a mountainous and hydro-dependent country, where rising temperatures and changing precipitation patterns are already influencing electricity consumption. The country's electricity system is dominated by hydropower, which accounts for over 90 percent of generation, making it highly sensitive to climate fluctuations and seasonal water availability.

This policy brief summarizes new empirical evidence on how climate variability impacts electricity demand based on time-series regression and ARIMA forecasting models using national data for 2001–2023. The results show a strong and statistically significant relationship between temperature, precipitation, and electricity consumption. Rising mean temperatures and increased seasonal variability are driving steady growth in electricity demand, particularly during peak periods. Forecasting scenarios suggest that, without adaptation, electricity consumption may increase by more than 75 percent by 2035. The country's hydro-dominated system is already facing capacity limits, aging infrastructure, and declining reliability. Without policy adjustments, climate-induced demand growth will further deepen the imbalance between consumption and available electricity generation.

This study highlights that Kyrgyzstan's current energy planning does not yet adequately account for climate projections or demand-side dynamics. As a result, the country risks frequent electricity shortages, import dependence, and social tensions from tariff adjustments or rationing. To address these emerging threats, the brief proposes developing a climate-resilient energy policy framework that integrates climate projections, strengthens grid flexibility, expands renewable diversification, and promotes demand-side management. Building a resilient energy system will ensure reliable, affordable, and sustainable electricity access for Kyrgyz citizens under a changing climate.

Keywords: Kyrgyzstan, Climate change, Electricity demand, Energy forecasting, Climate vulnerability

Anna Arkhangelskaya, a Candidate of Economic Sciences, is a researcher at the Institute of Energy and Networks, Kyrgyz State Technical University, and an independent energy expert. Her research focuses on energy economics, energy efficiency, renewable energy, human development, just transition, and energy security in Central Asia and beyond. E-mail: anna.arkhangelskaya2018@gmail.com

Akylai Muktarbek kyzy is a researcher at the Center for Environment and Development in the Economics Department of the American University of Central Asia. Her work focuses on energy economics, gender issues, and sustainable development in Kyrgyzstan. E-mail: muktarbek_a@auca.kg

Introduction and Policy Challenge

Global climate change poses serious challenges to energy systems worldwide, particularly for countries with limited adaptive capacity such as Kyrgyzstan. The increasing frequency of extreme weather events and rising global temperatures put extra pressure on already fragile energy infrastructures.[1] As temperatures rise, electricity demand patterns change – more cooling in summer, less heating in mild winters. In Kyrgyzstan, this situation is intensified by the country's strong dependence on hydropower, which is highly sensitive to water availability, itself influenced by climate shifts.

Kyrgyzstan is a landlocked, mountainous country in Central Asia, bordered by Kazakhstan, Uzbekistan, Tajikistan, and China. Over 94 percent of its territory lies over 1,000 meters above sea level, and around 40 percent exceeds 3,000 meters in elevation.[2] This topography largely determines both the country's climate and its energy systems. Hydropower dominates electricity generation, supplying over 90 percent of total output. Yet this dependence on river inflows makes the

---

[1] Fallah, B., Didovets, I., Rostami, M., & Hamidi, M. (2024). Climate change impacts on Central Asia: Trends, extremes and future projections. *International Journal of Climatology, 44*(10), 3191-3213. https://doi.org/10.1002/joc.8519

[2] World Bank. (2024). *Climate Knowledge Portal: Kyrgyz Republic.* Washington, DC: World Bank Group. https://climateknowledgeportal.worldbank.org/country/kyrgyz-republic (accessed December 17, 2024)

country extremely vulnerable to climate variations such as droughts, glacier melt, and unpredictable precipitation. Increasing temperatures, declining snowfall, and higher evaporation rates directly affect both hydropower generation capacity and household energy consumption, especially during extreme weather events.

Aside from environmental factors, Kyrgyzstan also faces economic and social challenges that amplify energy vulnerability.[3] About one-fourth of the population lives below the poverty line, and many households rely on electricity for heating due to limited access to alternative fuels. Infrastructure remains outdated, and investments in modernization are insufficient. Outmigration, poverty, and a weak institutional framework limit the capacity to respond effectively to climate-related energy shocks. Consequently, any disruption in electricity supply affects both economic productivity and social stability.

The figure below illustrates the trend of monthly average surface temperatures across years. Each line represents the average monthly temperature for a specific year. While there are fluctuations, the overall trend clearly shows a rise in temperatures over recent decades. This increase is especially pronounced during the summer months, which now record significantly higher averages, while winter months show a smaller change or even slight decreases. These trends signal an intensifying warming pattern that influences seasonal energy use and grid load.

---

3 Mehta, K., Ehrenwirth, M., Trinkl, C., Zörner, W., & Greenough, R. (2021). The energy situation in Central Asia: A comprehensive energy review focusing on rural areas. *Energies, 14*(10), 2805. https://doi.org/10.3390/en14102805

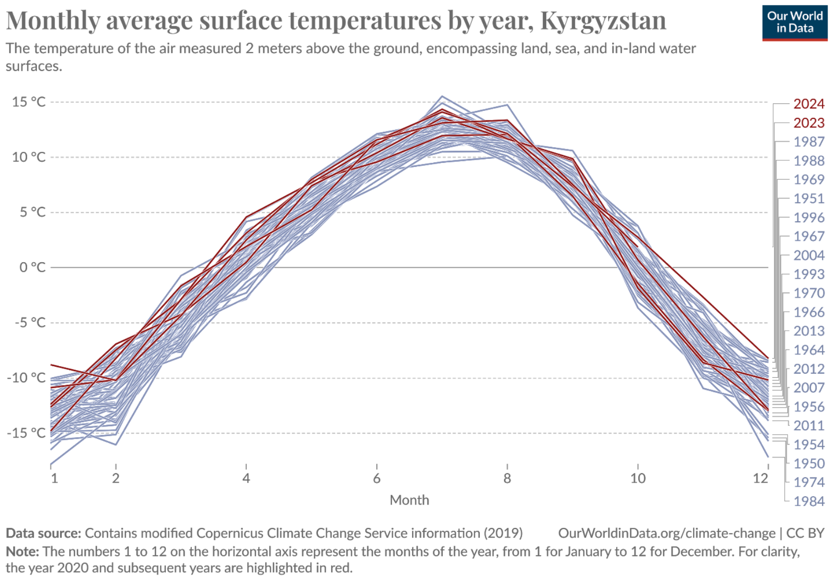

Figure 1: *Monthly Average Surface Temperatures by Year in Kyrgyzstan*

Source: *Our World in Data (2024), Monthly average surface temperatures by year - Kyrgyzstan, based on Copernicus Climate Change Service.*

https://ourworldindata.org/grapher/monthly-average-surface-temperatures-by-year?facet=none&country=~KGZ *(accessed December 17, 2024)*

Note: The numbers 1 to 12 on the horizontal axis represent the months of the year, from 1 for January to 12 for December. The year 2020 and subsequent years are highlighted in red. The temperature of the air is measured 2 meters above the ground for land and in-land water surfaces.

According to the Köppen-Geiger climate classification system, Kyrgyzstan falls within the "continental" climate group (D-type), characterized by hot summers and cold winters.[4] These sharp seasonal contrasts define how electricity demand fluctuates across the year. In summer, rising temperatures drive cooling loads; in winter, heating still dominates. Regional climatic differences across valleys, plateaus, and mountain zones mean that local energy demand varies widely, with southern areas typically facing stronger warming.

4 World Bank. (2024). *Climate Knowledge Portal: Kyrgyz Republic.* Washington, DC: World Bank Group. https://climateknowledgeportal.worldbank.org/country/kyrgyz-republic (accessed December 17, 2024)

Temperature changes have major implications for Kyrgyzstan's electricity system. Hotter summers increase the use of fans and air conditioners, pushing up electricity demand, while milder winters slightly reduce heating needs. However, when combined with hydrological fluctuations that limit hydropower output, the net effect is rising pressure on the energy grid.[5] The system is often forced to balance growing consumption with constrained water inflows, leading to supply shortages and import needs during low-water years.

A time-series analysis for 2001–2023 shows that the total electricity consumption in Kyrgyzstan has nearly doubled. The correlation between demand and temperature is particularly strong, confirming that climate variability now plays a major role in shaping electricity use. With further economic growth and electrification, these trends will continue to intensify. Unless energy policies begin to incorporate climate data and adaptive planning, the risks of power deficits, forced imports, and tariff increases will continue to grow.

The consequences of inaction are already visible. Power shortages during dry years disrupt industries, reduce agricultural productivity, and affect households. Unreliable supply also discourages private investment, slows economic growth, and undermines public confidence. Low-income families suffer the most, facing heating insecurity and rising costs. If current trends persist, Kyrgyzstan could experience a severe supply-demand imbalance by the early 2030s, jeopardizing both energy security and social stability. Strengthening the resilience of the power system through climate-informed planning and diversified energy sources is therefore essential for the country's sustainable development.

Climate Change and Electricity Demand

This study utilizes historical data and future climate projections to examine the relationship between climate change and energy demand in Kyrgyzstan. The dataset covers a period from 2001 to 2035, comprising both observed data and projections. Quarterly time-series data on electricity consumption is sourced from national energy agencies. This

5 Guo, L. N., She, C., Kong, D. B., Yan, S. L., Xu, Y. P., Khayatnezhad, M., & Gholinia, F. (2021). Prediction of the effects of climate change on hydroelectric generation, electricity demand, and emissions of greenhouse gases under climatic scenarios and optimized ANN model. *Energy Reports, 7*, 5431–5445. https://doi.org/10.1016/j.egyr.2021.08.134

includes daily maximum electricity consumption in both megawatts (MW) and megawatt-hours (MWh), enabling the identification of historical demand responses to climatic fluctuations. Temperature and precipitation data are collected from the Kyrgyz National Statistical Committee and the World Bank Climate Knowledge Portal.

The ARIMA Model

To assess the relationship between electricity consumption and climate variables, we specify an ARIMA (Autoregressive Integrated Moving Average with exogenous variables) model that captures the dynamic interactions between electricity demand and key climatic indicators and forecasts future electricity consumption. Following Pierre et al.,[6] Serrano et al.,[7] and Tarmanini et al.,[8] the general specification of the ARIMA model is:

$$Consumption_t = \phi_1 Consumption_{t-1} + \phi_2 Consumption_{t-2} + \cdots + \theta_1 \epsilon_{t-1} + \theta_2 \epsilon_{t-2} + + \beta_1 Temperature_t + \beta_2 Precipitation_t + \beta_3 Dummy_{seasons_t}$$

where: *Consumption* represents the maximum daily electricity consumption at time t, measured in megawatts (MW). *Temperature* denotes the mean temperature (in °C) at time t. *Precipitation* signifies the precipitation (in mm) at time t. Changes in precipitation patterns are likely to affect the availability and efficiency of hydroelectric power in Kyrgyzstan. Seasonal dummies account for seasonal effects (e.g., winter, summer), which might influence electricity consumption patterns. Structural change dummies account for changes in electricity consumption patterns observed in the study period. ϕ and θ represent the autoregressive and moving average terms, respectively. ε is the error term.

---

6 Pierre, A. A., Akim, S. A., Semenyo, A. K., & Babiga, B. (2023). Peak electrical energy consumption prediction by ARIMA, LSTM, GRU, ARIMA–LSTM and ARIMA–GRU approaches. *Energies, 16*(12), 4739. https://doi.org/10.3390/en16124739

7 Serrano, A. L. M., Rodrigues, G. A. P., Martins, P. H. D. S., Saiki, G. M., Filho, G. P. R., Gonçalves, V. P., & Albuquerque, R. D. O. (2024). Statistical comparison of time series models for forecasting Brazilian monthly energy demand using economic, industrial, and climatic exogenous variables. *Applied Sciences, 14*(13), 5846. https://doi.org/10.3390/app14135846

8 Tarmanini, C., Sarma, N., Gezegin, C., & Ozgonenel, O. (2023). Short-term load forecasting based on ARIMA and ANN approaches. *Energy Reports, 9*, 550–557. https://doi.org/10.1016/j.egyr.2023.01.060

Model selection is guided by criteria such as the Akaike Information Criterion (AIC) to determine the optimal lag structure that minimizes model complexity while maintaining predictive accuracy.

The mean temperature across the observed period shows significant seasonal variation. Winter months are characterized by lower temperatures, with an average dipping to around -11.69°C, matching the typical cold climate associated with Kyrgyzstan's continental climate zone. In contrast, summer months experience peak temperatures, averaging around 12.95°C. This seasonal temperature fluctuation reflects the region's climatic conditions, where heating is predominantly required in winter, and cooling becomes necessary in the hotter summer months. This cycle is indicative of the high energy demand variations throughout the year, which impact both the supply and consumption patterns of electricity.

Similarly, electricity consumption demonstrates a pronounced cyclical trend. The minimum consumption of 1113.0 MW and maximum consumption of 3391.0 MW highlight the extremes of energy demand driven by seasonal climatic factors. During the winter, heating needs lead to increased electricity demand, as evidenced by the peak consumption levels. In contrast, summer months exhibit lower demand as the need for heating diminishes, and cooling demand begins to increase. This seasonal demand shift underscores the importance of adaptive energy planning that can respond effectively to these fluctuations.

Precipitation patterns also vary significantly. The data show annual totals between 55.4 mm and 344.8 mm, confirming irregular rainfall and occasional drought conditions. Since most electricity is generated by hydropower, such variability directly affects generation capacity and water availability.

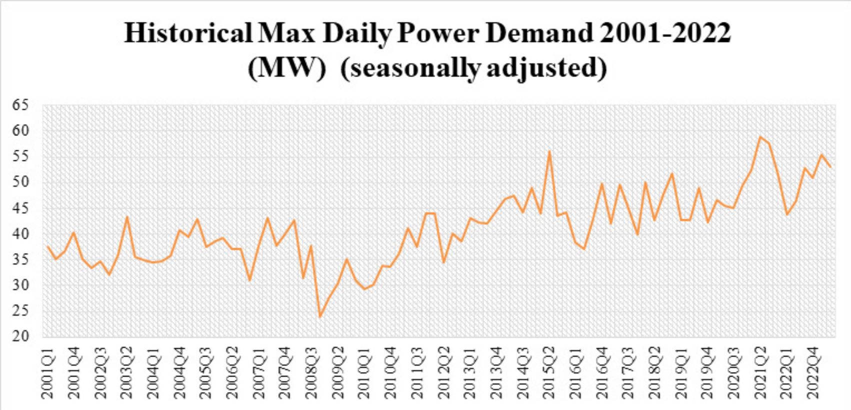

Figure 2: *Seasonally Adjusted Historical Max Daily Power Demand (MW)*

Source: *Authors' calculations*

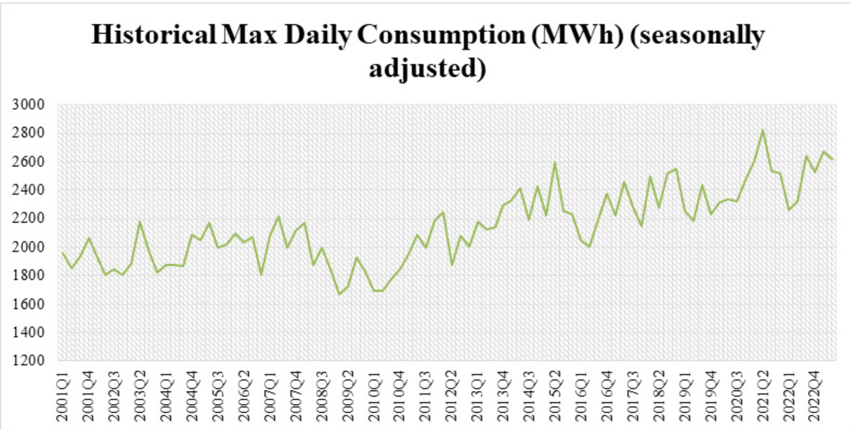

Figure 3: *Seasonally Adjusted Historical Max Daily Consumption (MWh)*

Source: *Authors' calculations*

Figures 2-5 illustrate the seasonally adjusted historical patterns of electricity consumption (in MW and MWh), temperature, and precipitation. Over 2001–2023, electricity use shows a consistent upward trend, aligning with both economic growth and climate variability. At the same time, mean annual temperature shows a gradual increase, confirming the warming trend observed regionally. Precipitation, however, reveals a mild decline, suggesting potential stress on water-dependent power generation.

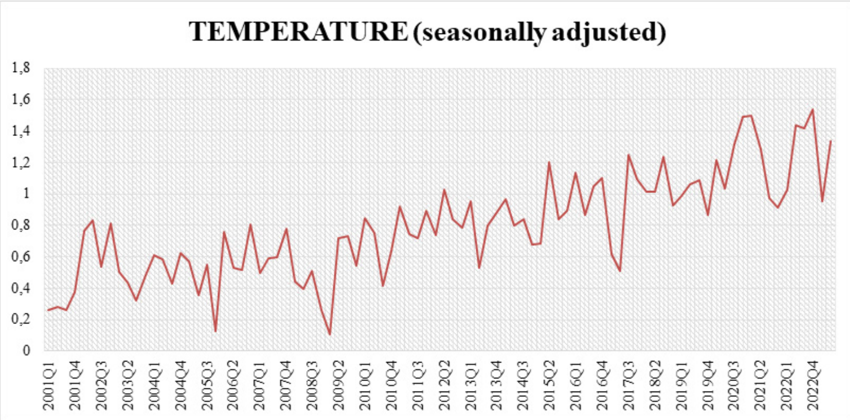

Figure 4: *Seasonally Adjusted Historical Mean Temperature, 2001-2022 (°C)*

Source: *Authors' calculations*

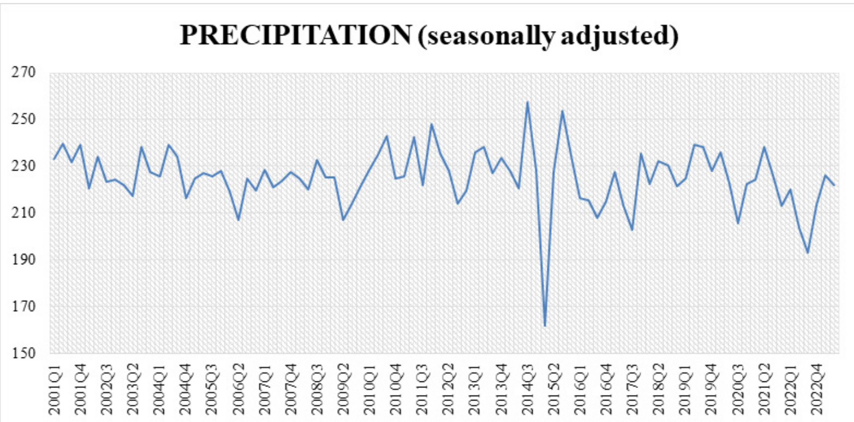

Figure 5: *Seasonally Adjusted Historical Precipitation, 2001-2022 (mm)*

Source: *Authors' calculations*

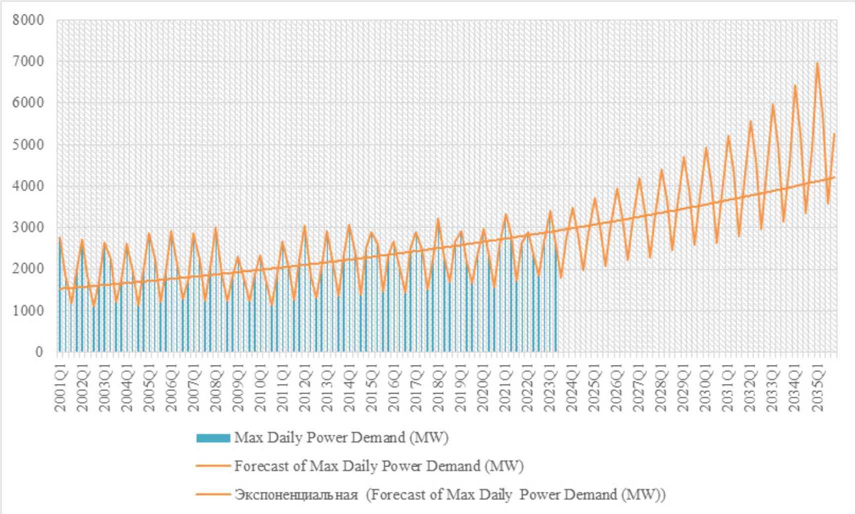

Figure 6*: Forecast Graph for Max Daily Power Demand (MW)*

Source: *Authors' calculations*

Figure 6, the forecast graph for maximum daily electricity consumption indicates a consistent increase in demand over the projection period (2023–2035). The ARIMA model results for forecasting daily maximum power demand (measured in MW) are presented in Annex Table.

Electricity Demand Forecast

The mean maximum daily electricity consumption is projected to increase by 78.41 percent from the observed period (2001–2023) to the forecasted period (2023–2035) (see Table 1, Annex Table 1 and Annex Table 2). This significant rise reflects the impact of changes in climatic conditions, particularly rising mean temperatures (136.54 percent) and fluctuations in precipitation (0.57 percent). These climatic factors play a critical role in influencing electricity consumption patterns, as increased temperatures drive higher energy demands, while variations in precipitation may indirectly affect energy generation and consumption dynamics.

Table 1: *Forecast Statistics for the Period 2023-2035 (Mean Values)*

	Max Daily Consumption (MW)			Mean Temperature (°C)			Precipitation (mm)		
	2001-2023	2023-2035	**Change in percent**	2001-2023	2023-2035	**Change in percent**	2001-2023	2023-2035	**Change in percent**
Mean	2151.7	3839	**78.41**	0.6617	1.5651	**136.54**	224.69	225.9	**0.57**
Standard Deviation	595.7	1189.5	**99.68**	8.157	8.2725	**1.42**	79.044	76.1	**-3.65**
Minimum	1113	1803.2	**62.01**	-11.69	-10.92	**-6.59**	55.4	116.9	**111.12**
Maximum	3391	6972.6	**105.6**	12.55	13.08	**4.22**	344.8	330.6	**-4.10**

Source: *Authors' calculations*

The ARIMA model accounts for these external influences, demonstrating the strong relationship between climatic variables and electricity demand. This underscores the importance of incorporating climate projections into energy planning and policy development to ensure that supply systems can adapt to changing conditions effectively.

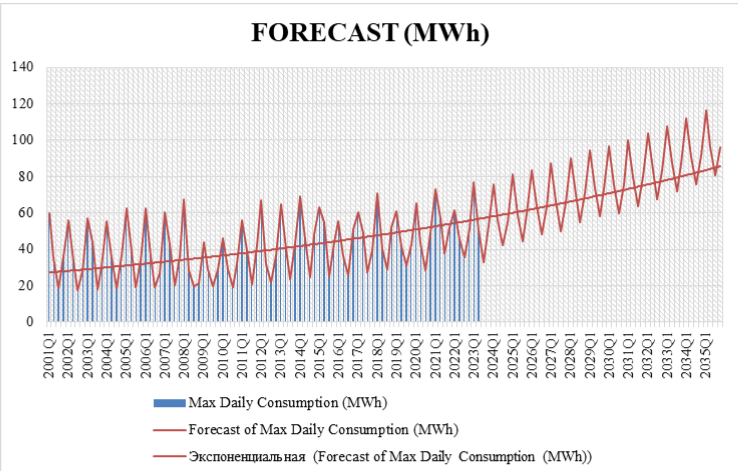

Figure 7: *Forecast Graph for Max Daily Consumption (MWh)*

Source: *Authors' calculations*

The empirical results of this study confirm that mean temperature and precipitation significantly affect electricity demand in Kyrgyzstan. Statistical analysis shows that electricity consumption rises during warmer periods, particularly when temperatures exceed long-term averages. Conversely, dry years with reduced precipitation also tend to coincide with higher demand, as hydropower availability decreases. Forecasts using ARIMA models project that maximum daily electricity consumption will continue to increase steadily through 2035. This pattern signals growing vulnerability to climate-induced demand surges.

The findings imply that Kyrgyzstan's energy system must evolve from a supply-driven, hydro-dependent model toward a climate-resilient, adaptive energy system. The current policy framework, while recognizing hydrological risks, lacks operational mechanisms to integrate climate projections or manage demand volatility. The government's Concept of Fuel and Energy Complex Development until 2040 focuses on expanding generation but does not fully address the long-term variability in water inflows or seasonal consumption patterns. This gap needs to be closed through new policy instruments and institutional reforms.

Concluding Remarks and Recommendations

The brief proposes creating a National Climate-Energy Adaptation Framework (NCEAF). The framework would coordinate climate-informed planning, diversify generation, and strengthen grid flexibility. It should include the following three components:

1. Integration of Climate Projections into Energy Planning.
   Climate projections and hydrological forecasts must become a routine input to power system modelling. The Ministry of Energy should collaborate closely with the Hydrometeorological Agency to generate annual climate and water flow outlooks, informing both long-term investment decisions and short-term dispatch planning. Key measures include requiring climate risk assessments for all new hydropower and energy infrastructure projects, incorporating temperature and precipitation scenarios into demand forecasting models used by the National Energy Holding, and establishing a centralized data-sharing platform for meteorological and energy information.

2. Strengthening Grid Flexibility and Demand Management.
   The current grid structure is limited in its ability to balance seasonal variability. Kyrgyzstan should prioritize grid modernization and the introduction of flexible storage and control systems. Measures include expanding small-scale pumped hydro and battery storage facilities to balance intraday and seasonal fluctuations, introducing time-of-use tariffs and seasonal pricing to reduce winter peaks, promoting smart metering, and launching pilot projects for demand response in large industrial facilities.

3. Diversification of Renewable Energy Sources.
   Reducing dependence on hydropower requires accelerating investment in solar and wind generation. The country has strong solar potential, especially in its southern and western regions, with over 2,700 hours of sunshine annually. Key actions include establishing feed-in tariffs and auction schemes for solar and wind energy, simplifying licensing and grid connection procedures for private developers, and encouraging hybrid systems (hydro + solar) to improve seasonal balance.

For successful implementation, institutional coordination is critical. The NCEAF should be led by an inter-ministerial Climate-Energy Task Force, bringing together the Ministry of Energy, the State Committee on Ecology, and the Hydrometeorological Agency. Legal amendments should include revising the Law on Renewable Energy to include climate risk evaluation for all energy investments, introducing mandatory climate adaptation clauses in energy sector planning documents, and developing financial incentives for utilities that reduce peak loads or invest in resilience-enhancing technologies.

Implementing such a climate-resilient energy framework can generate multiple benefits: improved reliability, reduced dependence on emergency imports, fairer tariff adjustments, and long-term sustainability.

Recommendations

- Integrate climate projections into energy policy and planning.
- Reform tariff structures to manage seasonal peaks.
- Invest in grid flexibility and storage infrastructure.
- Diversify the energy mix beyond hydropower.
- Strengthen regional power cooperation.
- Enhance data and forecasting capacity.
- Promote energy efficiency and awareness.

References

Fallah, B., Didovets, I., Rostami, M., & Hamidi, M. (2024). Climate change impacts on Central Asia: Trends, extremes and future projections. *International Journal of Climatology, 44*(10), 3191-3213. https://doi.org/10.1002/joc.8519

Guo, L. N., She, C., Kong, D. B., Yan, S. L., Xu, Y. P., Khayatnezhad, M., & Gholinia, F. (2021). Prediction of the effects of climate change on hydroelectric generation, electricity demand, and emissions of greenhouse gases under climatic scenarios and optimized ANN model. *Energy Reports, 7*, 5431–5445. https://doi.org/10.1016/j.egyr.2021.08.134

Mehta, K., Ehrenwirth, M., Trinkl, C., Zörner, W., & Greenough, R. (2021). The energy situation in Central Asia: A comprehensive energy review focusing on rural areas. *Energies, 14*(10), 2805. https://doi.org/10.3390/en14102805

Our World in Data (2024). *Monthly average surface temperatures by year – Kyrgyzstan.* Retrieved from https://ourworldindata.org/grapher/monthly-average-surface-temperatures-by-year (accessed December 17, 2024).

Pierre, A. A., Akim, S. A., Semenyo, A. K., & Babiga, B. (2023). Peak electrical energy consumption prediction by ARIMA, LSTM, GRU, ARIMA–LSTM and ARIMA–GRU approaches. *Energies, 16*(12), 4739. https://doi.org/10.3390/en16124739

Serrano, A. L. M., Rodrigues, G. A. P., Martins, P. H. D. S., Saiki, G. M., Filho, G. P. R., Gonçalves, V. P., & Albuquerque, R. D. O. (2024). Statistical comparison of time series models for forecasting Brazilian monthly energy demand using economic, industrial, and climatic exogenous variables. *Applied Sciences, 14*(13), 5846. https://doi.org/10.3390/app14135846

Tarmanini, C., Sarma, N., Gezegin, C., & Ozgonenel, O. (2023). Short-term load forecasting based on ARIMA and ANN approaches. *Energy Reports, 9*, 550–557. https://doi.org/10.1016/j.egyr.2023.01.060

World Bank. (2024). *Climate Knowledge Portal: Kyrgyz Republic.* Washington, DC: World Bank Group. https://climateknowledgeportal.worldbank.org/country/kyrgyz-republic

Annex

Annex Table 1: Estimation Outputs for Max Daily Consumption (MW)

Automatic ARIMA Forecasting
Selected dependent variable: DLOG(CONSUMPTION_MW)
Sample: 2001Q1 2023Q2
Included observations: 89
Forecast length: 50

Number of estimated ARMA models: 100
Number of non-converged estimations: 0
Selected ARMA model: (2,3)(1,0)
AIC value: -2.0356702945

Dependent Variable: DLOG(CONSUMPTION_MW)
Method: ARMA Maximum Likelihood (BFGS)
Sample: 2001Q2 2023Q2
Included observations: 89
Convergence achieved after 114 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
QUARTERS1	0.331739	0.078758	4.212140	0.0001
QUARTERS2	-0.485569	0.123807	-3.921984	0.0002
QUARTERS3	-0.851700	0.166096	-5.127745	0.0000
QUARTERS4	0.239785	0.111109	2.158099	0.0341
PRECIPITATION	0.000832	0.000426	1.952392	0.0546
TEMPERATURE	0.011692	0.002968	3.939557	0.0002
DUMMY	-0.021323	0.022032	-0.967824	0.3362
AR(1)	-0.076483	0.041945	-1.823407	0.0722
AR(2)	-0.987994	0.027299	-36.19161	0.0000
SAR(4)	-0.130233	0.139148	-0.935936	0.3523
MA(1)	-0.817007	300.0058	-0.002723	0.9978
MA(2)	0.817028	493.4539	0.001656	0.9987
MA(3)	-0.999975	968.7903	-0.001032	0.9992
SIGMASQ	0.004873	0.812417	0.005998	0.9952

R-squared	0.967995	Mean dependent var	-0.000638
Adjusted R-squared	0.962448	S.D. dependent var	0.392409
S.E. of regression	0.076043	Akaike info criterion	-2.049462
Sum squared resid	0.433685	Schwarz criterion	-1.657991
Log likelihood	105.2011	Hannan-Quinn criter.	-1.891672
Durbin-Watson stat	1.732951		

Source: *Authors' calculations*

Annex Table 2: Estimation Outputs for Max Daily Consumption (MWh)

Automatic ARIMA Forecasting
Selected dependent variable: D(CONSUMPTION MWH)
Sample: 2001Q1 2023Q2
Included observations: 89
Forecast length: 50

Number of estimated ARMA models: 100
Number of non-converged estimations: 0
Selected ARMA model: (2,3)(1,1)
AIC value: 6.22883407385

Dependent Variable: D(CONSUMPTION_MWH)
Method: ARMA Maximum Likelihood (BFGS)
Sample: 2001Q2 2023Q2
Included observations: 89
Convergence achieved after 206 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
QUARTERS1	24.64036	3.448967	7.144271	0.0000
QUARTERS2	-38.56734	9.026402	-4.272725	0.0001
QUARTERS3	-44.02481	11.84721	-3.716049	0.0004
QUARTERS4	3.171479	6.243907	0.507932	0.6130
PRECIPITATION	0.059183	0.030594	1.934488	0.0569
TEMPERATURE	0.780484	0.233014	3.349518	0.0013
DUMMY	-0.978325	1.542637	-0.634190	0.5279
AR(1)	-1.534867	0.117972	-13.01044	0.0000
AR(2)	-0.717988	0.116209	-6.178414	0.0000
SAR(4)	-0.941131	0.150545	-6.251501	0.0000
MA(1)	0.772241	422.3154	0.001829	0.9985
MA(2)	-0.772266	612.8096	-0.001260	0.9990
MA(3)	-0.999975	1339.908	-0.000746	0.9994
SMA(4)	0.857723	0.242565	3.536056	0.0007
SIGMASQ	20.31762	674.0456	0.030143	0.9760

R-squared	0.949863	Mean dependent var	-0.103146
Adjusted R-squared	0.940378	S.D. dependent var	20.24467
S.E. of regression	4.943284	Akaike info criterion	6.293623
Sum squared resid	1808.268	Schwarz criterion	6.713056
Log likelihood	-265.0662	Hannan-Quinn criter.	6.462685
Durbin-Watson stat	1.941530		

Source: *Authors' calculations*

OSCE Academy in Bishkek
1A, Botanichesky pereulok
Bishkek, Kyrgyz Republic 720044

Tel: +996 (312) 54-32-00, 54-12-00
E-mail: rtd@osce-academy.net
Website: www.osce-academy.net