ASIA CLEAN ENERGY FORUM 2026

Beyond Transition: Building Secure, Resilient, Inclusive, and Intelligent Energy Systems

8–11 June | ADB Headquarters, Metro Manila, Philippines

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Next Generation Energy Systems in Central, West and East Asia: Technology, Markets and Regional Integration

From Forecasting to System Value: Lessons from Implementing Renewable Energy Forecasting in Kazakhstan

Managing Director for system services of KEGOC JSC
Kerimkulov Nurzhan

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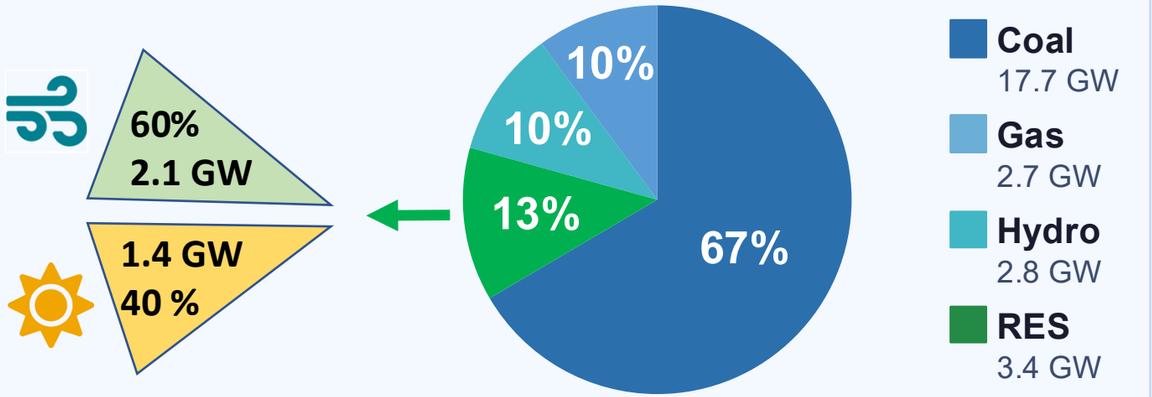
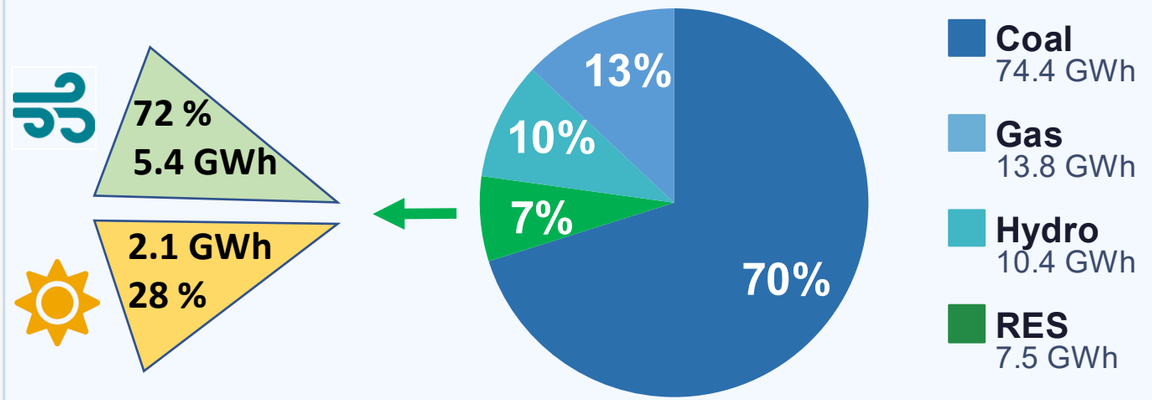
Kazakhstan Power Generation Structure

Total installed capacity as of 2025: 26.8 GW | 248 power plants | Total electricity generation: 123 GWh

Share out of total capacity



Share out of total electricity generation



Wind

62 plants · Capacity factor 35.6%

Solar

51 plants · Capacity factor 18.9%

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Prospective RES projects

Planned RES integration by 2030

≈ 10,5 GW

Total installed capacity of new RES projects

4,6 GW

Auction based RES capacity

4,8 GW

Large-scale RES capacity

Key indicators

Objective share of RES in total generation

21% by 2030

23% by 2035

This is **twice** the stated state indicators (15% by 2030), which indicates the accelerated nature of the energy transition in Kazakhstan.

Requirements for storage systems

BESS *Battery Energy Storage System*

Mandatory equipping of RES with BESS technologies in order to cover generation intermittency, smooth out peak loads, and participate in **AGC**.

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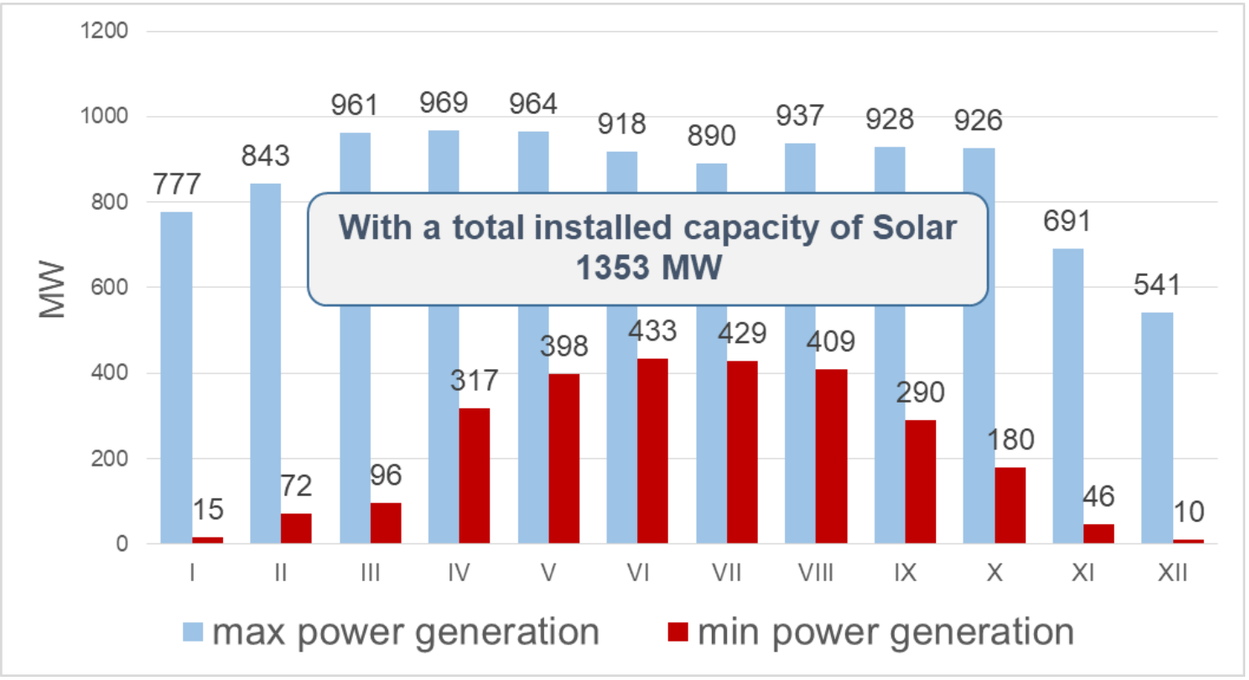
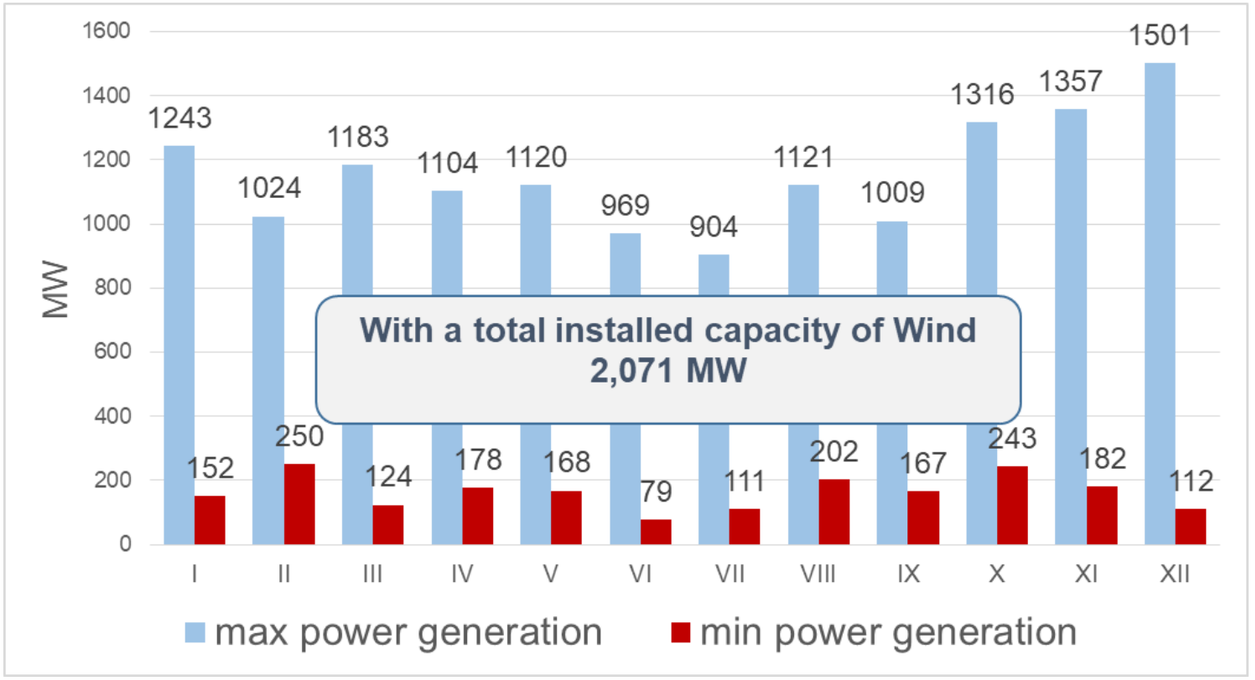
Analysis of RES peak generation in 2025





Solar power plants reach maximum generation of 900 MW with a total installed capacity of over 1,300 MW;
For Wind power plants it is 1,500 MW with a total installed capacity of over 2,000 MW

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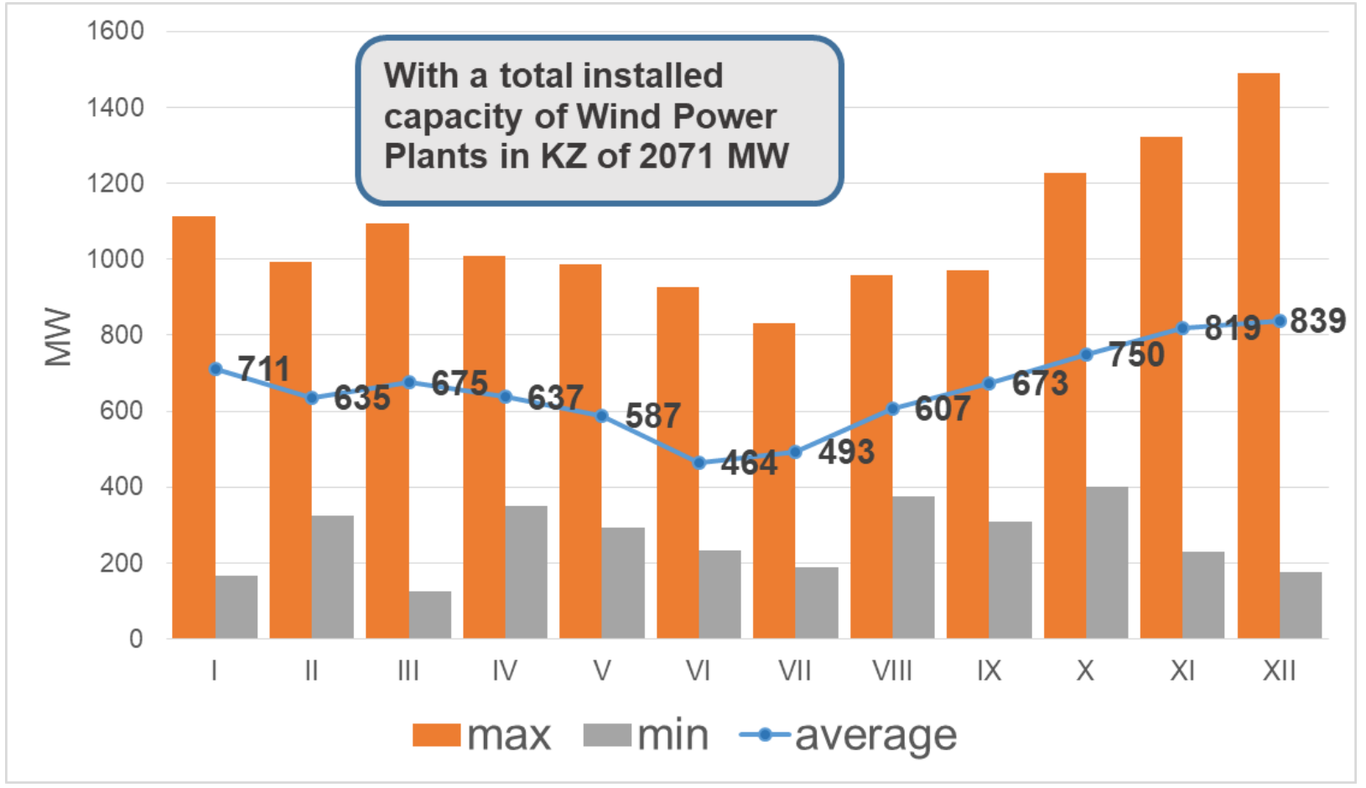
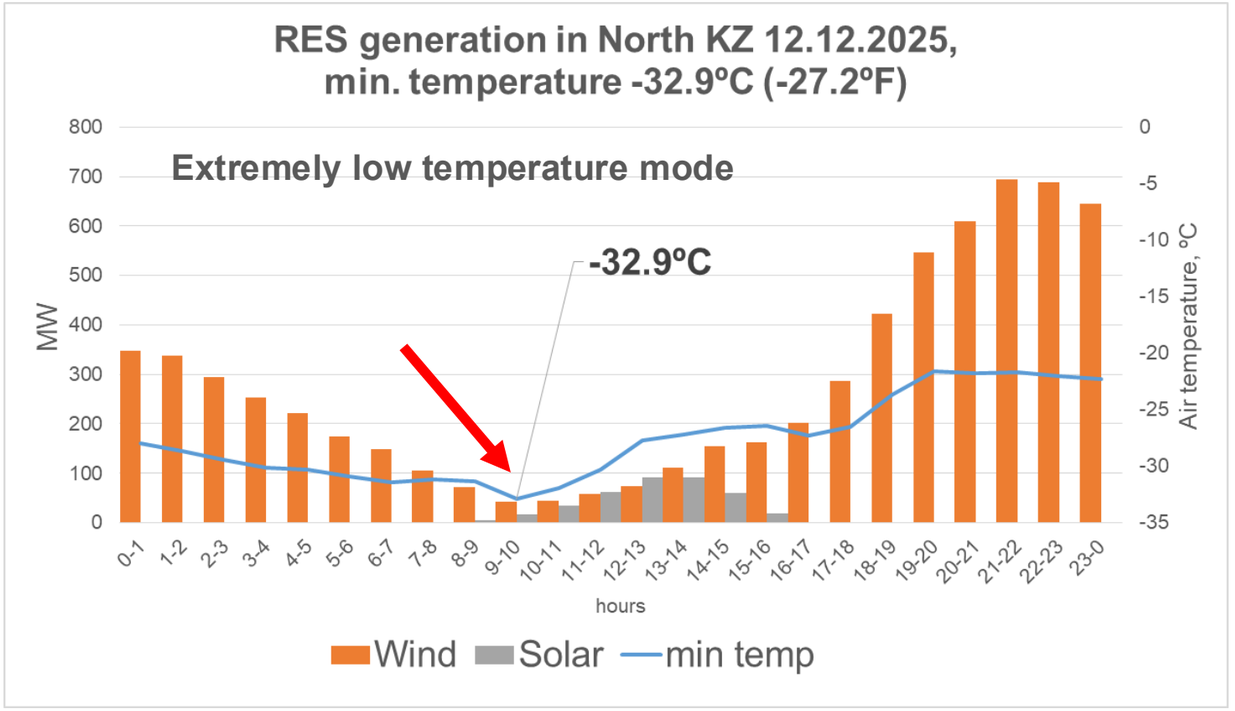
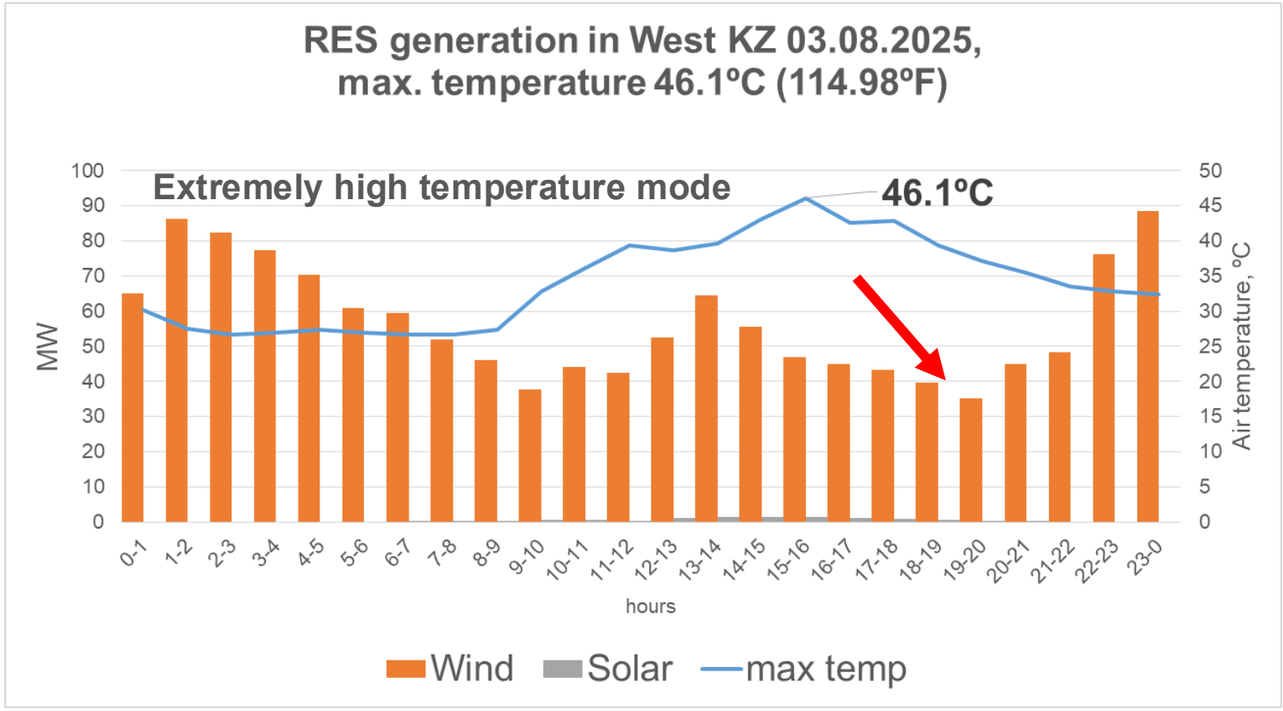
Wind power generation during peak hours in 2025



Depending on seasonality
wind power plants contribute to peak load coverage in the range of 400-800 MW

RES generation during extreme temperatures in 2025





Wind power generation dropped to 50 MW with the installed capacity of wind in the Zone being 1383 MW

Maximum solar power generation did not exceed 100 MW with the installed capacity of solar in the Zone being 411 MW

Wind power generation dropped to 40 MW with a total installed wind power capacity in the Zone of 214 MW

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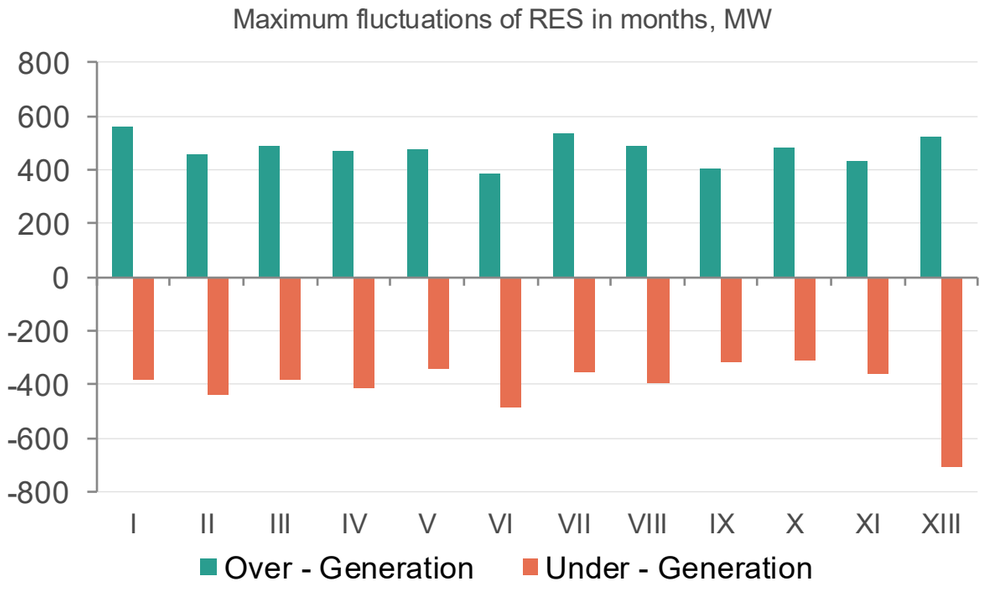
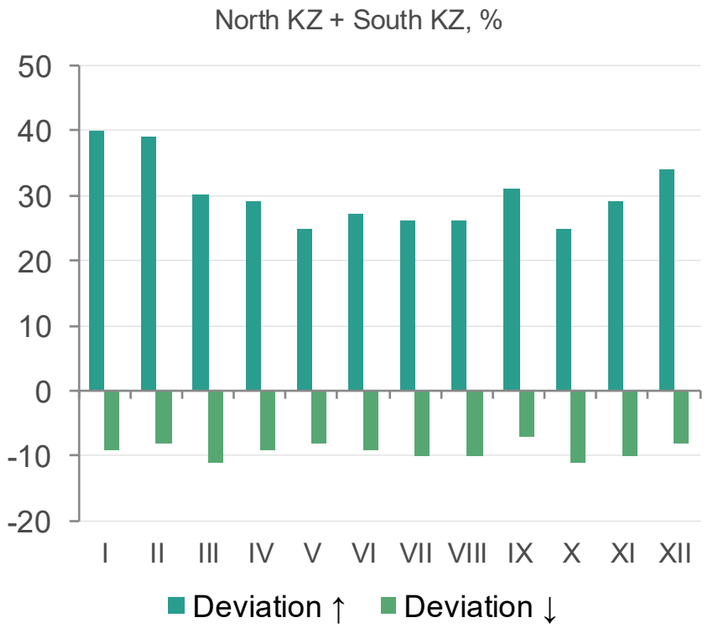
The impact of RES fluctuations (analysis of 2025)

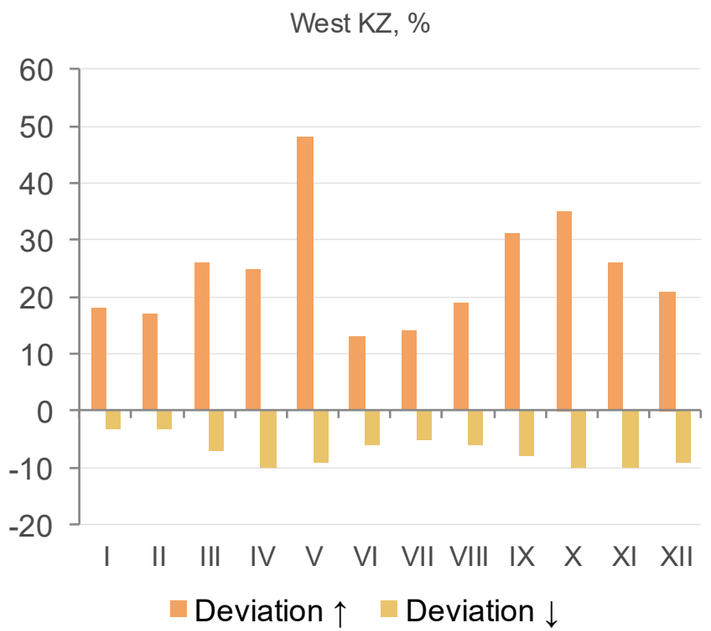
RES fluctuations range



Fluctuations reach 600 MW at peak, which is about 20% of the installed capacity (3.4 GW)

The impact of RES fluctuations on cross-border flow deviations





Impact of RES fluctuations on cross-border deviations in average throughout the year: 30% increase (negative) and 10% decrease (positive)

RENEWABLE GENERATION FORECASTING WILL IMPROVE PLANNING AND MINIMIZE DEVIATIONS

RES generation forecasting

40

Renewable power plants generation forecasted by ENFOR

19

21

ENFOR

24/7 operational availability
Forecast horizon
1-168 hours ahead
Update Frequency
Every 60 min

Visualization by horizon,
plant level,
region and technology

elia group

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Example. 13 May 2026. SPP Balkhash 50 MW

MAE

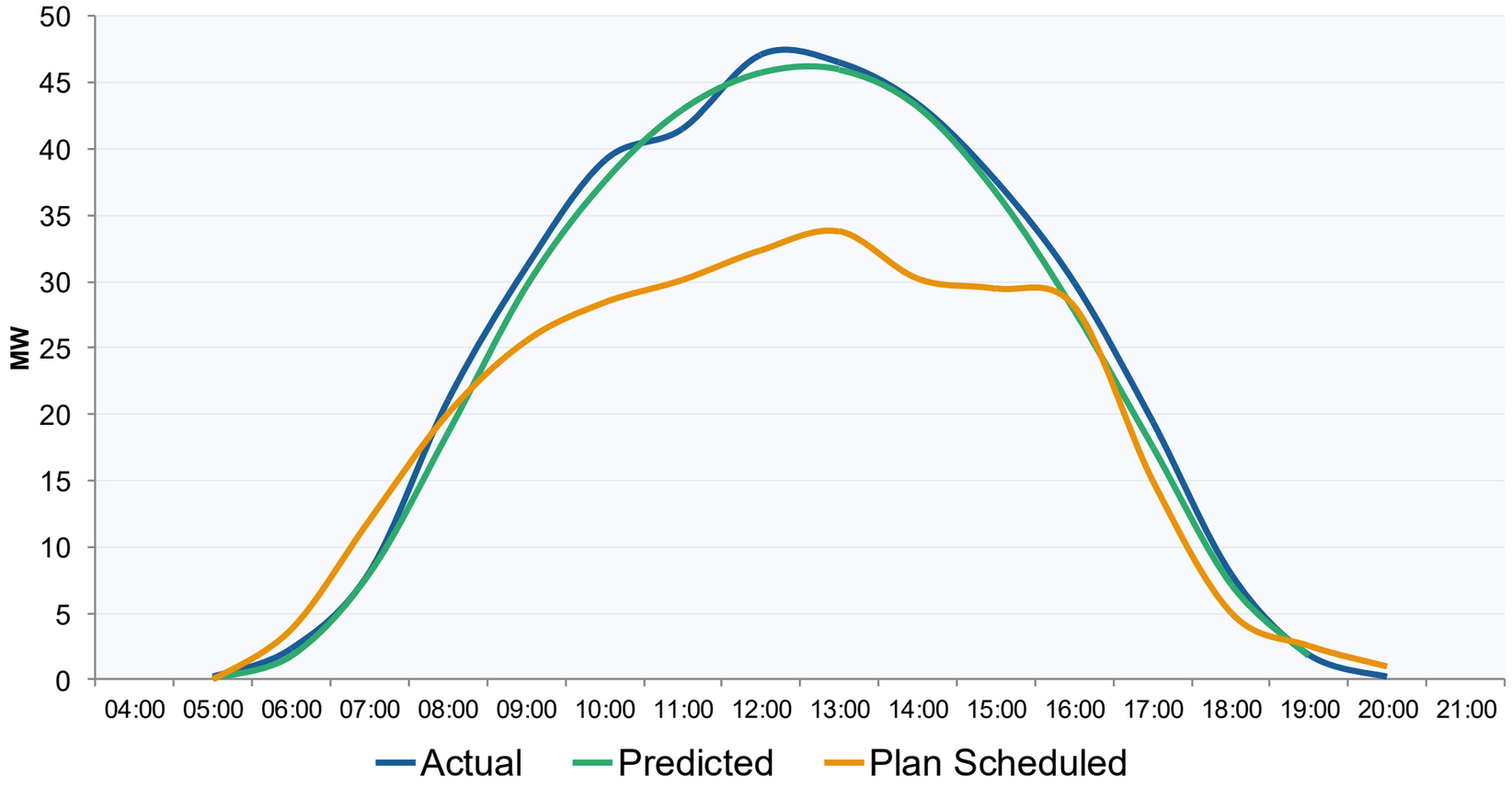
Forecast ENFOR	Plan Scheduled
0.98 MW	6.23 MW

MAE — mean absolute error

RMSE

Forecast ENFOR	Plan Scheduled
1.24 MW	7.95 MW

RMSE — root mean square error



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Example. 2 May 2026. WPP CATEC 100 MW

MAE

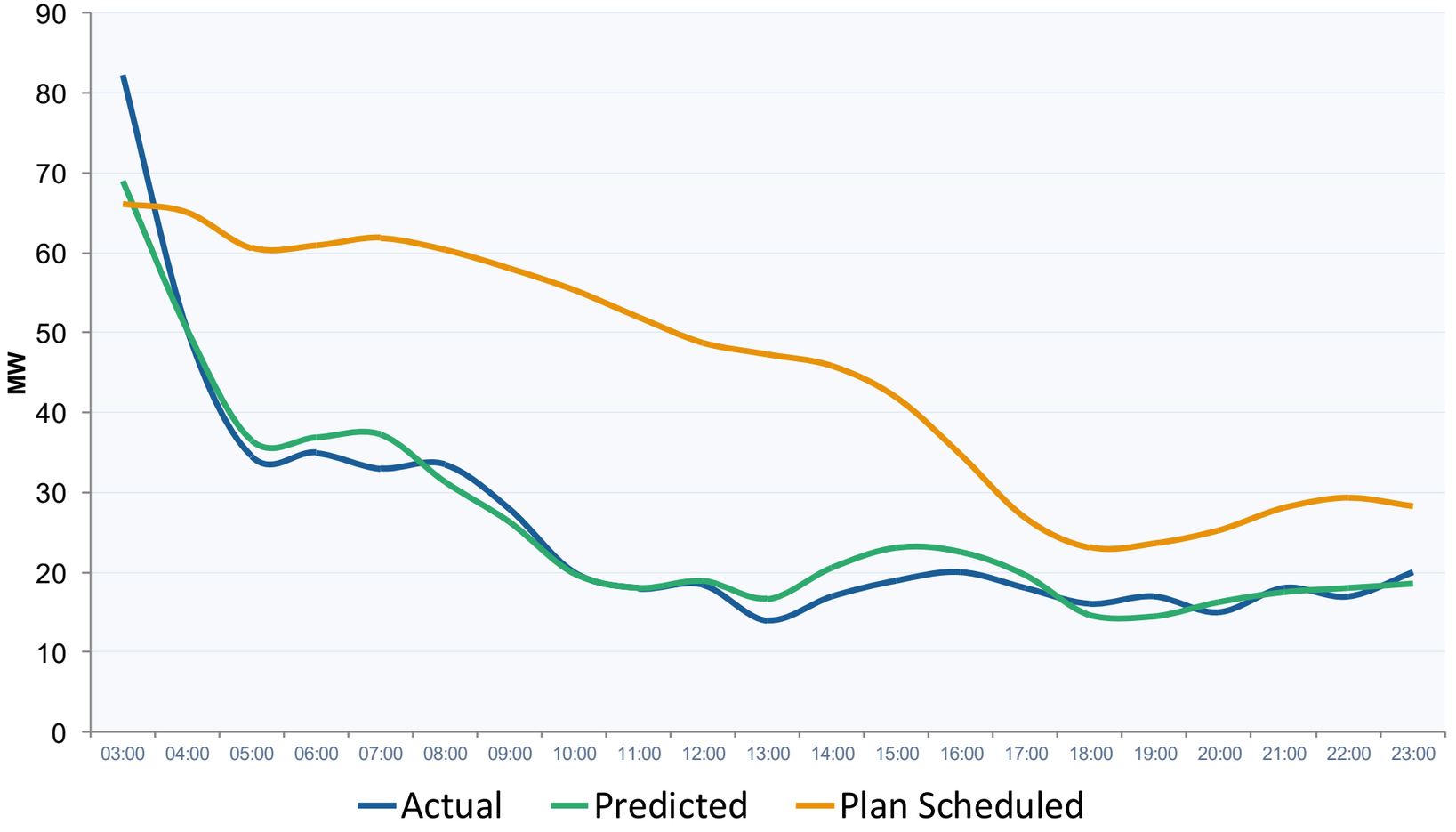
Forecast ENFOR	Plan Scheduled
1.18 MW	13.95 MW

MAE — mean absolute error

RMSE

Forecast ENFOR	Plan Scheduled
1.73 MW	18.91 MW

RMSE — root mean square error



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RES forecasting extension plans

1

Expanding the scope of the renewable energy forecasting system

Systematic expansion of the coverage of renewable energy facilities included in the forecasting system, to ensure comprehensive monitoring and management of renewable energy generation at the national level.

2

Integrating renewable energy forecasting into operational planning processes

Application of forecasting results to generate a daily load schedule on a 24-hour horizon, as well as operational adjustment of balance decisions in real time with a 2-3 hour horizon to ensure the reliability and stability of the power system.

3

Improving market mechanisms and increasing the responsibility of renewable energy entities

Developing a regulatory environment to strengthen the responsibility of renewable energy producers for the quality of generation forecasts, including by equipping market participants with **specialized generation forecasting and planning** services.

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Thank you for your attention!