

Kazakhstan | Impacts of Climate Change and Adaptation in the Energy Sector

Find the underlying analysis in [the sectoral policy brief "Kazakhstan: Economy-wide Effects of Adaptation in the Energy Sector"](#) and in the report ["Supporting climate resilient economic development in Kazakhstan"](#)



Annual changes in % are between a climate change scenario without adaptation (SCC) and a climate change scenario with adaptation (SCCA).

Kazakhstan's energy sector is vulnerable to climate change



Floods damage energy infrastructure such as power transmission lines causing power losses and costs for reconstruction.



Heatwaves lead to higher electricity demand for cooling and reduced thermoelectric power potential due to insufficient cooling.



Droughts and heatwaves cause lower hydro power production as a result from lower water levels.



Negative impacts on the energy sector can lead to **lower growth in other sectors, lower GDP and employment.**

Exemplary adaptation measures for reducing vulnerability to heavy rain and heatwaves



Wind power deployment and energy efficiency in the housing sector

The expansion of water-independent energy technologies like **wind power** and the **reduction of energy consumption** are important elements to respond to possible imbalances of energy supply and demand during heatwaves. These measures also make use of **synergies between adaptation and mitigation.**

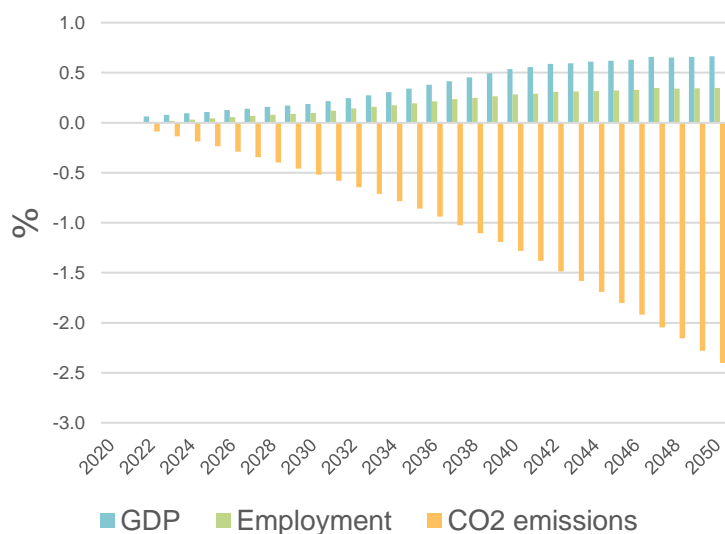


Underground powerlines

Underground powerlines are well suited to prevent damages from extreme precipitation and storms. They increase the climate resilience of the grid as they **reduce the number of power outages** and thereby **limit production failures** in other sectors.

Economy-wide impacts of wind power, energy efficiency and underground powerlines

Economy-wide impacts of wind power & energy efficiency (SCCA compared to SCC)



Macroeconomic modelling allows for **long-term assessment of economy-wide effects** of adaptation measures.

- Investments in wind power and energy efficiency improvements in the housing sector result annually in up to **0.7% higher GDP (resp. KZT 558 bn.)** and **up to 35,000 additional jobs (resp. 0.35% higher employment)** (SCCA compared to SCC).
- Investments in **underground powerline expansion** also have positive economy-wide effects: **GDP** rises annually by **up to 0.6%** and **up to 17,000 additional jobs** per year are created (SCCA compared to SCC).
- Both measures harness **mitigation and adaptation synergies**: with investments in wind power and energy efficiency (underground powerlines) **energy-related CO₂ emissions drop up to 2.4% (0.35%)** per year (SCCA compared to SCC). They avoid energy losses or use renewable energy sources.

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