

## **Economics of climate change adaptation in Kazakhstan**

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Economic growth and the wealth of Kazakhstan is dependent on resources which are at risk. The country exports fossil fuels (52% of total nominal exports in 2017) especially to the European market as well as agricultural products. While the agricultural sector is highly vulnerable to climate change, oil and gas demand is more affected by mitigation strategies of EU countries and their aim to be climate-neutral in 2050.

Climate change is an issue of growing importance – recently addressed by Kazakhstan’s president – which is affecting especially the agricultural, energy and the water sector. In climate projections, increased temperatures, droughts, heat waves and heavy precipitation events are expected to appear more intensely and more frequently by 2050. The economic damage of climate change is increasing and results in destroyed infrastructure, yield losses or negative health impacts. Adaptation measures such as investments in climate-resilient infrastructure help to minimize or even avoid these negative impacts.

Based on experiences in previous projects, macro-econometric Input-Output models (and their extensions to E3 (economy-energy-emissions) models) are considered appropriate tools to analyze the impacts of climate change and adaptation on a yearly basis. Scenario analysis is used to implement economic implications from climate change (e. g. damages caused by flooding) and adaptation strategies (e. g. investments in infrastructure) into the economic model.

The e3.kz model for Kazakhstan is applied to analyze the economic impacts of climate change adaptation. First, sector specific damages from climate risks and appropriate adaptation measures need to be quantified and implemented into the model. Then, the model reveals insight into the inter-industry impacts and the overall consequences of adaptation on the Kazakh economy in terms of e. g. employment and growth. Scenario results support Kazakh policymakers in finding suitable countermeasures to adapt to climate change.