

## Energy Sector Vulnerability to Climate Change: Description of Activity

### Background

Changes in hydrology, air temperature and extreme events are likely to impact energy supply and demand in Central Asia. Information suggests some climate changes are underway, although full, measurable impacts are expected to emerge around 2030, with increasing impact through 2050. Energy sector vulnerability to climate change was explored in a series of studies for each of Kazakhstan, Kyrgyz Republic, Turkmenistan and Uzbekistan over the last four years, funded by USAID and the World Bank.

The objective of these studies was to build understanding of the linkages between future energy (primarily power) supply-demand balance and climatic conditions and identify actions that can help to build a resilient future. The studies addressed the question: “How can country X manage the future security of its power supply in the face of climate change?” The studies identify climate-driven hazards, vulnerabilities and risks for the energy sector, as well as options for adaptation.

Consistent with the objective of raising awareness, stakeholders were at the heart of the assessments through workshops and multiple smaller meetings and discussions. The assessment also employed technical (engineering and economic) analysis to: (i) quantitatively estimate (where possible) the impacts of climate stress on both the demand and supply of energy; (ii) estimate an order-of-magnitude potential impact of climate change on the economy; and (iii) explore the relative costs and benefits of alternative combinations of energy sources and policies to match supply with demand in the face of climate change. The studies were intended to stimulate discussion on energy-climate change linkages and identify areas for further policy analysis, if appropriate.

### Results of Recent Studies

**Risks:** At the national level, the following key risks were identified, largely from changes in temperature<sup>1</sup>:

1. Increased air temperature – higher transmission and distribution losses
2. Increased extreme climate-related events – intense precipitation, flooding, mudflows, GLOFs, landslides – damage to transmission systems
3. In Kazakhstan and Turkmenistan, in case of increased Caspian Sea level, storm surges can damage onshore and offshore oil and gas production facilities
4. Increased risk of competition between water users in shared river basins and between energy and agriculture
5. Risk of decreased water resource availability for cooling water (thermal power plants) and hydropower generation.

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<sup>1</sup> Potential changes in temperature are better understood than precipitation.

The studies concluded that climate change impacts on energy sectors (supply and demand) could affect countries' economic performance if not managed. These results are consistent with actions in other jurisdictions. Two examples include the United Kingdom's Climate Change Act (2008) which identified potential impacts on thermal ratings in transmission and risk of flooding of power facilities. Eskom in South Africa concluded that "Adaptation is a necessity ... it is a business risk" and includes reducing water consumption by dry cooling in thermal plants and emergency preparedness in its Six Point Climate Change Strategy.

**Possible adaptation responses in Central Asia:** The studies identified four national level responses for consideration:

- a. Improved energy demand control
- b. Diversification of power sources including more climate resilient forms of power generation
- c. Improved efficiency and resilience of existing (but aging) energy assets
- d. Water management in water using sectors, as well as increased attention to water allocation mechanisms across sectors
- e. Facility maintenance and disaster risk management.

Water management encompassed both the impact on agricultural practices (increased demand for power for irrigation pumping) and the availability of water for thermal generation and hydropower generation.

It was noted that many of the identified adaptation measures have broad benefits even in the absence of climate change and complement country efforts to revitalize and develop energy sectors for the decades ahead.

### **Exploration of regional linkages**

The World Bank is initiating a study in Tajikistan, complementing those already completed for the other four Central Asia countries. Because the Central Asian countries' power supply are linked by transboundary rivers (which generate hydropower) and interconnected grids, the study will have a second component to better understand the potential impact of climate change at the regional scale. This regional level study will explore how national level adaptation may have implications across borders (i.e., positive and negative externalities). More importantly, the study will explore opportunities for synergies and coordinated adaptation to reduce costs and increase effectiveness, such as disaster risk management, technology development, and climate forecasting.

### **Study process**

The study will be undertaken by an international consultant, competitively selected. Expressions of Interest have been received and, once Terms of Reference are finalized, proposals will be requested. Terms of Reference will be shared with the ESCC as will updates on study progress. ESCC will also be asked to provide input on a discussion paper on initial regional linkages, in addition to the draft final report.