

The importance of nexus approach to water-energy-food security for transitional and resource-rich countries

by Dr. Marat Karatayev on May 14, 2019 at 12:30 p.m.

The next 'Science Talk', organized by the Institute of Systems Sciences, Innovation and Sustainability Research (SIS), will be presented by Ernst Mach Scholar Dr. Marat Karatayev on the topic "The importance of nexus approach to water-energy-food security for transitional and resource-rich countries". His talk will take place on Tuesday, 14 May 2019 at 12.30 pm in the **meeting room of SIS (Merangasse 18, 1st floor)**.

Duration: **Approximately one hour** including discussion.

The participation is free of charge and there is no need to register. SIS offers three to five guest talks each semester, covering its research areas systems sciences, innovation and sustainability research.

Bio-sketch

His research focuses on energy security, resource use, post-carbon transition, clean fuel and energy technologies, energy and environmental policy, climate change and water-food-energy nexus. Contribution to recent grants: Multidimensional impact of the low carbon European strategy on energy security, and socio-economic dimension up to 2050 perspective (MILESECURE 2050, €6.2M, EU funding, 2012-2016); Post-Carbon Cities of Tomorrow 2050 (POCACITO, €4.5M, EU funding, 2014-2017); Climate change impacts on land degradation and society in Kazakhstan (INSPIRE, £80K, UK Research Councils, 2010-2013); The potential application of renewable energy for rural energy services and electrification in Kazakhstan (£125K, Newton Fund). The current Ernst Mach project explores new paradigm of energy security in times of environmental change and its relevance to resource-rich energy-exporting countries of Caspian Sea region (OEAD, 2018-19).

Abstract

Water scarcity is increasing as demand for water intensifies with population and economic growth especially in transitional and resource-rich countries (e.g., China, Russia, Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan). Challenges in securing enough water for energy, energy for water and water for food will increase with population, economic growth, intensive agriculture development and climate change. However, current energy planning in these countries is often done without considering changes in water availability and quality. This study aims to show why is the water-energy-food nexus approach important for transitional and resource-rich countries? Kazakhstan as a case of transitional and resource-rich economy is examined. As part of its commitment to become one of the top-30 developed countries, Kazakhstan has a target of increasing the share of renewables and alternative energy sources in power generation to 50% by 2050. This greatly contrasts with the current situation, where around 90% of electricity is produced from fossil fuels. To achieve the target, the introduction of between 600-2000 MW of nuclear power is expected by 2030. This would affect water resources, already under stress due to significant losses, heavy reliance on irrigation for agriculture, unevenly distributed surface water, variations in transboundary inflows, amongst others. Using nexus scenario generation Foreseer Tool, this study presents the integrated analysis of the water-energy-food systems in Kazakhstan and investigates the current and future water resource availability to support transition from high to low carbon energy system.