Geophysical Research Abstracts
Vol. 18, EGU2016-16596, 2016
EGU General Assembly 2016

Water-energy nexus in the Sava River Basin: energy security in a transboundary perspective

Eunice Ramos and Mark Howells
KTH - Royal Institute of Technology

Resource management policies are frequently designed and planned to target specific needs of particular sectors, without taking into account the interests of other sectors who share the same resources. In a climate of resource depletion, population growth, increase in energy demand and climate change awareness, it is of great importance to promote the assessment of intersectoral linkages and, by doing so, understand their effects and implications. This need is further augmented when common use of resources might not be solely relevant at national level, but also when the distribution of resources spans over different nations.
This paper focuses on the study of the energy systems of five south eastern European countries, which share the Sava River Basin (SRB), using a water-food(agriculture)-energy nexus approach. In the case of the electricity generation sector, the use of water is essential for the integrity of the energy systems, as the electricity production in the riparian countries relies on two major technology types dependent on water resources: hydro and thermal power plants. For example, in 2012, an average of 37% of the electricity production in the SRB countries was generated by hydropower and 61% in thermal power plants. Focusing on the SRB, in terms of existing installed capacities, the basin accommodates close to a tenth of all hydropower capacity while providing water for cooling to 42% of the net capacity of thermal power currently in operation in the basin.
This energy-oriented nexus study explores the dependency on the basin's water resources of the energy systems in the region for the period between 2015 and 2030. To do so, a multi-country electricity model was developed to provide a quantification ground to the analysis, using the open-source software modelling tool OSeMOSYS. Three main areas are subject to analysis: first, the impact of energy efficiency and renewable energy strategies in the electricity generation mix; secondly, the potential impacts of climate change under a moderate climate change projection scenario; and finally, deriving from the latter point, the cumulative impact of an increase in water demand in the agriculture sector, for irrigation. Additionally, electricity trade dynamics are compared across the different scenarios under scrutiny, as an effort to investigate the response of the regional energy systems in simulated trade conditions.