World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

A Multi-Regional Structural Path Analysis of Virtual Water Flows Caused by Coal Consumption in China

Authors : Cuiyang Feng, Xu Tang, Yi Jin

Abstract : Coal is the most important primary energy source in China, which exerts a significant influence on the rapid economic growth. However, it makes the water resources to be a constraint on coal industry development, on account of the reverse geographical distribution between coal and water. To ease the pressure on water shortage, the '3 Red Lines' water policies were announced by the Chinese government, and then 'water for coal' plan was added to that policies in 2013. This study utilized a structural path analysis (SPA) based on the multi-regional input-output table to quantify the virtual water flows caused by coal consumption in different stages. Results showed that the direct water input (the first stage) was the highest amount in all stages of coal consumption, accounting for approximately 30% of total virtual water content. Regional analysis demonstrated that virtual water trade alleviated the pressure on water use for coal consumption in water shortage areas, but the import of virtual water was not from the areas which are rich in water. Sectoral analysis indicated that the direct inputs from the sectors of 'production and distribution of electric power and heat power' and 'Smelting and pressing of metals' took up the major virtual water flows, while the sectors of 'chemical industry' and 'manufacture of non-metallic mineral products' importantly but indirectly consumed the water. With the population and economic growth in China, the water demand-and-supply gap in coal consumption would be more remarkable. In additional to water efficiency improvement measures, the central government should adjust the strategies of the virtual water trade to address local water scarcity issues. Water resource as the main constraints should be highly considered in coal policy to promote the sustainable development of the coal industry.

Keywords : coal consumption, multi-regional input-output model, structural path analysis, virtual water
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020