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## Megacity Food-Energy-Water Pathway Analysis based on A Systems Thinking Dynamic Circular Economy Calculator

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### Abstract

Circular economy is regarded as a policy for fulfilling the sustainable development which has been implemented for 9 years by the government in many cities of China. Chinese circular economy view insists to overcome the dilemma between the economic depression and energy shortage in the nationwide. However, a circular economy may have a different flavor in different megacities, depending on geographic, environmental, economic or social factors. Besides, few literatures contribute to checking the efficiency of current circular economy policies, especially in the aspect of regional wide, which will be practically helpful in guiding China's future development. In this paper, we proposed an Urban Circular Economy Calculator based on a full Excel version energy-based urban dynamic model, which is a feasible approach to help the policy-makers create circular economy pathway under different food-energy-water (FEW) policies. The scenario analysis approach has been used in this Urban Circular Economy Calculator to illustrate a greener economy under alternative assumptions of the FEW Circular Economy policy. What's more, long-term simulation will be provided by the calculator to test the trajectories of Circular Economy policy effects under the assumptions of the associated levels. Taking Beijing city as a case, the impact of different circular economy policies can be observed by using real scientific data. This model can be applied to other cities as well in the light of their actual situation respectively. In that case, suggestions on regional management, which make sure our cities achieve friendly and sustainable development over a long period of time can be proposed for our government accordingly.

**Keywords:** Energy analysis, Urban dynamic model, Circular economy, Food-Energy-Water (FEW) policies, Scenario analysis