

Developing an Optimization Module for Water, Energy, and Food Nexus Simulation

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Abstract

A nation-wide water-energy-food (WEF) nexus simulation model has been developed by the authors and successfully applied to South Korea to predict the sustainability of those three resources in the next 30 years. The model was also capable of simulating future scenarios of resources allocation based on priority rules aiming to maximize resources sustainability. However, the process was still relying on several assumptions and trial-and-error approach, which sometimes resulted in non-optimal solutions of resources allocation. In this study, an optimization module was introduced to enhance the model in generating optimal resources management rules. The objective of the optimization was to maximize the reliability index of resources by determining the resources' allocation and/or priority rules for each demand type that accordingly reflect the resources management policies. Implementation of the optimization module would result in balanced allocation and management of limited resources and assist the stakeholders in deciding resources' management plans, either by fulfilling the domestic production or by global trading.

Keywords : WEF nexus, Nation-wide, Optimization module, Reliability index

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