Optimal design of the second and third generation biofuel supply network by a mixed-integer linear programming model

Zarei Mohammadamin, 유 준[1,†]
부경대학교; [1]pukyong national university
(jayliu@pknu.ac.kr[†])

The depletion of fossil fuels and their serious environmental concerns have made renewable energy sources much more attractive. One of the more promising renewable energy alternatives is the use of second/third-generation biomass that does not endanger food security, to produce bioenergy. The biomass-to-bioenergy supply chain design is a challenging issue that has attracted the attention of academic and industrial research. In this direction, a MILP model is developed to design the second/third-generation biofuel supply chain. Three types of biomass (i.e. macroalgae, pellet, and wood chips) simultaneously are studied as feedstock to produce clean energy. Selection of raw material resources, location of production facilities, location of storage, and optimal material flows are the main decisions made by the proposed model to minimize the total cost. The performance of this model is evaluated through conducting a real case study. The results show the comparison between the case using multiple and only the case using third generation feedstock. Furthermore, a sensitivity analysis is performed to assess the effect of uncertainty associated with some economic and production parameters.