APPLICATION OF LCA FOR ASSESSING CO_2 REDUCTION POTENTIAL BY UTILIZING PLASTIC WASTES IN STEEL WORKS

Y. Sekine, I. Daigo, Y. Matsuno, Y. Adachi

Dept. of Materials Engineering, Graduate school of Engineering

University of Tokyo 7-3-1 Hongo, Bunkyo-ku, Tokyo, Japan 113-8656

In Japan, recycling of plastic wastes has been enhanced since the enforcement of *Containers and Packaging Recycling Law*. Approximately, 5.4 million-t of plastic wastes was recycled in 2002. It is expected that the amount of plastic wastes to be recycled will further increase in the future. Steel industry has a large potential to consume plastic wastes as replacement of coal in coke oven, and coke and pulverized coal in blast furnace. Therefore, it has been of interest to apply LCA for estimating the environmental reduction potential by utilizing plastic wastes in steel works. However, few attempts have so far been made to investigate the effect of operative conditions in steel works on environmental reduction potential. In this work, a model was developed to figure out the energy flow in steel work. Then, the change in energy flow was calculated by matrix method when plastic wastes were utilized in steel work. Use of plastic wastes in coke oven and blast furnace were investigated. Sensitivity analyses have been conducted to investigate the effect on CO_2 emission reduction potential of the following factors: 1) how the surplus COG was used, 2) the operative condition in blast furnace, i. e. substitution ratio of coke and pulverized coal by plastic wastes. It was found that the reduction potential of CO_2 emissions by feedstock recycling of plastic wastes in coke oven was dependent on how the surplus COG is used. The total reduction potential of environmental impact by feedstock recycling of plastic wastes in blast furnace was quite dependent on the substitution ratio of coke and pulverized coal by plastic wastes. Therefore, careful investigation on the substitution ratio of coke and pulverized coal by plastic wastes is necessary to reduce CO_2 emissions by feedstock recycling of plastic wastes.