ASSESSING THE EFFECTS OF CARBON TAXES ON DIFFERENT INDUSTRY SECTORS – A FUZZY GOAL PROGRAMMING MODEL INTEGRATED WITH GREY PREDICTION AND INPUT-OUTPUT THEORY

Cheng F. Lee¹, Sue J. Lin², Shin J. Cheng¹ and Huey H. Hsieh¹

¹Department of Environment and Resources Engineering, Diwan University, 87-1, Nanshih Li, Madou, Tainan 721, Taiwan, ROC
²Department of Environmental Engineering, SERC, National Cheng Kung University, 1 University Road, Tainan 701, Taiwan, ROC

Abstract: Application of price mechanisms has been the important instrument for carbon reduction, among which the carbon tax have been frequently advocated as a cost-effective economic tool. This study aims to assess the effects of carbon taxes on different industry sectors in Taiwan. A fuzzy goal programming approach, integrated with grey prediction and input-output theory, is used to construct a model for assessing the CO₂ reduction potential and the induced economic impacts of a selected carbon tax scenario on different industry sectors. Results indicate that the up-stream sectors show improved CO₂ reduction while the down-stream sectors fail to achieve their reduction targets. The results also find that the sectors with significant CO₂ reduction usually encounter the greater GDP losses.

Keywords: Fuzzy goal programming, grey prediction, CO₂ reduction, industry