A SYSTEM DYNAMIC ANALYSIS OF ENERGY CONSUMPTION AND CO$_2$ EMISSION OF INDIAN IRON AND STEEL INDUSTRIES

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ABSTRACT

The iron and steel sector is one of the largest energy-consuming manufacturing sectors in the world. India was the fifth largest producer of steel and hence has a greater importance in this iron and steel industry. Energy conservation techniques in iron and steel industry are a main area of research today. Developments in Iron and Steel industry are still in basic level. Any improvements in this field are very important. System dynamic analysis is a suitable approach to model a complex problem involving multiple decision making, technological limitations etc. A system dynamic model is presented in this paper to analyse steel demand, production, consumption and mitigation of CO$_2$ in an integrated frame work. "POWERSIM" software was utilized for the system dynamic analysis of this study. Through system dynamic modelling the energy consumption in steel industry is estimated under various steel production scenarios and various energy conservation techniques can applied and its feedback can be obtained. Finally, the model was modified and applied to the projection of steel production and associated CO$_2$ emissions in India up to 2031 starting from 2011 as base year. This modified model was run under three scenarios; such as baseline scenario, scenario- 1(S1) and scenario-2(S2). Energy efficient scenario was also incorporated in the model to estimate the future CO$_2$ emissions reduction.

KEYWORDS: CO$_2$, Emission, POWERSIM, Steel Production, System Dynamic Model