

Measuring Resource Recovery and Environmental Benefits of Global Waste Management System Using the Zero Waste Index

Authors : Atiq Uz Zaman

Abstract : Sustainable waste management is one of the major global challenges that we face today. A poor waste management system not only symbolises the inefficiency of our society but also depletes valuable resources and emits pollutions to the environment. Presently, we extract more natural resources than ever before in order to meet the demand for constantly growing resource consumption. It is estimated that around 71 tonnes of 'upstream' materials are used for every tonne of MSW. Therefore, resource recovery from waste potentially offsets a significant amount of upstream resource being depleted. This study tries to measure the environmental benefits of global waste management systems by applying a tool called the Zero Waste Index (ZWI). The ZWI measures the waste management performance by accounting for the potential amount of virgin material that can be offset by recovering resources from waste. In addition, the ZWI tool also considers the energy, GHG and water savings by offsetting virgin materials and recovering energy from waste. This study analyses the municipal solid waste management system of 172 countries from all over the globe and the population covers in the study is 3.37 billion. This study indicates that we generated around 1.47 billion tonnes (436kg/cap/year) of municipal solid waste each year and the waste generation is increasing over time. This study also finds a strong and positive correlation ($R^2=0.29$, $p < .001$) between income (GDP/capita/year) and amount of waste generated (kg/capita/year). About 84% of the waste is collected globally and only 15% of the collected waste is recycled. The ZWI of the world is measured in this study of 0.12, which means that the current waste management system potentially offsets only 12% of the total virgin material substitution potential from waste. Annually, an average person saved around 219kWh of energy, emitted around 48kg of GHG and saved around 38l of water. Findings of this study are very important to measure the current waste management performance in a global context. In addition, the study also analysed countries waste management performance based on their income level.

Keywords : global performance, material substitution; municipal waste, resource recovery, waste management, zero waste index

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