Solid waste generation and management in Nigeria: - An environmental input-output modelling approach

Topic: Environmental IO models 6
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Solid waste disposal sites account for up to 20% of global emissions of methane the second most significant greenhouse gas. This need not happen as under proper management landfills can in fact have a positive carbon balance. However such management entails the capture and destruction of methane gas emitted from these landfills, an undertaking that has been too costly for many developing countries to implement. The Clean Development Mechanism (CDM) is one of the three emissions trading schemes under the Kyoto protocol that allows investors from developed countries invest in emission reduction projects in developing countries that contribute to their sustainable development. Methane capture from landfills is one of such projects. It, in fact, now account for about 22% of proposed CDM projects so far in countries like India, Brazil and Indonesia. Its popularity can easily be explained by its very obvious potential benefits – improved sanitation, renewable energy generation and the fact that methane has a global warming potential 21 times that of CO2.
The Thrust of this research is the generation and management of solid waste and their economic and environmental dimensions. An environmental input-output model for the Nigerian economy is presented to give an analytical representation of the interdependencies between the economic activities and the quantities of waste generated, the main specific sources of waste generation, the significance of hazardous substances present in the waste generated, and the overall dependence on landfill consumption of individual industries. This modelling approach is tested on the study of the waste-economy-environment interactions. Further the model examines the interactions within the three main sectors that will affect the projects performance, waste, energy and climate. The project viability as determined by its Net Present Value and Internal Rate of return was evaluated under three scenarios: first scenario depicts a situation where the project is funded by local private sources, second scenario presumes, project funding is received from foreign sources with lower interest rates. The last scenario assumes that the no electricity is generated from recovered methane, instead, the all recovered gas is flared. The results of the analysis showed that the last scenario was the most viable. The results of this study are limited in that it does not consider the life cycle of the waste in calculating emissions Finally, the most important results, as well as the potentialities and limitations of the modelling analysis implemented, will be critically assessed and a summary concerning the needs for future research will be given.