Waste management in the Irkutsk Region, Siberia, Russia: Environmental assessment of current practice focusing on landfilling

The municipal waste management system of the region of Irkutsk is described and a life cycle assessment (LCA) performed to assess the environmental performance of the system. Annually about 500 000 tons of waste are managed. The waste originates from three sources: household waste (27%), commercial waste (23%) and office & institutional waste (44%). Other waste of unknown composition constitutes 6%. Only 3% of the waste is recycled; 97% of the municipal waste is disposed of at the old Alexandrovsky landfill. The environmental impact from the current system is dominated by the landfill, which has no gas or leachate collection system. The global warming contribution is due to the emission of methane of the order of 420 000 tons CO2-equivalents per year. Collection and transport of the waste are insignificant compared with impacts from the landfill. As the old landfill runs out of capacity in a few years, the LCA modelling showed that introduction of a new and modern landfill with gas and leachate collection could improve the performance of the waste management system significantly. Collection of landfill gas and utilization for 30 years for electricity production (gas turbine) would reduce the global warming completely and result in a net saving of 100 000 CO2-equivalents per year due to storage of biogenic carbon in the landfill beyond 100 years. Considering other first-order degradation rates for the landfilled organic matter did not overtly affect the results, while assumptions about the top cover oxidation of methane significantly affected the results. This shows the importance of controlling the gas escape from the landfill.

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