

IMPACT OF DIFFERENT WASTE MANAGEMENT PRACTISES ON GLOBAL CLIMATIC CHANGE

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Abstract

Waste management has important impacts on global CO₂-concentrations and climate change. Material recycling saves resources and delays emissions of CO₂. This includes the use of waste-wood for board production, and fibre material as filter for eutrophicated water, followed by composting and use as soil improvement.

Fermentation for biogas production supplies both with bio-energy and soil improvement, while composting re-circulates nutrients and increase the carbon accumulation of the soil. Charcoal production from waste-wood is another way to produce both combustible gas and long-term storage of carbon, if used as soil improvement.

Insufficiently managed landfills, with major methane emissions, can pose a threat for climate change, while properly managed landfills have very positive effects as long-term accumulators of organic carbon, counteracting global warming. They also produce biogas, replacing fossil fuels. If more than 60 % of the produced landfill gas is collected, landfills are positive for reducing atmospheric CO₂ concentrations and global warming.

New reactor landfill technologies in e.g. Sweden and in the US have shown that over 90 % of produced biogas can be collected from landfill bioreactor cells. About 150-250 m³ biogas can be extracted per tonne landfilled MSW during a 10-year period. In Sweden landfill gas provides 310 GWh energy, including 24 GWh electricity.

Landfills are regarded as urban counterparts to natural peatlands providing long-term accumulation of organic carbon. Sequestration of long-lived organic fractions in a landfill, with an input of 200 000 t/year compensates for CO₂ emissions from about 30 000 cars/year.

About 30-50 % of CO₂ in stack-gasses from waste incinerators have fossil origin (plastics, synthetic textiles and rubber). An incinerator burning approximately 550 000 tons of waste per year is the major single source of fossil CO₂ in a major Swedish city with about 350 000 inhabitants, and stands for 20-25 % of the total fossil CO₂ emissions from the city, traffic included. Swedish waste incinerators today pay over 1000 SEK (100 €) in penalty taxes per tonne emitted fossil CO₂, as well as a waste tax of 100 SEK (100 €) per tonne waste.

Keywords: Waste management, landfill, bioreactor-cell, climate-change, CO₂, carbon-storage, waste-to-energy, circular economy