

CLIMATIC EFFECTS OF MUNICIPAL SOLID WASTE MANAGEMENT- COMPARISONS BETWEEN SUSTAINABLE LANDFILLING AND WASTE-TO-ENERGY INCINERATION

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Abstract

Energy from waste incineration is partly of fossil origin as normally over 50 % of the CO₂ in the stack-gases has a fossil origin (plastics and other polymers). Experiments have started to collect CO₂ from stack gases to store it in porous bedrocks under the sea. However, the technology is expensive and un-proven. Some incinerators instead separate plastics and other polymers before incineration, to decrease the fossil carbon content.

In Sweden increasing environmental taxes are laid on waste incineration based on weight, but also on emitted nitrogen oxides (NO_x) and fossil CO₂ emissions. By efforts to convert NO_x to nitrogen gas (N₂), using urea, instead dinitrogen oxides (N₂O) are formed as an intermediate gas, being about 250 times as powerful green-house gas as carbon dioxide.

In properly managed landfills and bioreactor cells, accumulation of long-lived carbon is a way to counteract global warming as long as more than 60 % of the biogas is collected. New reactor landfill technologies in countries like the US, UK, Australia and Sweden collect up to over 90% of produced biogas. Plastics and long-lived biogenic carbon-fractions from e.g. lignin remain as a carbon sink in the landfill. Landfills thus act like long-term carbon accumulators, similar to natural peatlands and other accumulating natural ecosystems. Accumulation in a landfill of plastics, synthetic rubber and textiles, and other fossil material which cannot be recycled today, is a way to store resources for future better recycling techniques (urban mining). It also brings back fossil material to long-term-storage, balancing exploitation of oil, coal and natural gas. A normal sized landfill can balance annual fossil emissions of hundreds of cars.

Collected landfill gas can be used for electricity and heat production, renewable motor fuel or even raw material in chemical industry. Biogas, like landfill gas, is of increasing importance as energy resource due to increasing prizes in Europe during the current situation in the Ukraine. Produced landfill gas at the Northwest Scania Recycling Company in Helsingborg, South Sweden, is enough to warm up about 3,500 homes, capturing 70,000 MWh from landfill gas.

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