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Landfill and the pulp and paper industry

Landfill is defined as areas of land built up with layers of solid waste and covered with soil or other types of covering. It is different to dumps or tips, which are what most people think of when they hear about landfill, because landfill is (mostly) carefully constructed with special lining and covering systems to contain the waste.

Fossil fuel versus biomass CO_2 emissions

Lack of decomposition
Inside the landfill there is very little oxygen and moisture, therefore waste broken down very slowly. There have been reports of landfill sites being excavated 40 years after being covered and articles such as newspapers being found still intact![1]

Potential health hazards
Unlined sanitary landfills are known to release large amounts of hazardous and otherwise deleterious chemicals to nearby groundwater and to the air, via leaching and landfill gas. Such releases contain a wide variety of potential carcinogens and potentially toxic chemicals that represent a threat to public health[2]. However, even state-of-the-art, contained landfills cannot prevent groundwater contamination and pollution problems forever - at best, they only postpone it to haunt later generations[3].

Green house gas emissions
Most of the organic waste in landfills decays an-aerobically (in the absence of oxygen) and its carbon is gradually released to the atmosphere - about half as carbon dioxide and half as methane. The latter is a particular problem: the same amount of carbon released as methane has a global warming potential 21-23 times greater than if released in the form of carbon dioxide. When waste ends up as litter in small, un-compacted dumpsites, there are potentially severe problems of sanitation, public health, and aesthetics, but the decay of waste under these conditions is aerobic, releasing virtually all of its carbon as CO2 rather than methane.

Benefits of recycling rather than incineration of paper waste

Although often preferable to landfill, incineration of paper is not a particularly effective way of generating energy. Thus, both methods of disposal can be considered as opportunities lost to recycle and thereby reduce the need for virgin fibres. Recycling paper also saves water and energy in the production process, as well as reducing air, water, and land pollution.

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[1] *Freudenrich, C.C. How Landfills Work. 30/11/02 http:www.howstuffworks.com/landfill.htm*

[2] *Impact of Municipal and Industrial Non-Hazardous Waste Landfills on Public Health and the Environment: An Overview: http:// www.gfredlee.com/cal_risk.htm*

[3] *Conservatree: http://www.conservatree.org/learn/Essential%20Issues/EIGoingOn.shtml*

What are the constituents of landfill waste from pulp- and paper mills?

Much of the waste consists of wood fibre in the effluent sludge. Other waste is the clay filler materials, black liquor by-product from pulping, sawdust, chemical storage containers, office waste, oil, fluorescent tubes, ash from coal burning, pallets, machine parts etc.

What is the scale of the problem in the pulp- and paper industry?

The amount of landfill from pulp and paper mills varies enormously. In Sweden the government has recently passed a law banning landfill of organic waste so here many paper mills have been forced to find alternative uses for their waste. In other European countries there are also examples of mills making tissue, packaging, newsprint and fine paper grades which report zero non-hazardous waste to landfill. Unfortunately, there are also mills that send tens of thousands of tonnes to landfill every year.

How successful are mills reducing their landfill?

Mills have found many ways to re-use the waste from production. Black liquor, a by-product from pulp production, is used as a fuel in a recovery boiler that can produce steam and electricity. Paper sludge can be recycled into a reusable product such as glass aggregate which is then used for various construction and industrial purposes . Sludge from de-inking can be used as a fuel and as a binding agent in the production of building blocks . Coal ash is used in concrete additives, fill material, aggregate for road building and soil stabilisation under roads, as well as covering landfill sites. Some companies also use ash as a hardener in filling cavities in mines or fibre clay and ash in landscaping.

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[4]Company producing glass aggregate from sludge http://www.epa.gov/chp/partners/minergycorporation.htm And http://www3.uwm.edu/Dept/shwec/links/uwgb/papermill.htm

[5]P40 'Holmen and its world', Corporate publication, 2005