The European Commission Research Programme on Sludge

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Abstract:

The implementation of the urban wastewater directive has an impact on the volume of the produce sludge, hence all local authorities are facing the same question: how to dispose of the sludge safely. Ell the existing routes are under pressure from the legislator, the economy and the local population. In this context, the General Direction of Research of Commission has defined its work programme to address this problem and to try to obtain sustainable and acceptable solutions.

With the implementation of the municipal wastewater directive (Directive 91/271/EEC), it is expected to see the production volume of sludge to increase to 8 million tons per years. All Member States will see their volume increase. The directive was introduce to improve the water quality of the rivers across Europe by cleaning municipal wastewater before the release into the environment and reducing the adverse effect of such discharges. The general aim is to have secondary treatment for all cities above 2000 population equivalent. The drawback is the sludge production making its safe disposal a critical aspect of its implementation. Several routes existed, but they are also regulated. The general tendency is to move towards tighter emissions limits.

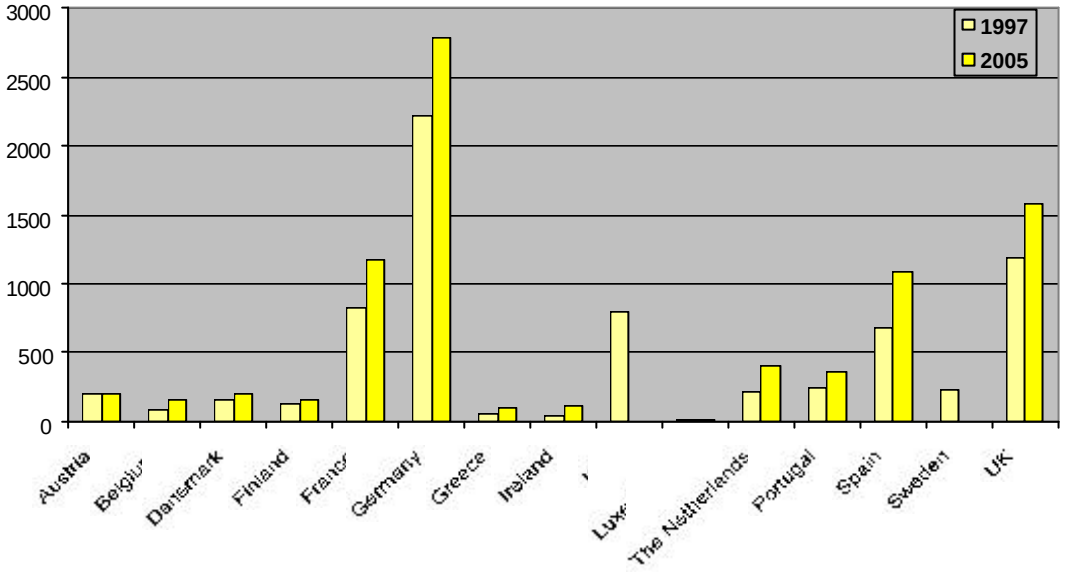
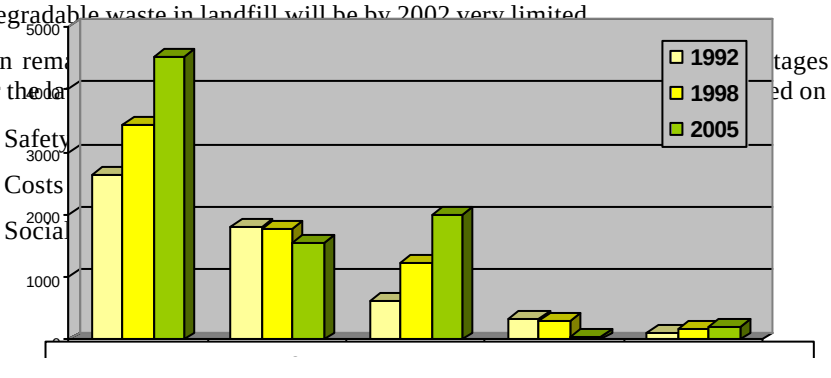


Figure 1 Forecast evolution of the sludge volume produce in each MS

Forecast

Now all local authorities are faced with the problem of the disposal. The most common routes are the incineration, the agricultural reuse, sea disposal, landfill disposal, etc. However recently several new directives have restricted further the options available. The sea disposal is now banned. The landfill disposal will soon be restricted with the implementation of the landfill directive. Indeed the disposal of the biodegradable waste in landfill will be by 2002 very limited.

The main rema tages and disadvantages, however the da ed on several levels:



Safety
Costs
Social

Agriculture reuse

Sludge has a fertilising benefit as it contains nitrogen and phosphorus both are needed by plants, at the same time sludge can contain other chemicals such as heavy metal, present in the sewage water of all European cities. The directive 86/278/EEC regulate the reuse practice in agriculture. The aim of the directive is to protect the soil, the worker as well as the consumer. It imposes pre-treatment to reduce the pathogen content. It restricted the heavy metal amount if the sludge for reuse, taking into account the content of heavy metal already present in the soil and its pH.

The directive is currently under revision. The major changes are the necessity to have treatment of the sludge what ever the application method used, lower limits for the metal content and the introduction of new criteria (e.g. PAH content).

The practice of reusing sludge faces some difficulties, technical and social. Technically, the sludge needs to be stored. Indeed the production of the sludge is all year round, but its application is limited to once or twice per year. Furthermore the sludge need to have controlled limits when applied on the field, yet no accepted norms exist.

The social acceptance is however a larger problem. Indeed in several MS, the pressure against the reuse in agriculture is rising. The fears come from the fears over the food quality and safety. Currently, little is known about the impact of micro-pollutants in sludge and their possible impact on the food chains.

Incineration

Today incineration is seen as a last resort for the disposal of sludge, yet it represents nearly 15% of total masses of sludge treated. Moreover its share is increasing, mainly due to tighter control and limits on the other disposal routes, even though emission from incinerators are also tied (89/369/EEC).

Several techniques are used to incinerate sludge (mono incineration, co-incineration, etc). All aims at destroying pollutants while at the same time energy is recovered. This is an efficient way to dispose of them. It reduces dramatically the volume of dry-matter while recovering energy. The incineration is not sensible to the content of the sludge, in particular for variation of pollutants. However incinerators produce fumes and ashes.

Fumes contained many different kind of chemicals (CO2, NO_x, dust, …). The most feared chemical is dioxin. This chemical is known for having potential impact on health, and it is the most feared by local population. Of course fumes are filtered before being released into the atmosphere as the incinerators directive impose but it does not means peoples feel safe and accept an incinerator in their backdoor.

The final disposal of the ashes produced is either in landfills or in building material.

The initial investment can be high while at the same time the running cost is high too. Therefore this can become for small municipalities financial burden. Overall this path for disposal is not seen as a sustainable solution, but can be a solution for local cases.

New Technologies

Gasification is one of the most advanced alternative technologies. As such it is not a new technique, as the principal was already used during the 2nd world war, but applied to the sludge it is new. The principle is to oxidise the sludge with oxygen and to produce methane. The output is energy and ashes. Currently the technique is too recent to be able to have a good global view on its impact and benefit.

Wet oxidation consists of oxidising the sludge at high temperature (200°c to 300°c) at high pressure (150bar). Through this process the mineral content is increase to 95%. The sludge can after dewatering be reuse in agriculture.

Plasma pyrolysis consist to burn at very high temperature (4000°C) the sludge into gas (CO2 and H2 mainly) which can be use to produce electricity, and molten slag metal. The energy ratio between the input and output can reach 4.

Water Key Action

To help with the implementation of both the urban wastewater directive and the reuse of sludge in agriculture, DG Research has included several paragraph in the work programme to co-finance research project in that field. In the Water Key Action of the Energy, Environment and sustainable Development programme, treatment of wastewater, monitoring of pollution and standardisation of measurement are addressed to tackle the sludge problem.

First, as in Europe many industries are connected to the municipal sewage network, they need to develop clean technologies, increase the treatment of their wastewater capabilities and develop more the recycling of the used water. In the work programme, DG research is seeking project to develop technologies to increase the recycling of the water within the industry. The impact will be fewer pollutants in the sewage, consequently better sludge quality.

As seen in the previous chapter, one of the major problems comes from the volume of sludge produced by the wastewater treatment plant. If the volume can be significantly reduced while still maintaining the same quality of the treated water, the negative impact of the directives implementation would be reduce. However by reducing the sludge volume while keeping the same water effluent, heavy metal content in sludge will increase, hence the need to increase the recycling of water in industries and the need to track the source of pollution in towns to reduce the source of pollutants.

Finally one of the last important aspect for the reuse of sludge is to guarantee the quality of the sludge. In the area 'pollution monitoring', the programme aims at the development of early warning system for the protection of the wastewater plants from accidental release of pollution. Such protective measures would guarantee and improve the sludge quality. Furthermore research for standardisation in the field of sampling and measurement of sludge to monitor and guarantee the quality to the end users.

Conclusion

The implementation of the directives will increase the sludge production in the near future. Yet there are solution for a safe and acceptable disposal of them. The reuse in agriculture can be seen as the most sustainable solution with the present technology, but it cannot be apply in all the regions of all the Member States. DG Research seeks research project to address several of the gaps in the knowledge, which should help to go toward a safer reuse of sludge. The next deadline for the submission of research project is October, 15 2001, where two area are focusing on tackling the problem of the sludge quality and its safe disposal.

References:

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Pollutants and Urban wastewater and sewage sludge; ICON, draft report for DG ENV, 2001

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