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Evidence of health impact of Energy from Waste with reference to the GCC Residual Waste Procurement – a paper by Professor Roy Harrison

The process

1. As with other treatment options, after removal of recyclates at the kerbside, waste is normally received nowadays in a reception hall maintained under negative pressure to prevent the release of odours. The waste is then fed continuously to the grate of a combustor where it is burnt at temperatures above 850ºC. The flue gases are rapidly cooled which minimises dioxin formation and then passed through a gas cleaning plant designed to remove trace gases and particles with very high efficiency. The gases which pass from the gas cleaning plant to the chimney are required to meet very high standards set by the EU Waste Incineration Directive. Before entering the gas cleaning plant, the gases are used to raise steam which drives turbines which generate electricity.

2. In addition to discharges from the chimney, the incinerator generates two other waste streams. By far the largest in terms of volume is the bottom ash from the grate consisting of the non-combustible materials. This is generally considered to be inert and is used as a foundation for roads etc., or may be incorporated into building blocks. Alternatively, it can be safely disposed to landfill. The other, smaller waste stream is from the gas cleaning plant. The gas cleaning process typically involves the injection of activated carbon and lime to absorb the toxic chemicals followed by a bag filter which retains the particles. The air pollution control residues are considered as hazardous waste and are normally disposed of in a hazardous waste repository or landfill. The key to safe disposal is to ensure that there are no releases of dust to atmosphere, and hence good enclosure is essential.

Studies of human health impacts

3. Of the processes commonly used for waste management, only landfill and incineration have been the subject of substantial studies of human health impacts. There is also a small volume of information concerning windrow (open air) composting.

4. Because of public concern over incineration, this has been the focus of a large number of research investigations and all of those published prior to 2003 were reviewed in the Enviros/University of Birmingham report for Defra[1]. There have been no studies published since which lead to a change of view from the conclusions in the Defra report. The health effects studies reviewed in that report were based upon incinerators operating prior to implementation of the Waste Incineration Directive. Consequently, their emissions were subject to much less efficient abatement than on modern plant and were of the order of 10-100 times those of a modern incinerator, which coupled with a lower chimney height would have meant much larger exposures for local populations. Despite these much larger emissions, the overview of research conducted for Defra was able to find no consistent pattern of adverse effects on health.

5. The largest UK study by Elliott and co-workers sought evidence for a connection between residence in proximity to a UK waste incinerator between 1974 and 1986 (England), 1974 and 1984 (Wales) and 1975 and 1987 (Scotland) and an excess of cancers. When socio-economic factors were fully accounted for, Elliott et al. (1996; 2000) were unable to find an effect of incinerators upon cancer rates. In reviewing this study, the UK Department of Health's Committee on Carcinogenicity published a statement in March 2000 evaluating the evidence linking cancer with proximity to municipal solid waste incinerators. The Committee concluded that "any potential risk of cancer due to residency (periods in excess of 10 years) near to municipal solid waste incinerators was exceedingly low and probably not measureable by the most modern techniques". The Committee also stated that at the present time there is no need for any further epidemiological investigations of cancer incidence near municipal solid waste incinerators. Other research has looked at effects on respiratory disease and upon reproductive health and has failed to demonstrate a convincing link between disease and an incinerator.

6. As mentioned above, since the implementation of the EU Waste Incineration Directive, there has been a massive tightening of emissions controls upon incinerators and consequently exposure of the local population will have been very much reduced. According to data obtained from the National Atmospheric Emissions Inventory, emissions of dioxins and furans to atmosphere from waste incineration fell from 557 g ITEQ (international toxic equivalent) in 1990 to just 4.05 g ITEQ in 2008. The latter represented around 2% of total UK dioxin and furan emissions to the atmosphere. A number of studies have analysed soil and vegetation around modern incinerators and have failed to find any elevation in concentrations attributable to the presence of an incinerator.

7. Similarly, measurements of dioxins in the blood of local residents have shown no increase attributable to the operation of a modern incineration plant. Questions are often also raised about ultrafine particle emissions from incinerators, but the available evidence is that these have minimal impact upon local concentrations, which are due mainly to road traffic emissions.

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[1] Review of Environmental and Health Aspects of Waste Management: Municipal Waste and Similar Wastes, Defra, 2004.

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