

Report on the document ‘A Review of the Potential Health and Environmental Impacts from Municipal Waste Management Technologies which might be used in Milton Keynes’

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Introduction

I am requested to provide an external review of this document, which has been developed and written by the Environmental Health Division, Milton Keynes Council.

The Milton Keynes Report (MK Report) is the work of a group of Officers with strong academic as well as service qualification. It is a thoughtful discussion of a complex set of problems. I have not had previous contact with this team; but their concern for ‘environmental health impact’ overlaps with my own work. It is a pleasure to see the objective and systematic way that the question of how to provide waste management for the Council is being addressed.

The Report

Three sets of issues are indicated for the report:

Part A: Introduction to Impacts, Milton Keynes & Waste

Part B: Concepts, Emissions and Control

Part C: Potential Health and Environmental Effects and Impacts

(It is not stated who the audience should be.)

Chapter 1 is an introduction, and describes the range of concerns addressed by local authority environmental health department in Britain.

Chapter 2 describes techniques for managing municipal solid waste (MSW)
Chapter 3 describes toxicology and risk assessment
Chapter 4 describes emissions by MSW disposal method
Chapter 5 overviews epidemiology methods and relevant studies
Chapter 6 draws from the Environment Agency health impact assessment of MSW methods
Chapter 7 reviews limitations of a report on MSW methods based on the 'life-cycle' approach.

Commentary

The report is an important document, seeking to extend understanding in an area of public concern and policy relevance. The European Directive on Landfill has required the Government to rethink waste management policy, pushed also by concerns on recycling – both areas where the UK lags behind European leaders. However, new policies have financial implications, both capital investment and rents for use of different facilities; and technologies can be added together in multiple options. The different forms of waste management are set out in Chapter 2; and Chapter 5 reviews their environmental impacts.

The MK Report draws on two reports in the latter section which are particularly relevant for the final assessment – a detailed study and report by Enviros and partners for the Environment Agency (EA Report) (Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes, published 2004 by the Department for Environment and Rural Affairs), and by Jacobs Baktie for Milton Keynes Council (JB Report - I did not find a reference). I have read the material extracted from the first of these in its original context, but I have not seen the original of the second.

These two are significant reports. The first provides the base material for the comparative health assessment. The second uses the Environment Agency's WISARD computer programme (provided commercially) to assess different options for waste policy. I draw the implicit commentary from the MK Report that the JB Report, to the Council, has taken a more 'environmental' view, in particular using

WISARD to provide a 'life cycle' assessment, but with less concern for health impacts. On the other hand, the EA Report has made an innovative and detailed attempt to review and understand the strengths and limitations of the health impacts, in particular from an epidemiological approach.

It is of note that the EA Report was refereed by an academic group established by the Royal Society. The group was chaired by a biochemist, and included experts in environmental engineering, environmental risk assessment, toxicology and environmental statistics. There was no public health perspective, nor view from decision-makers. The Royal Society referee report was critical that the EA Report had not used a 'life cycle' perspective and in their opinion had not been cautious enough in drawing evidence from epidemiological studies. It also commented on the focus of health studies on air, and relative lack of other modes of environmental transmission. In contrast, I believe the EA report - at over 400 pages - has made an important contribution in this complex field, has steered an appropriate path between acceptance and denial, making 'best estimates' on existing knowledge. While there is a lack of sufficient evidence, there are grounds for believing the human health risks of current MSW management are low, whatever concerns environmental scientists may have in other ecological areas. I think it is justifiable to use it as a basis for local impact assessments.

The findings of the MK Report, drawing from the EA Report, are threefold:

- Detailed investigation of existing evidence by national experts indicates that the absolute level of health harm from MSW is low in comparison with many other daily environmental exposures;
- There are uncertainties in quantitative assessments (wide confidence limits)
- There is a substantial lack of data for some disposal methods.

I agree with this view.

There is a further dimension of exposure. In recent decades, heavy industry has been moved from urban areas and most cities have become cleaner. However, putting

waste disposal away from urban areas creates additional transport impacts of both road accidents and air pollution (vehicles now create more air pollution in urban areas than industrial emissions). It is unfortunate that neither the EA Report nor the JB Report quantifies the health impact of transport options, even though the health burden from accidents is likely to be higher than from air pollution.

In summary, then, the MK Report argues that existing technology should provide an acceptably low health burden, and the various options cannot be excluded on health grounds. There are no grounds for excluding incineration, which may have advantages in avoiding biological hazards. The main argument against landfill, the higher amount of methane produced, is a concern for greenhouse gases rather than local direct health impact.

Detailed comments

Local perspectives

As an external reader, and because the document appears to be a contribution to local policy formulation, it would have been helpful for me to provide a summary of the Milton Keynes Environment department's current management of waste services in the first chapter – for example, how many people served, how waste is currently disposed of, organisation, staff and annual spend. This provides a perspective for the discussion. It could also be useful to provide a summary of European and government guidance and some activities of other comparable local authorities and national agencies (eg Environment Agency), and to bring this material together with sections 2.4 and 4.3.2 in Part B.

Environmental health impacts

Environmental impact assessment has been undertaken in the UK for 20 years since the European Directive was applied in UK law. There are about 500 EIAs each year, covering a range of developments including manufacturing industry, mining, transport and power generation. IPPC has widened the regulatory field. While the EU

directive requires concern on human populations as well as fauna and flora, EIA has traditionally been focussed towards ecological concerns. Health impact assessment has grown independently of environmental impact assessment.

There is no single view at present how to demonstrate health impacts. Health impact assessment is undertaken within the NHS in relation to policies, and to some extent by the commercial sector for environmental developments: both fields use community consultation as well as scientific evidence. There are probably about 30 formal HIAs across the country each year, although rather more 'rapid assessments'. There is little descriptive evidence of how health impact assessment weighs on policy decisions.

The exposition of deriving health impacts from toxicology seeks to be explicit about a field that is complex. It is based on practice drawn from the US Environment Protection Agency. Laboratory evidence, sometime supplemented by evidence from studies of industrial workers, provide evidence about metal and some particular chemical groups – although it is recognised that many chemicals have not been formally tested. The chapter describes the Human Toxicity Potential, which is divided among environmental compartments, and gives a summative formula.

Chapter 5 describes a different approach – epidemiology. While toxicology imputes a possible effect on a human, epidemiology relates rates of known diseases to evidence of exposure. This is inherently a more plausible approach, since the toxicology relies on extrapolations from animal experiments which may not apply to human exposures at real levels. However, the evidence from epidemiology is limited – as set out well in chapter 5 – exactly because experiments can't be done on humans. Moreover, there is rarely a specific relationship between a particular type of environmental exposure and a particular disease. (An exception, as an example, is the rare lung cancer called *mesothelioma* which is specifically induced by inhaled asbestos.) 'Cancer' may be increased – but there are many different forms of cancer, and indeed 30% of deaths are from cancer. Only large, complex studies are able to demonstrate plausible relationships between exposure and disease, and this is rarely possible in ordinary settings, such as monitoring impacts of waste management.

A second consideration is that environmental health impact evidence drawn from toxicology is usually defined as a dose for a ‘maximally exposed individual’, and ‘limit values’ are set above this dose. By contrast, epidemiological evidence usually provides a population risk rate, and calculates a fractional increase in disease in the population exposed. This provides two different ways of describing risk: the toxicologist says ‘this value of substance in the environment should not be exceeded’ while the epidemiologist says ‘this unrecordable increase in disease over a given period could theoretically happen in this exposed population’.

These two approaches are used in the MK Report in determining long-term health effects. Toxicology is used for chemicals, epidemiology for particulates. Both are related to air exposure, and other routes are not assessed quantitatively.

Drawing conclusions

The important findings in Chapter 4 are that:

- proportionately, MSW makes a small part of all pollutants,
- some methods of disposal have specific aspects, eg landfill

In chapter 6, the lack of evidence across different methods for waste disposal becomes clear. The EA Report appears to rely strongly on the important, but partial, study of long-term air pollution reported by the UK Committee of Air Pollution (COMEAP). Having this epidemiological evidence provides a basis for calculating respiratory impacts from incineration (and suggests that they are really very small). But there is not comparable evidence of air effects from other MSW options, especially possible biological impacts from composting. Thus, while incineration will certainly prevent biological effects, the possible effects of sorting waste, composting and windrow have not been quantitatively evaluated.

It would be useful to restate the point made for Chapter 1 that health impact is one of two dimensions of environmental concern. The second, that has been evident since the 1970, is how the pollutants impact on the ecological receptors of plants and species, rather than the humans. While local authorities (concerned with urban issues)

are primarily responsible for the first, while the government's Environment Agency (concerned with industry and countryside) is primarily concerned with the second.

The concluding Chapter 7 describes the interplay between a report by ENTEC to the council and the health aspects considered earlier. WISARD is found to have some critical problems. Moreover, health effects are critically dependent on the proximity of people and the siting of the facility. In Chapter 7, there is a discussion of the JB Report, but this is difficult to assess without direct access to the report. MK Report says: *The Entec (2005) report for Milton Keynes Council includes an indicator "Emissions injurious to public health" but gives little or no information about: the data used, any underlying assumptions, uncertainty, etc. ... Blindly relying on these figures to give a relative assessment of the potential for impact on human health of the different MSW management options could be very misleading without a thorough understanding of the uncertainties and assumptions inherent in the underlying data.*

I would agree that applying the results of the EA Report, as undertaken in Chapter 6, is likely to be more appropriate than extrapolating from net emissions data derived from WISARD; but I can't evaluate these two alternatives clearly from the material presented. A further problem in reading Chapters 6 and 7 is to match up the waste disposal options evaluated by EA Report with those offered in the JB Report. I was not able to do so. Indeed, in the JB Report tables I could not see clearly the different forms of disposal.

A last concern is risk perception and risk communication. These are well treated in MK Report Chapter 3.2.12, but it might be useful to return to them at the end of the report. In summary, the report argues that the MSW management options can't be sensibly distinguished on health grounds, as the risks that are known are estimated to be very low, while for several newer options the risks are unknown. The issue of choice, therefore, turns on perception – by the public and by decision-makers. There is growing knowledge now that the health hazards of incinerators are low, especially as a result of modifications in recent years. However, incinerators that (beneficially) combust waste to provide energy need to be sited close to urban areas, whereas landfill is (conveniently) out of sight. Such choices are within the political domain.

Conclusion

This report brings together academic concerns from a range of disciplines - chemistry, toxicology, engineering, epidemiology, public health. In the main it sets out the issues and limitations of these in understanding policy for managing municipal solid waste. The government's requirements (led by the EU) for recycling and reducing landfill are changing municipal waste strategies, and a range of new technologies are being tested. It is in the interests of citizens that rational judgements are made for practicable handling of waste. Current technologies all appear to have very low health risks; but more scientific assessment of new techniques will be welcomed.