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Submission into Waste Generation

The Chair,
Inquiry into Waste Generation
and Resource Efficiency,
Productivity Commission

Dear Sir/Madam,

This submission is aimed at looking at the realities of waste production in modern society. That society may be the 'developed' societies of the West, transitional societies such as China and the rump of the former Soviet Union, and developing societies such as those of Africa and parts of S. E. Asia and Oceania.

Themes to be developed:

1. That ZERO waste is a non-achievable goal, and never an achievable target. Zero waste is a concept that provides a goal to which all humans can aspire, but will never be reached. The reason for this limitation is that humans by their nature change the natural World and in doing so leave their mark – that is waste. The aim of humanity should be to minimise that mark, and only leave waste that will be least harmful to future generations. That waste should also be 'naturally' degrading as far as is possible, so that at some time in the future the mark will be barely discernible. Waste minimisation coupled with materials selection that promotes degradation of wastes should be the themes of waste management.

2. Waste Minimisation is common sense. It encompasses the conservation of resources, which in turn encompasses, the reduction in energy wastage, more productive human activity better use of natural resources and reduced environmental risk. Waste Minisation is a mother's milk concept, but a concept that should be enshrined.

3. The purveyors of zero waste concepts are threatening the efforts of waste management professionals who are attempting to devise, promote, design, construct, use, manage and monitor waste management schemes that do provide good use of all resources with minimal environmental disturbance.

4. Zero waste is a concept that has been promoted to developing countries by self-anointed environmental NGO's (specifically Greenpeace) who have not looked at the basic sciences behind resource use. By telling communities that face severe environmental challenges from poor waste management practices that they can adopt zero waste strategies that will eliminate their problems, false expectations are created, and further those communities will often reject practical and environmentally benign solutions to their waste management problems in the dream of a zero waste solution.

The waste management hierarchy, strengths, weaknesses, opportunities and threats.

The simple hierarchy pyramid shown below is the classic view of 'the desirability' of waste management activities.

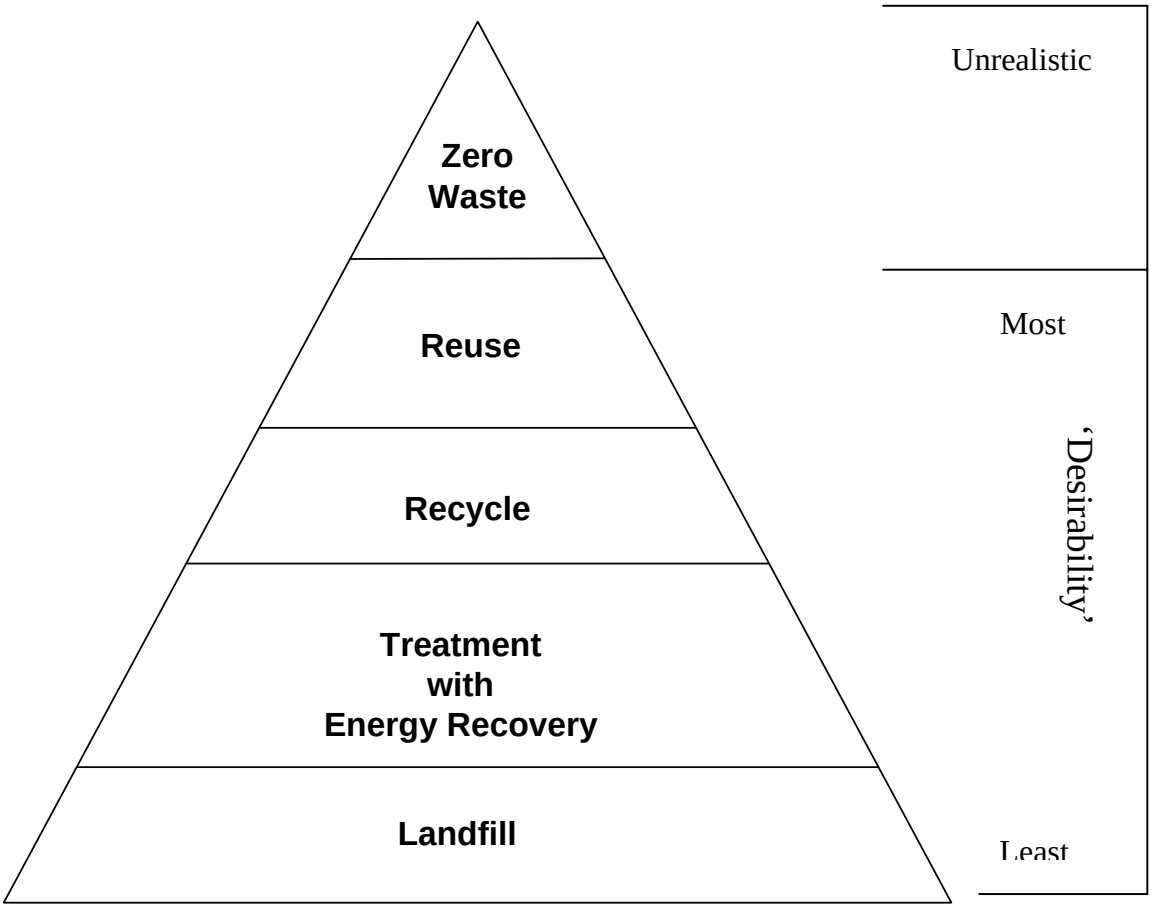

Figure 1. The Waste Management Hierarchy

The strength of the hierarchy depiction is that it does reasonably prioritise what practices are desirable in waste management. Its weakness is that it incorporates the Zero Waste fallacy. The Hierarchy is useful in assisting with emphasising the opportunities that could be had by moving the management of a particular waste up the pyramid. The threat however is that it takes no account of the cost in resources and energy in say moving a waste's management from Treatment with Energy Recovery to Recycle.

Incineration with Energy Recovery

Thermal processes for managing wastes have become unpopular since the 1970's. Part of this unpopularity was caused by past bad practice where emissions were un or poorly controlled. These poor practices gave the NGO's opportunity to label incineration as 'dirty', a description that has unfortunately stuck in the public's perception and has influenced the political will to manage waste.

The word incineration has caused proponents of thermal waste management practices to look for alternate technologies with less emotive titles. These alternate technologies have relied on partial combustion and can be grouped as pyrolysis/gasification systems. For municipal wastes pyrolysis/ gasification technologies do NOT work.

Incineration should have the following characteristics:

• Produce an ash with minimal residual organic carbon (say <3%),

• Significantly reduce the quantity of material that eventually goes to landfill,

• Maximise the use of all fuel constituents in the Process Engineered Fuels (no mass burn),

• Produce an unambiguously biologically neutral ash (no residual organic substrates),

• Liquid and solid emissions (as dirt, dust and process water) should likewise be minimised,

• Direct any harmful volatile residuals into dedicated scrubbers,

• Be CO_2 neutral due to grid energy displacement,

• Use oxygen combustion to aid potential CO_2 sequestration,

• Energy recovery should be maximised taking into account the specific energy of the fuel and the conversion process, and

• Produce useful electricity and/or steam.

How can incineration achieve those goals with minimal environmental harm? By following the EU Directive on Incineration such that [1]:

• Dioxin (as Total Equivalent) is less than 0.1 ng/cu metre,

• Limiting heavy metal emissions, on an element by element basis,

• Establishing and maintaining operating conditions, including gas temperatures and residence times, such as 850ºC for 2 seconds and 1100ºC for 2 seconds for hazardous wastes with greater than 1% halogenated organic substances (expressed as chlorine),

• Ensuring that Total Organic Carbon Content of bottom ashes will not be higher than 5%, and

• Oxygen does not to fall below 11% in the flue gasses.

(Note: The oxygen content of the flue gases being maintained at a relative high level in order to ensure the complete destruction of organic volatile compounds and produce an ash with a low organic carbon residual.)

Can Incineration be resurrected as a waste management process?

In the Irish case, yes! The Irish have recently decided to use incineration with energy recovery over landfill [2]. Education to counter the NIMBY syndrome, as well as the realities of alternatives will assist in having incineration accepted by society and thence by politicians.

The realisation that landfilling even with landfill gas capture still releases significant amounts of gaseous, liquid and solid emissions into the environment is a good reason for limiting landfilling (a ‘mark’ for future generations) wherever possible. The production and emission of methane from landfills is a GHG issue that should be addressed.

Moving up the Hierarchy pyramid, wisdom or foolishness

In a recent meeting of the Queensland branch of the Environmental Engineering Society the question was asked why not use old tyres as fuel for power generation? It was pointed that tyres have a fuel content close to that of petrol and that there are good emission control systems for keeping emissions from tyre combustion within the acceptable limits ie those of the EU Directive. In a subsequent seminar to the same organisation, the value of recycled tyres in construction was emphasised. The presenters showed how tyres that have one face removed could be a very valuable construction item in both road and embankment construction when filled with gravel. The consensual view (wisdom) from the environmental engineers attending this later seminar was that recycling of tyres is preferable if there is a market for the product. An example of successfully moving a waste up the pyramid!

The recycling of organic wastes into composts is more problematical. Where the organic feed into the composting system can be assured of 'quality', that is relatively free of non-organic wastes and pathogens, then the compost product will have a demand and thus a market value. Where quality in (and thus quality out) cannot be assured, then the compost product will in itself have no market and be another waste. If organic wastes can be 'cleaned' of impurities before composting, and assurance of quality provided, then composting may be a suitable process, but what are the energy and other resource costs of the 'cleaning'? (It should be noted that two Queensland commercial worm farming operations have not been a success. The high cost of fuel for green waste collection, contamination from other wastes, and the perceived excessive cost of product to potential customers caused cessation of activities.)

To be able to move the management of a particular waste up the Hierarchy a Life Cycle Analysis (LCA) of the waste (in its raw state and in the proposed final product state) should be carried out. Further, the LCA should be reviewed from time-to-time to see how the prevailing economics, technology options and emission standards effect the LCA.

Waste Management in the Developing World

All societies produce waste and that waste will vary in quantity and nature according to the wealth and technical sophistication of the society. The imposition of waste management regimes that are based on First World norms onto developing societies can produce human hardship and environmental harm. First World based NGOs have been active in imposing unrealistic expectations on developing nations of the Asia-Pacific region. One such example being the Greenpeace inspired and promoted Philippine Clean Air Act.

In the Philippines, the new Clean Air Act (1999) states: 'Pursuant to Section 20 of the Act, incineration, hereby defined as the burning of municipal, bio-medical and hazardous wastes, which process emits toxic and poisonous fumes is prohibited.' The Act goes onto ban the burning of any material in any quantity that 'includes plastic, polyvinyl chloride, …….., industrial wastes, ozone depleting substances and other similar toxic and hazardous substances'. Lastly the Act has penal provisions, such that, 'Any person who burns municipal waste in violation of Sections 1 and 3 of Rule XXV shall be punished with two (2) years and one (1) day to four (4) years imprisonment.'

The situation in the major Philippine cities, with Manila, population 11 million, being the worst case, is that there is only limited waste pick-up, no proper landfills, and a domestic waste that contains a considerable un-recyclable plastics content. The local's solution to not having a 'garbage service' is to burn their rubbish on vacant lots, street corners, in drains or any other spot that is conveniently away from their abode. The result is a myriad of small smouldering heaps across the Capital (and all regional cities), with the uncontrolled burning exasperating the vehicular smog that is all too much a way of life in Manila.

Recent attempts at solutions to Manila's waste problem have included giving the Mayors of Metro Manila national funding to fix the problem. The result has been the movement of waste from municipality to municipality, the illegal dumping of waste by municipal contractors, and even more 'do-it-yourself' street corner incineration. Further, the Act by banning burning of municipal waste and applying criminal penalties, has in effect turned the average citizen into a criminal (luckily there are few garbage police!).

The developed World, including Australia, can assist developing neighbouring nations with waste management technology and expertise. By understanding what are the waste generation drivers in developing countries and their internal capacities to successfully manage waste meaningful assistance can be provided. Examples of meaningful assistance from Australia have been the landfill management aid packages to Java and the clean-up assistance provided to Ache following the tsunami. An example of irresponsible assistance was the imposition of NO incineration regulations on the Philippines with the promise that help in achieving a zero waste society was on the way by NGOs.

Conclusion

Waste generation is part of human existence. Waste will produce a mark on the environment that will exist for many generations and thus we should as far as possible minimise waste production. This minimisation should not however be to the point where our economic and social stability are threatened.

Waste management principles are well established and can be expressed in a Waste Management Hierarchy. The use of the Hierarchy in promoting a specific waste's fate to a higher echelon should be matched with a current Life Cycle Analysis of the waste in its raw state and in the proposed final product state.

For the Developing World realistic and achievable solutions to waste management are required. These may be low or high tech, but they must take into account local circumstances of waste generation, accumulation and disposal requirements.

References

1. European Directive on Incineration 2000/76/EC. Sources through the UK Department of Environment, Food & Regional Affairs, www.defra.gov.uk/environment/ppc/wastincin/

2. Aggressive campaign stifles opposition to incineration. Garth Lamb. WME Magazine, August 2005, pp 28/29

I trust that the above short submission will be of assistance in your deliberations.

Yours faithfully,

Michael C. Clarke