

Five Popular Myths About Incineration

by Paul Mobbs, environmental consultant, June 1997

Communities across the UK are under pressure from developers and/or local authorities to accept the development of "waste to energy" plants - incinerators - in their area. The arguments which are put forward to support incineration are based on 'facts' - and the development of 'waste to energy' is apparently supported by the Department of the Environment. But, if we examine the arguments in favour of incineration, there is very little substance to them, and many of the arguments are based on very poor science. The arguments are no more than myths.

The main five myths promoted about incineration are:

*Incineration reduces the need for landfill;
Incineration is a way of recycling energy;
Incineration is safe;
Incineration and materials recycling can work together;
Incinerators solve the waste 'problem'.*

"Incineration reduces the need for landfill"

There are many figures put forward for how much landfill space is saved by building incinerator plants. Incinerators do not mean we get rid of landfill - in fact the adoption of incineration creates wastes which themselves can be difficult to safely dispose of.

The Department of the Environment booklet on energy from waste [1] states that, "energy from waste plants reduce the waste for disposal by 90%" (70% by weight). This statement is extremely 'economical with the truth. Studies of the waste streams associated with incineration, commissioned by the Government's renewable energy body ETSU [2], show that the real figure for the whole waste stream is about 50% (by weight).

The reason for the difference in figures is that the 'official' figure only includes waste burnt. In reality incinerators close for maintenance, and waste quantities vary over the year, so a significant quantity of waste still goes to landfill, 'diverted' from the incinerator.

There are problems with the disposal of the ash from incinerators. The bottom ash, while being described as 'inert' will leach pollutants such as heavy metals if it becomes wet. The 'fly ash', from the pollution control equipment, is extremely toxic and has to be disposed of as 'special waste'.

There are few sites equipped to handle such large quantities of special waste. If we take as an example the 'flagship' of all incinerators - the SELCHP plant in London - it had to send its fly ash to a site near Cheltenham because no one else would take it.

"Incineration is a way of recycling energy"

Waste materials have two values: -

the quantity of energy that was expended in their manufacture, and hence which must be expended again to replace the material;

the quantity of energy that is released when the material is burnt.

For most materials the amount of energy produced by burning in incinerators is significantly less than that invested in their manufacture. See the example below for a more detailed explanation. This means that incineration is the 'worst environmental option' when compared to other solutions such as recycling or reuse.

Energy implications of plastics incineration

Energy in manufacture (a), MJ/kg: 120
Energy from combustion (b), MJ/kg: 44
Efficiency of generation (c): 0.33
Electricity produced (d), MJ/kg (b x c): 14.5
**Energy efficiency of plastics
incineration (d / a): 12%**

In terms of the practicalities of waste combustion as an energy source, if we take a traditional fossil fuel such as coal, coal contains more energy per unit volume than mixed waste. You have to burn three times more mixed waste for the same energy release.

What, we have to ask, is the primary purpose of an incinerator - to generate power or to dispose of waste?:

If it is to produce power, there are other generation options with lesser environmental impacts, and an equal or smaller capital cost - e.g., wind, micro-hydro and wave/tidal devices;
If it is to dispose of waste there are other options with lesser environmental impacts - e.g., anaerobic digestion, source separation of recyclable materials, or better still waste avoidance/minimisation. More importantly, if the primary purpose of waste combustion is waste disposal, it cannot be regarded additionally as a renewable energy source;
Another way to look at the issue - £60M (the cost of an average incinerator) would buy around 5 million low energy bulbs, and would save about 1 billion kWh of electricity - equal to the energy production of an average incinerator over 15 years. Do we therefore regard the sales of low-energy light bulbs as renewable?

"Incineration is safe"

The combustion of waste produces substances that are harmful to health. Some of these substances are harmful in extremely small quantities - such as dioxin. Others are produced in large quantities and add to the general 'background' levels of pollution.

There has been much publicity about the toxicity of dioxin, and the effects of dioxin from incinerators. In 1996 Her Majesty's Inspectorate of Pollution, one of the agencies which was later incorporated into the Environment Agency, produced a report on dioxin releases from waste incineration [3]. This report, supported by many in the incineration industry, concludes that there is little risk from the dioxin emissions of incinerators. However, the research which forms the basis of this report has recently been reassessed [4]. Combined with the uncertainties within the HMIP report - which are many - it can be shown that dioxin intakes have been significantly underestimated. This means that any significant new source of dioxin in a community poses a threat to health.

Although there has been much attention given to dioxin, the more 'conventional' emissions from incinerators have been largely ignored. For pollutants such as particulates (soot) or carbon monoxide it is difficult to find a comparison to give an idea of the size of discharge an incinerator represents. It is therefore necessary to convert the figures to some other meaningful quantity. If we consider an average 200,000 to 250,000 tonne per year incinerator, the particulate emissions from the chimney are around 100 kilos per day. That is equivalent to 1.7 million diesel vehicles travelling down a road every hour.

Incinerators also produce high levels of localised pollution. Although the tall chimney dilutes pollution in the air, at certain times emergency vents (called 'dump stacks') discharge pollution from the top of the pollution control plant with minimal dilution. The effect on communities within a few miles of the plant is significant. Any waste management option will produce polluting emissions. But compared to other options waste incineration represents one of the largest 'point' sources of air pollution.

"Incineration and materials recycling can work together"

The main attraction of incineration to local authorities is that it does not require any of their 'systems' to change. They can still collect waste in bulk without the need to ask their citizens to separate it, and then they can deposit that waste in bulk at one central point. This poses the question as to whether working incinerators can really benefit materials recycling.

For an incinerator to operate it has to secure waste contracts with local authorities in the area. In order to ensure that incinerators work at maximum load, the operator must ensure a steady supply of waste. This puts obvious restrictions on the authorities in the area to divert waste to other waste management options, or engage in waste minimisation.

Another problem with the recycling side of things is that all materials have two economic values - one based on their value as recycled material, and one according to their potential to burn and produce electricity. From this perspective the burn value of glass and metal is negative - because they do not burn, and actually remove energy from the system as they heat up. Plastics and paper on the other hand have a great burn value. Balancing this, metal, glass, paper and plastics have a reclaim value, based on their economic value or the energy used in manufacture. Those materials which are extremely energy intensive to produce, but which have a high calorific value (such as plastics) will not be reclaimed. Even aluminium, because of the difficulties of segregating small items of non-ferrous metal, will be destroyed in the incinerator.

There is evidence emerging [5] that the practical effects of long-term contracts for incinerators work against the best interests of recycling. In mid-1995, Cleveland Waste Management signed a 25-year contract with Cleveland County Council based on projected long-term waste arisings of 310,000 tonnes. However, in the first year of the contract the region supplied only 248,000 tonnes - and the county and four borough councils which succeeded it incurred penalty charges of £147,000 because of the shortfall. The Assistant Director of Environmental Services at Stockton Borough Council, observed that the penalty clauses "mean that fundamentally we are into waste maximisation." According to the Assistant Director, the councils, "are already constrained by the contracts from doing even a modest amount of recycling," and the future of two materials reclamation facilities is in jeopardy.

"Incinerators solve the waste 'problem'"

The perceived 'problems' with waste at the moment are three-fold: -

**traditional landfill sites are filling up;
waste management is unsustainable - huge quantities of resources are thrown away each year;
landfill is becoming more expensive.**

The problems of landfill will not be solved by more incineration of waste. Landfill will still be needed for significant quantities of waste.

In terms of the 'sustainability' of incineration, it is no better than landfill. It is still wasteful of resources which could have been recycled, reused, or not produced at all.

Finally, when considering costs, it is misleading the public for any body to state that incineration will be cheaper in the longer term. It is true that the costs of landfill are rising because of higher technical standards and the landfill tax. However, it is likely that in the next few years the landfill tax will be extended to cover incineration. Also, the emission standards for incinerators will be soon be raised yet again, and the terms of most waste contracts mean that these costs will pass directly to local authorities.

But, what is the answer to waste disposal?

In essence, the purpose of waste management is to dispose of waste materials in a manner which causes the least damage to the environment. There are three priorities:

Firstly, we have to minimise the amount of waste we produce. This will require national legislation as local authorities have very little power in this area. As well as minimising quantities, we need to improve the 'service life' of goods. If your ink pen lasts twice as long you produce half the waste. Making goods of higher quality and which are easily repairable reduces waste in the short term, and will save the consumer money in the long term. Only by addressing the actual production of waste will we be able to control the total quantity.

Secondly, we have to encourage reuse. This means encouraging the use of reusable containers, and where possible encouraging bulk buying - buying products in large bags uses proportionately less materials.

Finally, we need to recycle more. This means getting the public to separate their waste before collection, and then reprocessing this material through a network of 'materials recovery facilities'. As well as simply recycling, we also have to consider the design of products. Where there are problems about recycling products we need to encourage the 'substitution' of problematic materials for ones which can be easily recycled.

There is no quick and easy fix to the waste problem. We will not be able to introduce more sustainable systems of waste management without fundamental changes to how we use goods and dispose of them.

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For example, ENDS Journal, November 1996 - "Emission deadline heralds new era in municipal incineration"

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