



Using and managing waste

Exploring issues

I am Andrew Porteous, Emeritus Professor of Environmental Engineering at the Open University. I initiated and founded the Open University's environmental engineering programme in 1975, and that programme has continued thereafter in one form or another. My involvement in Course T210 is that I was course team Chair, or Chairman, I'm an old fashioned fellow, and I selected academic staff, had media staff seconded to me, editorial staff, and we put the course together as a package which embraced the management of land or waste, solid wastes, air, water or effluence, and noise management or control, and these entities are what impinge on most people in the urban environment and in the rural environment too. My involvement in the waste sector grew from my early days as a coal miner in Fife at age 15, and thereafter a mine mechanic in charge of coal face plant, boiler plant, steam-raising plant, and I saw what could be done by efficient use of resources, even in those days. In my coal mine, the largest in Scotland, we burned the waste that we couldn't sell to raise the steam, and then we made sure the boilers were super-efficient. And from there I went on to night school, to university in Edinburgh and a NATO fellowship to America for my higher degrees, and in the higher degree work I was tasked with making a useful product from household waste that was innovative, and I came up with the idea of making industrial ethyl alcohol from waste cellulose, and that project is now commercialised today. And when I saw what could be done with waste, allied with declining resources, even then in the 1970's it was obvious that oil would peak eventually, that we should be conserving resources, and when I returned to America I pretty well signed up at the Open University in 1970, and given my background as a coal miner, that is perhaps understandable now I feel I've had a vocation in educating people who could benefit from my skills and my perspective. The study of waste management has never been more relevant than it is today. One of the reasons is there's a driver called the EU Landfill Directive which places stringent requirements on all member states to reduce the use of landfill, and Britain in the past has been extremely lax, or relaxed, about the use of landfill, in fact it was quite profligate, where other countries in the EU such as France, Germany, Denmark, etcetera, went heavily into recycling and earned a recovery from waste, and I'd like to emphasise a factor in this, that both these processes reduce the requirement for landfill. You cannot achieve a hundred percent recycling because the cost would be astronomical. It's like me saying it's possible to have a holiday on the moon and hang the expense, so there has to be rational waste management and there has to be a modicum of recycling, a modicum of energy from waste, and a modicum of composting, and also let's go to the top of the pyramid and say let's examine what we've produced as waste in the first place, and try and minimise it, so the course really wraps around these concepts. The series of examples in the videos are still probably current best practice, although they've been expanded on a mega-scale now to be practical in every community in the United Kingdom. So separation at source, or mixed waste, is then sent under a separate collection scheme to material recovery facilities to facilitate the recovery of recycled materials. The bulk of the material is paper, followed by metals and glass. Now there's an important point to be made in recycling - you don't get anything for nothing. In the case of waste paper recycling there's always a reject stream and there has to be an injection of fresh fibres from trees to make sure that the paper meets its quality requirements. The legislation is extremely important because that's been the driver to make Britain recycle more, minimise more and recover, that is burn more waste to recover energy, and compost, and the legislation lays down that there must be a substantial reduction in landfill, and the government has set a target by 2020 of reducing household waste output by 50%. What that means is from 450 kilograms per person, per year in 2000, it wants output to be 225 kilograms in 2020 going to landfill, that's a 50% reduction in landfill, that's a very big ask, so you can see how that is being driven. The government has also produced what is called the Landfill Tax, which is an escalating tax year on year, which means, I believe it's currently £32 per ton, so every ton of waste that goes to landfill incurs a levy of £32, so there's also a financial driver to make sure

the legislation is complied with, otherwise we receive a mega-fine from the EU for not meeting our targets. The energy from waste plant or incinerator at Taisley is one of the latest generation of plants. It is situated pretty well in the middle of an urban conurbation which gives ally to, I have to say, environmental scares about pollution. These plants operate to the highest standards and Taisley, and all other energy from waste plants in use in the United Kingdom, are the most strictly controlled???. ...combustion processes available. And for that reason Taisley incorporating what was then best practice, and is now standard practice, is an ideal example to show how a large scale energy from waste plant operates, and how it can be located in an ordinary community, and provide electrical needs day-in, day-out without interruption for many, many thousands of houses. So what it does is it takes in post-recycling waste, that is waste that is not practicable to recycle or compost, and make something useful from it, recover the energy, and in effect produce around 600 kilowatt hours of electricity per ton of waste, and that's roughly 600 kilowatt hours that we'd be wasting if that waste had been sent to landfill. So, for a variety of reasons, the technology, the operating standards, the high performance of the plant itself and reliability, and the fact it was in the middle of an urban conurbation, commended Taisley to me, and I want to emphasise the urban conurbation location in practically every major city in Europe, the energy from waste bond isn't consigned to the outer limits, and miles away from a town, they're usually in the middle of the city centre, and they employ what is known as combined heat and power where both electricity and heat are produced, and this increases the efficiency of the plant to around 80%, which is quite a staggering figure. And, for example, a third of Central Paris is heated by its waste in a former string of energy for waste plants around the périphérique. Every town in Sweden has an energy from waste plant complementing its district heating scheme, the same in Denmark. Energy from waste does not negate recycling, it works in tandem with recycling, and makes use of the waste that has not been recycled, in other words, a second bit of the cherry is provided. That's why I see the Taisley incinerator or energy from waste plant, as a pivotal programme in the course. The landfill example chosen in the programme is a modern, high-tech landfill, as they all are now basically, which has an engineered base, and a lot of the programme shows how the base is engineered to make sure that leeches don't escape, or if they do, in a very, very controlled manner, and are caught and treated. The gas from the decomposing waste will also be caught, and what may not have been heavily emphasised in the programme is once the landfill is capped off and no more waste is put into it, that landfill site will produce methane and/or landfill gas for the next thirty or forty years, and that in turn means that the post-closure programme has to be in place, gas capture has to be in place, gas utilisation has to be in place, to make sure the methane, which is an extremely powerful greenhouse gas, does not escape to the environment. I would like to make a point on methane as well that's not featured by government prognostications. They tend to say that methane is twenty-five times more potent than an equal mass of carbon monoxide in official pronouncements. What they don't tell us is that's on a hundred year timescale. If you take the methane effect on a twenty year timescale it is pushing 60-65 for the greenhouse factor and the government, in my view, has fudged the figures. If global warming is as serious a problem that it is claimed to be we need to have it resolved within twenty, twenty-five years, and not postpone it to a hundred years just to make our greenhouse gas figures look good. The utilisation of landfill will always continue because there'll always be waste that'll escape recycling or composting on the verge of a waste plant, and there'll also be the by-products. Recycling is not a 100% process, there's always wastes come out from recycling, these go to landfill. There can be quite often waste from composting where the compost doesn't need specifications, and that would be landfilled, or stuck on top of the landfill and called 'top dressing' or a 'mulch', and also from the energy from waste plant there are two waste streams, solid waste streams. There is a bottom ash which is around 22% of the input waste, plus a residue from the gas cleaning process which is around 2 or 3% of the input waste. The bottom ash nowadays is mainly recycled for tarmac purposes, or car parks, but some of it is still landfilled or used as cover on landfill, or used for roads on the landfill, so what in essence what I'm saying is there is an almost irreducible amount which will always be landfilled, so we do need landfill, but the opportunity to use landfill is decreasing rapidly, and rightly so. I think it's extremely important that students and the public at large, or anybody who listens or views these programmes, realises the professionalism that does go into managing the environment, the professionalism that goes into engineering and that means rigour, document what you say, analyse what you say, be grounded in facts, and draw logical conclusions, not emotive conclusions, therefore the nub of most of the coursework is that it is founded in harsh reality,

data, legislation, boring calculations to some people, not to the likes of me, and anyone who does the course or views the videos will have a better idea of how the environment might be managed in a rational manner. That means you analyse a problem, you come up with solutions, you cost the options of the solutions, you follow through with pilot programmes to make sure that what you proposed actually works, and flavours of that will come through in the modules. If you are what I might term a fundamentalist you might say waste bad, packaging bad, and ignore the fact that packaging will stop products from spoiling. So at one level the emotive person will say I don't want packaging, strip it off. That's fine but what about the people who do want packaging, who do need packaging, who've got to store their food in substandard housing or in strange locations? Now what is needed is more professionalism in our government, in our civil servants, more accountability, more open debate on a rational basis, not oh, we must recycle, we must recycle, we must recycle. If the recycling starts to cost, I mean in the case of filthy plastics over £200 a ton, when you can burn them cleanly and considerately and get the energy back at the energy from waste plant at £60 a ton, why do it? I would like to think that the course material will educate people, no matter what their perspective is, you'll educate them into the care and hard work and professionalism, and the logical thought processes that go into waste management, air pollution control, noise management control, and an acceptance that as long as we want cars, we want canned foods, we want the convenience of electricity 24 hours a day, 365 days a year, there will be impacts on the environment but they can be mitigated, you can't just shut down the consumption of resources because you feel that this is bad for the environment. Living's bad for the environment, what we've got to do is mitigate the impacts. I would like to think this course shows that the impacts can be mitigated in a logical.....