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'Waste Disposal; a Legal and a Moral Issue.'

by
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Contents.

Introduction.

> In an age of mass production when everything must be planned and designed, design has become the most powerful tool with which man shapes his environment (and by extension society and himself). This demands a high social and moral responsibility from the designer. It also demands greater understanding of the people by those who practice design and more insight into the design process by the public.
>
> (5. pp: xxii)

If the common sense and sincerity of the principles laid down for design by Papanek were to be applied to waste disposal, I believe the above statement would read as follows:

> In an age of mass production when everything must be produced and reproduced, waste has become the most powerful weapon with which man has the potential to destroy his environment (and by extension society and himself). This demands high social and moral responsibility from everyone from the industrialist to the man, or woman on the street. It also demands greater understanding and consideration of the environment by those who dispose of waste and more insight into waste disposal processes by the public.

The following paper is an analysis of the disposal of waste. It is particularly an examination of where the responsibility lies for effective and safe waste disposal. This responsibility has become the proverbial buck which has been passed off at either Local Council, Government, or EEC levels. Alternatively it has been translated into 'money-spinning' enterprises, which should be of general benefit to all parties concerned. However, these

enterprises often consider themselves above and beyond the laws governing controlled waste disposal and in turn leave even greater problems for the next party.

It is necessary to examine what has to date, been the trade-off point between industry and the environment.

(illustration. Ref: 49). A beach at Coney Island, U.S.A. lies deserted. Dangerous medical waste, including infected syringes,has been washed ashore, after being illegally dumped in the sea. This creates a major public health risk.

Chapter One involves a discussion of the production of new materials and products that are proving ecologically and environmentally unsound, but which we are becoming

increasingly reliant upon. This is a very 'grey' area since the use of some of the products in this category, is imperative to our own safety and well-being, not to mention convenience.

Chapter Two is a case study. By taking one particular example, it is possible to examine all the positive and negative aspects of a product. The example in question is foam manufacture in Ireland. It is easy to overlook the importance of foam in today's society, and unless you are a foam manufacturer the extent of your knowledge of what happens to foam once it has gone past its working life-span, is a trip to the local tip or dump-site. Chapter two concerns itself with the recyclable and decompositional properties of foam. We look at how foam manufacturers are responding to the pressures of the environment, and what lies in store.

Chapter Three examines Waste disposal in Ireland. We examine what type of waste is produced in Ireland, where it comes from and who is disposing of it. Various methods of disposal available are examined, together with their respective advantages and disadvantages.

Chapter Four examines an Irish 'National Survey of Attitudes to the Environment' as carried out by the Department of the Environment. It allows us a glimpse as to what people are thinking about the environment and related issues, where their priorities lie and what they think the priorities of the government and industry should involve.

Chapter Five is an analysis of how the production of goods and services for pollution abatement and environmental protection is now a growing industrial sector world-wide. Due to waste disposal becoming a marketable industry, we examine

how a central control and governing body monitering the production, as well as the disposal of waste, is needed to co-ordinate individual efforts on the environmental front.

Chapter Six examines the lead (perceived or otherwise) Germany has taken in responding to the needs of the environment and whether this is a precursor of things to come in the rest of Europe. We look at not only the positive but the negative repercussions that Germany is already experiencing in relation to its reforms, and examine what can be avoided by its example.

Chapter Seven looks at existing legislation both in Ireland and the EC concerning waste disposal. We examine if and how these regulations are being implemented and whether there is room for improvement. We also look at 'source reduction', employing the theory of 'prevention is better than cure'.

Chapter Eight expounds the 'Green' theory and looks at organisations that have been, or are in the process of being set up as a reaction to the indifferent manner in which we have treated the environment to date, with respect to waste disposal.

It would be impossible to cover all of the issues that the term 'waste disposal' encompasses. However, the contents of the above chapters have been selected to give an accurate picture of what is happening on both sides of the environmental fence. It is from all of this information that we can draw unbiased conclusions based on fact and not prejudices.

Chapter 1: 'Catch 22.'

There is a certain list of characteristics that adds to the 'saleability' of a product. Convenience is certainly one of them.

If you ask any mother what the single greatest invention has been with respect to babycare, she will undoubtedly say disposable nappies. Disposable nappies answered all the problems associated with terry cloth nappies. The elimination of endless hours of soaking, bleaching and washing combined with an awkward shape, not to mention the ever present worry of possibly stabbing your child while trying to fasten a safety pin, was a welcome relief. But disposable nappies created a new problem. When after use, they were folded, sealed and discarded, they rendered what is possibly the most bio-degradable substance known to man, completely non-bio-degradable. Environmentally, the obvious truth is that the terry nappy was a better solution.

Beyond the conveniences that have been produced for todays society, there are those products that are paramount to our own safety and well-being. Products of this nature pose a variety of problems. While manufacturers, industrialists and designers are busy solving a problem for society, they are often responsible for creating new problems for the environment.

For example, the quest to find the shortest possible route from A to B resulted in commercial air travel and with it came a whole new world of technology. The fact that air travel created

and is still creating, incomprehensible problems regarding the environment, is only now becoming an issue.

With the introduction of larger aircraft carrying more people as well as more fuel over longer distances, the serious concerns over air passenger safety were and are well founded.

Air passenger travel became one of the biggest boom industries of this century (Ref: 38), and aircraft manufacturing became a whole new science. Larger aircraft travelling at faster speeds, stretched the imagination of engineers and it wasn't long before the birth of the Concorde, a plane with the capacity to travel at supersonic speeds.

With all the new demands placed on air passenger travel it was necessary to analyse everything from typical passenger behavioural patterns, to past air disasters. The resulting information raised a few eye-brows to say the least.

One such piece of information was that on close examination of aircraft crashes it was established that the majority of passengers that died, did not actually die from injuries received on impact, or from rapid decompression. The largest cause of death was in fact toxic inhalation as a result of burning foam. (Ref: 47). This as would be expected, launched a whole new line of questioning aimed particularly at the foam contained in aircraft seats.

The first solution to the problem was the use of a combination of a flame-retarded foam (a foam which contained certain properties which raised its resistance to heat) with an FBL 'Fire Blocking Layer' which was placed between the foam and the dress cover.

Whereas this did solve the immediate problem which satisfied the Aviation Authorities, it was only a temporary solution as problems arose with the FBL after a period in use.

The importance of fireproof and firehard foams had now escalated to a new level. The problem did not just lie in the creation of a firehardened foam, as this technology was already available. The most effective fire resistant foam was 'graphite impregnated' foam. (See Appendix: (a)). This foam as the name suggests used a graphite compound to delay if not avoid combustion of the foam when in close proximity to flames or heat. The problem lay in producing a foam which was not only firehardened but which people could sit on (the early samples of foam containing graphite rendered the foam very dense and unsuitable for seating). Ergonomic constraints particularly relating to long haul flights had to be matched, as well as existing weight standards.

Two years ago, after years of costly research and analysis, refining and testing, a foam matching all the constraints of safety, weight and ergonomics was launched into the realms of aerospace travel. It is necessary to state that <u>at no time</u> during the preliminary, advanced, or final stages of research was emphasis made on the 'recyclability' or decompositional properties of graphite impregnated or graphite containing foams. (Ref: 47) So what price does the environment now pay?

In order to answer this question it is necessary to examine the realms of foam manufacture more closely. This we do in

chapter 2. We will treat foam manufacture as a case study. This allows us to examine in detail, one particular product, but at the same time use it as an example of what is happening in general, concerning the manufacture of new products.

Chapter 2: A Case Study: Foam.

The following chapter is based on information received during an interview with Mr.J.F.McHenry of Vita Cortex Ltd. (Ref: 47).

The chemistry of urethane foams was first developed by Otto Bayer, of Bayer Chemicals Ltd., Germany. Foam was first manufactured in Ireland in Cork, by Cortex Proofers Ltd (later to become Vita Cortex Ltd.) in 1959, using a High Pressure Injection Block Plant, whose patent was owned by HENNEKE of West Germany.

Probably the greatest mechanical innovation concerning foam manufacture, was the development of the 'Max-Foam' process, by Laader Berg of Norway in 1960. He devised a machine that substantially reduced the effects of gravity on the expanding foam. (See Appendix: (b)). This process allowed the manufacturer to create a greater range of foam densities, thus making his product suitable for a greater range of products.

Chemically, the single greatest development was by the HOUDRY Corporation, U.S.A., in 1957. Their new AMINE, a catalyst, reduced the polymerisation (see Appendix: (c)) process from 24 hours, to seconds. This transformed the manufacturing operation from a 2 day cycle to a continuous process.

The basic principles of foam manufacture still remain the same. It is a process where various chemicals, additives and catalysts are mixed in very precise quantities and discharged onto moving conveyors. However, up-to-date technology providing greater accuracy and more precise control, means a greater

variety of materials can be handled, enabling foams with many varied characteristics to be produced. The two Irish manufacturers, Kayfoam and Vita Cortex each produce 20 types of foam, each tailored to meet various applications.

Today all furniture foams in Ireland and the UK have to be flame retarded. This probably accounts for 75% of all Kayfoam production and 60% of Vita Cortex. However, furniture foam tonnage is likely to decline. In contrast, 'technical' foams, are likely to grow, with the growth in graphite containing foams being significant. Presently, graphite containing foam only accounts for 2000 tonnes of the 450,000 tonnes produced in Europe annually. Ireland produces 4000 tonnes of various foams per annum.

So what happens to it all?

In theory, according to the manufacturers all foam can be recycled, although graphite containing foams could be the exception to this rule. The truth is that the manufacturers don't know.

Standard and fire-hardened foams can be recycled by specialised manufacturers of compressed foam products. These companies granulate the old foam and re-use it in the manufacturing of high-impact athletic equipment, such as shin-pads and gymnasium mats, carpet underlays, or pillows and cushions.

The percentage of foams to reach recycling however is minimal, since neither the manufacturer of the foam, nor the manufacturer of the item containing the foam, is legally bound to accommodate the safe disposal of their products once that

product has been sold. Also the demand for high density foam products is relatively small.

Waste foam from factories accounts for 1000 tonnes (25%) of the total amount of foam produced in Ireland. All of this is recycled. However, if you assume that all foam sold to furniture, bedding, automobile and aircraft manufacturers is displacing worn-out foams, then their annual input is 2200 tonnes. Similarly if you consider the foam used in cushion packaging, this accounts for 800 tonnes of waste. (Cushion packaging is the largest contributor to foam waste today as its working life-span is extremely short, typically 1 month.) In total 75% (3000 tonnes) of the waste foam that accumulates in Ireland every year is left to however the consumer choses to dispose of it.

Some retailers however, are becoming 'street-wise' and are, on large contracts, including clauses whereby the manufacturing company have to take back the products after their working life-span has expired, and dispose of them thereafter. Today it is the decision of the retailer to include this clause, tomorrow it is likely that it will be legislation that dictates that the manufacturer is responsible.

The alternative to recycling is decomposition on tips. (Foams cannot be buried in landfills as they will only decompose when exposed to Ultra-Violet light.) Fortunately, foams graphite or otherwise, do not release toxic particles when decomposing The problem arises in trying to accommodate large quantities of bulky foam for a period of 1-3 yrs where exposed to UV-light. Additional problems are likely to arise here concerning graphite-containing foams, since the graphite will slow down the decomposition

process even further. It has not yet been established just how much longer it is likely to take.

With the words 'environment' and 'recycle' being on the lips of every industrialist and politician in the EC, foam and chemical manufacturers are frantically trying to find some method of disposing of foam, particularly graphite containing foam since, as was mentioned earlier, its production is likely to increase significantly. This, partnered with the fact that environmentally we know very little, if anything, about this product, gives us good reason to be concerned.

Presently DuPont and DOW chemicals are experimenting with foam as a potential energy source, using it in much the same capacity as peat, to maintain intense heat levels. Although this is a possible solution to the minimal and slow process of decomposition, the chemical derivatives of foam become very unstable when exposed to such intense heat. This energy source would only add to the already extensive list of toxic fumes and emissions already circulating in the Earth's atmosphere.

Chapter 3: Waste Disposal in Ireland.

Waste can be divided in to three categories, solid liquid and gaseous. Of the three, solid waste accounts for the largest mass and volume and thus the greater problems. Solid waste is made up of domestic refuse, industrial and commercial waste, litter, wastes from mining, quarrying, construction and agriculture, including sludges and semi-solids that cannot be discharged into water or air. Each year an estimated 28m tonnes of waste is produced in Ireland, of which 22m tonnes is as a result of agriculture.*

Facts and Figures:

Of the remaining 6.6m tonnes, 24% is disposed of by local authorities. An incredible 74% (4,860,000 tonnes per annum) is disposed of by private firms, the remaining 2% is treated as special waste.* ('Special' waste is a term given to that waste which is, or may be so dangerous or difficult to dispose of that special provision is required. There are three categories which come under this title: Toxic & Dangerous Waste, Problematic Waste, and Waste Oils. These are dealt with in more detail on the following page).

The 24% of waste that is disposed of by local authorities, can be broken down further. Sixty-four percent (1m tonnes) is household and commercial refuse. Diluted sewage treatment plant sludge accounts for 29%. The remaining 2% is equally divided between bulky items like abandoned cars and 'other' waste.*

Similarly the origins of the waste disposed of by private firms can be broken down. Mining and quarrying waste account for the largest percentage, 40%, estimated as 1,930,000 tonnes per annum. Unclassified industrial and process waste makes up 19%. Of the remaining 41%, 11.5% is treatment plant sludges, 7.5% is construction debris and boiler slag, 5.5% is forestry and wood processing waste, 5% is metal scrap, 4.5% is organic problem waste and the other 7% is termed as 'other' waste.*

Special Waste:

Toxic and Dangerous Waste.

EC Directive 78/319/EEC categorises twenty-seven types of waste as toxic or hazardous. (30. pp:99). In Ireland 19 of these 27 categories of waste are produced, at an estimated 52,000 tonnes per annum. The largest percentage of this waste, 63%, is chlorinated and organic solvents. Biocides and pharmaceutical substances make-up 15%, lead and lead compounds 8.3% and asbestos, either dust or fibres accounts for 7% of the annual tonnage.

The majority of toxic and dangerous waste, 66%, is disposed of by producers on their own sites, 28% is exported overseas, the remaining 6% is disposed of on sanitary authority tip-sites, specially prepared to cater for the waste.

Toxic and dangerous waste is considered the greatest environmental problem in the European Community. There is an estimated 50% deficiency in Europe's capacity to dispose of its hazardous waste. At present toxic and dangerous wastes are disposed of in co-disposal sites (this is where toxic waste is diluted

with inert waste in an effort to stabilize it), specially designed land-fill sites or alternatively the waste is exported where it becomes someone else's problem.*

Problematic Waste.

Problematic waste is subdivided into two categories, metal and chemical treatment plant sludges makes-up 54,000 tonnes of the annual 75,000, the remainder being chemical oil and other problematic waste not defined by the EC. Eighty-percent of the first category and 87% of the latter are disposed of by land-fills.*

Waste oils.

There is only a 60%, 9,000 tonnes, recovery rate of the collectable market of waste oils. Considering that 35,000 tonnes of lubricating oil are used in Ireland every year, there is certainly room for improvement.*

The options available for the disposal of standard, non-hazardous waste include incineration, reduction of waste volumes by compaction, high density baling and pulverisation, or the final disposal of residues by dumping at sea or in land-fills.

The single greatest advantage to incineration is the ten-fold reduction in the volume of waste to be disposed of, thus greatly increasing the life-span of land-fill sites. As an added bonus the heat of combustion can be recovered to provide an income to offset operating costs. Economically, the operating costs create the largest stumbling blocks concerning incineration. Environmentally, air pollution is the greatest concern.

(Illustration. Ref: 50). Burning waste is more difficult than it appears, needing careful control if toxic waste products are to be avoided. The furnace shown here at Ichikawa in Japan is a simple incinerator designed to burn domestic waste. Some incinerators can produce so much heat and electricity that it can be sold to the National power supply.

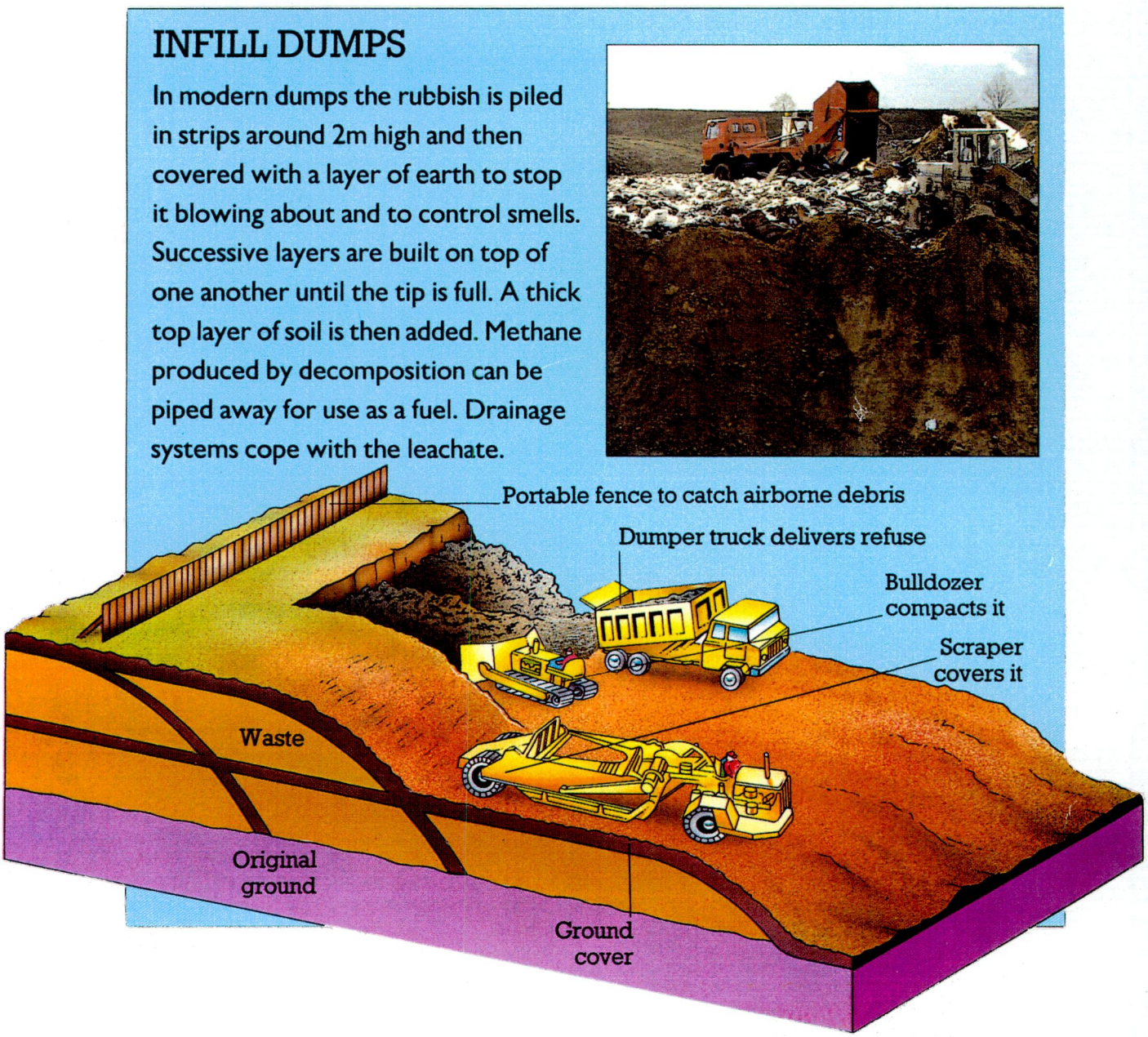
The reduction of waste volumes by compaction, baling and pulverisation is largely to extend the life-span of land-fill sites. Both compaction and baling compress waste into large stable masses to facilitate both transportation and land-fill costs. The added benefit of both of these processes is that they relatively eliminate the problem of wind-blown material and problems caused by rodents or birds.

Pulverisation involves the actual physical breakdown of waste to a thoroughly mixed material of small size. The advantage of this process is that it facilitates the processes of mechanical separation or incineration.

Land-fills are the final destination for almost all domestic refuse and industrial waste (70% of all waste in Europe is disposed of on land).*Controlled landfill can be environmentally acceptable if appropriate steps are taken. The preliminary site selection must incorporate a thorough investigation into the water table/ patterns and geographical layout of the general area. Efficient methods of operation combined with sufficient cover material, man power and suitable machinery are imperative. Fencing, permanent and temporary is important to control the spread of wind blown material. The greatest threat a badly run land-fill site poses is that of the pollution of water resources. Depending on the type of waste to be disposed of, the land-fill site must contain a drainage system to collect the leachate contained within the site, facilities to treat the leachate and to discharge of it thereof into a sewer. Alternatively the migration of the leachate must be anticipated and if the conditions are right,

the leachate can be allowed to be naturally broken down into a relatively harmless liquid before it enters the water system.

(Illustration. Ref: 51).



The disposal of almost 190,000 tonnes of dilute sewage sludge and 500,000 tonnes of industrial waste at sea around Ireland is a problem of international concern. Today the pressure is on to reduce this number. International organisations are insisting on a

ban on dumping wastes at sea that can be more safely disposed of on land.

Because of the incredible expense of waste collection either by local authorities or by industry, as well as the expenses incurred in recycling, a newer and more appropriate step is now being researched and implemented both in industry and on the domestic front. It is the theory of 'source reduction'. (The advantages of source reduction are investigated further in Chapter 6 & 7). This preventive policy requires a new approach of clean or low waste technology in industry. This involves less wasteful processes and good house-keeping practices and materials substitution.

(* Statistics received from Ref: 29. pp: 1-4.)

Chapter 4: A Survey of Attitudes to the Environment.

'Environmental awareness' have become the 'buzz-words' of the 1990's, yet how environmentally aware are we?

In this chapter we examine a national survey of Irish attitudes towards the environment, which was carried out by the Department of the Environment during November/December of 1990 and February/March of 1991. (Ref: 26). In it, 2000 members of the general public, 350 farmers and 250 business managers were quizzed on the extent of their concerns about the environment.

Not surprisingly, a far higher percentage of the corporate sector, as opposed to the public sector, was not only environmentally aware, but considered the environment to be an 'immediate and urgent concern.'

48% of the corporate sector considered themselves very well informed about the environment, compared to only 9% of the general public. (26. pp: 5). The majority of the general public expressed concern about key issues directly affecting the environment. However, a large proportion of this group admitted confusion concerning less obvious issues, as well as alternative policies, practices and products.

On a global scale the main sources of concern regarding the environment were rubbish, pollution of the atmosphere, pollution of the rivers, pollution from factories and the pollution of the sea. On a local scale, The quality of drinking water and the

appearance and upkeep of local areas appeared in the top five sources of concern.

A large proportion of the general public said they were willing to do more to integrate good environmental practices into their lifestyles. Indeed some had already made considerable changes to their way of life, while more were just starting. Interestingly, the most significant difference between various groups was that between men and women. This was largely due to women being responsible for buying such products as environmentally friendly cleaners and detergents, toiletries and cosmetics. Of these products, ozone-friendly aerosols was top of the list, followed by food products without harmful additives and environmentally friendly toiletries. Some other positive environmental activities undertaken were buying recycled household paper, using a bottle bank, buying organic produce and returning cans for recycling. It is important to mention that one in five people said they chose certain products because the label or packaging said the product was 'green' or 'environmentally friendly.'

Outside of buying certain products, 69% of those interviewed in the survey said that they would be willig to seperate refuse into recyclable and non-recyclable material. 69% also said they would be willing to pay a deposit on returnable glass bottles. 46% would pay one pound extra in every twenty for food free of additives. 42% said they would pay one pound extra on each electricity bill to reduce acid rain and 47% would be willing to pay an extra penny in every pound on income tax for cleaning sewage discharge. Finally, 15% said they would pay the extra five hundred pounds to install catalytic convertors in their cars.(26.pp:13)

The general consensus, not only among the public sector, but also among the farmers and businesses alike, regarding offenders against the environment, was the full implementation of the 'polluter pays' principle. This would effectively transfer the expense of correcting pollution from the tax-payer to the offender.

The survey showed larger companies to have taken a number of initiatives concerning the environment, themselves. (We will examine this in more detail in chapter 8.). The same companies were in support of the need for tighter laws and stricter penalties, but recommended a series of tax incentives to induce other industries into conforming to environmental standards and policies.

Finally, 20% of the general public saw the environment as an area of job creation for the future, while only 12% of the corporate sector felt the same way. (This issue is examined further in chapter: 5).

Chapter 5: The business value of the Environment.

In a complete reversal of fortune the solutions implemented to tackle the escalating problems of waste disposal, have in turn developed into two flourishing industrial sectors. The collective market for environmental goods and environmental services, which in 1990 was estimated at $200 bn, is set to grow at a rate of 5.5% per annum, to achieve an estimated value of $300 bn by the year 2000. (14. pp:22).

Not surprisingly, the structure of output from environmental industries differs by region and is indicative of local environmental concerns and particularly, variations in environmental legislation. For example, in Europe, water-treatment equipment makes-up the largest part of the environmental goods sector. In the U.S. waste-water management services are presently the greatest concern and in Japan the development and production of equipment for the control of air pollution heads the agenda. (Interestingly, considering Japan's leading role in electronic engineering and manufacturing, its environmental services sector is surprisingly under-developed.)

On a world wide market basis, the environmental services industry is just emerging from its infancy and is set to become one of the growth industries of the 1990s. The Programme for Economic and Social Progress (PESP) states that the international environmental technology sector is forecast to grow at a rate of 7.5% per annum. (25. pp: 13).

In addition to the growth of primary services offered by the development of environmental technology, auxiliary services such as environmental auditing, risk management and product testing are expected to experience rapid growth.

Another area expected to have an impressive market growth is waste management. This is largely due to controls on waste disposal becoming more stringent, building opposition to direct land-filling without pre-treatment and a larger proportion of solid waste being recognised as hazardous.

Again, this produces a secondary market for the manufacture of equipment suitable for waste management, i.e. toxic waste handling equipment, equipment suitable for chemical and biological degradation processes, and incineration equipment.

On the other hand, with the production of recyclable products and packaging, there is now a market for equipment to recover and process recyclable materials, including compactors, bailing systems, shredders and conveyors, (which we examined in chapter: 1).

The diversity of the environment market and the many routes of access to the industry have resulted in a flourish of entrepreneurial ventures and start-ups, with smaller environmental firms ranging from high-technology suppliers of chemicals, instruments and consultancy services, to low-technology producers of recycling bins and suppliers of waste transportation services. Presently, 50% of the environment industry is controlled by a small number of large firms and the remaining 50% is controlled

by a large number of small firms. However, the rising expense of waste disposal is resulting in a series of mergers and acquisitions as rationalisations of both regional and product markets take place. (14. pp: 22).

The economic opportunities now available with the rapid expansion of the environment market include a considerable scope for job creation. The progressively stricter controls on environmental standards should stimulate additional employment in the areas of monitoring environmental controls, manufacturing environmental equipment , providing environmental services and producing environmentally friendly products.

Now more than ever there is an urgent need for a central governing body to monitor and control the production as well as the disposal of waste. This body would not only be sympathetic to the needs of the environment but also to the problems of industry. Such organisations are examined further in chapter 8.

Chapter 6: Germany's Example.

Germany's leading role with respect to European industry is easily validated. Its destruction during WW2, and its subsequent reconstruction, produced the determination and application of a nation which account for its success. Industrially, Germany has become the maternal figure to which the rest of Europe now turns to for example.

However, Germany's perceived response to Environmental pressures, particularly concerning waste disposal is somewhat mixed. According to Dr. Heinrich Von Lersner (see Appendix: (d)) Germany is probably the greatest exporter of wastes in Europe, even though in its Waste Disposal Act there is a sentence that stipulates that German waste, hazardous or otherwise, has to be disposed of on German soil. (This however, does not seem to apply to nuclear waste.)

'At the same time, there is no other State known in which technique and organisation of waste disposal has been developed to a higher degree than in Germany.'

(13.pp:211).

The adverse sides of the intensive industry in Germany are the residues and waste from the production and processes. Waste has now become the single greatest concern in Germany. Shaping the National Waste Program are the following factors:

1. The growing scarcity of disposal sites and facilities for both hazardous and domestic waste. Even the enforcement of the

most urgent planning procedures is becoming more and more difficult.

2. The sharpening of requirements on disposal technology, mean that disposal costs will escalate, in turn raising the pressure for export.

3. Opposition to the exportation of waste to other EEC community member states as well as international political opposition, is being felt already and is set to grow.

4.The archaic human aversion of the neighbours trash in our own garden has incited opposition to disposal facilities even to accommodate 'home-grown' waste. (13. pp: 212).

The developing German attitude to ecology is that there is almost nothing which is not both waste and raw material at the same time. Co-operation within the EEC member states concerning material and market supplies should be extended to the area of disposal, as long as each state assumes responsibility for its own waste and does not subject the people and environment of other nations to risks that that member state would not burden its own environment with.

As a result of public, governmental, and international outcry, the pressure is now on producers, traders and consumers to do everything that is possible to avoid and reduce waste. Germany is now in a position whereby the implementation of new disposal facilities by the Federal States and municipalities is only allowed if they can provide evidence that they have done everything, to reduce the amount and hazardous potential of the waste they are handling.

As far back as 1989 the Commission of the European Communities prioritised avoidance of waste by process and product modifications, over re-use and optimisation of disposal. Germany is now going a step further by avoiding waste not only through modifications of technology and products, but by simply discontinuing certain products or radically changing the thought process behind new products. BMW's 're-cyclable car has provided their engineers with the task not only of being concerned with the construction, but with the destruction of automobiles. (27. pp:16). The challenge facing them was and is to reduce the need to extract new raw materials from the earth, and to reduce the amount of material which must be disposed of.

> The problems of environmentally compatible waste management will stimulate technical innovation toward three directions. First toward avoiding substances or products which are difficult to dispose of. Second, connected to my first point, toward re-usable products, and third toward longer durability of products....
> ..... I am sure that the technique of avoiding wastes by re-using or also disposing of them has become today, already, one of the most important parts of international competition.
>
> (13. pp: 215).

The impressive strides that Germany is now taking, as in the new legislation concerning the mandatory taking back of packaging material, to safe-guard the environment, could however temporarily alienate Germany, until the rest of Europe is able and willing to catch up. (19B. pp: 15).

Chapter 7: European Legislation Concerning the Environment.

The term 'environment ' can be broken down into three categories. They are air, water and land resources (the source of all raw materials). Three out every four Europeans are concerned with the uneconomical and indifferent manner in which these three elements are treated. *

(Illustration. Ref: 53). The tall chimneys of power stations emit fumes and gases which can drift in the air above crop fields.

Pollution knows no boundaries. Emissions of sulphur dioxide from industrial chimney stacks in Britain can cause acid rain in the forests in Germany, one thousand Kilometres away. Because of this it is necessary for Europe to act as a single unit concerning environmental protection and control. In this manner the precautions taken by one country will not be made redundant by its neighbouring state.

The summit meeting of the Heads of State, in Paris,1972, put the environment above short-term political and economic considerations. However, its importance, concerning larger more lucrative, or supposedly political progressive issues, remained relatively insignificant. *

The first EEC programme on Action on the Environment implemented a 'Cure" policy from 1973 to 1983. All this policy did was to basically dress the wounds left by industry concerning smog, chemicals, residues, and water emissions. The 1973 directive also established the Wildlife and Habitat Act, allowing the nomination of certain areas of land and water to be protected as wildlife sanctuaries.

It wasn't until 1983 that the EEC adopted the more progressive "Preventive" policy. This stipulated that a full Environmental Impact Assessment (EIA) had to be carried out before a single sod was turned. Economic and physical development could no longer take place at the expense of the environment. Finally, in 1987, the full integration of the environment

was completed, when the environment was moved from the periphery to the centrefold of all EEC decision making. This means that today, the environment is the single highest priority in any EEC policy. *

Policies relating to agriculture, which had originally been carried out without proper planning and with little sensitivity to the environment, are now subject to more stringent analysis. Industry (which has long been seen to be incompatible with the nature) and its resulting waste, which will challenge technology in to the next century, now have to prove their worth. The hazardous effects of transport and its resulting noise pollution, means that a greater effort has to be made to balance the trade-off between transport and the environment.

Over one hundred detailed European Environmental directives have been introduced in Brussels. Some have been adapted by National Governments and implemented, in order to shape the environmental future of Europe in a positive fashion. However, even more have only been implemented in half measures. For instance, the European Communities (Waste) Regulations, 1979, implementing directive 75/442/EEC on waste, do not mention the obligations which this directive imposes on local and governmental bodies. These obligations include promoting the beneficial uses of wastes, carrying out periodic inspections of waste disposal facilities, ensuring respect for the 'polluter pays' principle, and forwarding situation reports to the Commission of the European Communities.

Similarly, the European Communities (toxic and dangerous) waste Regulations,1982, implementing EC directive 78/319/EEC, do not refer to the obligations for local and governmental bodies to take appropriate steps, as a matter of priority, to encourage the prevention of this waste, its processing and recycling, the extraction of raw materials and energy thereafter and any other process for its re-use. (30. pp: 102).

These shortcomings have been responsible for the majority of the environmental disasters in the last two decades. For example, the pollution of the rivers of Northern Europe could have been avoided, if the 1975 EEC directive on surface water had been implemented.*Similarly the escalating problems of smog in Milan could have been avoided if only one of the Five directives concerning air emissions had been acted upon.

The priority today is the strict implementation of policies concerning the environment. This responsibility does not lie squarely on the shoulders of the government and industry. Every single citizen has a role to play.

There are four channels through which the individual can participate.

They are:

1. Consumer Power.
2. Lobby Power.
3. Political Power.
4. Direct Citizen Action. *

Consumer Power:

Each consumer has the option to be 'environmentally Friendly' when they spend. This involves the purchasing of products for instance, that do not contain CFC's (chloroflourocarbons) or lead, and when the product is finished, disposing of the container or packaging in an 'environmentally-friendly' fashion.

Lobby Power:

The environment has many friends. In order to insure that EEC policy is being implemented at a local level, the European Parliament now acknowledges the ability of non-governmental organisations to bring cases before the European Court of Justice.

Political Power:

When voting for new local and governmental offices there is an option to chose candidates whose policies are concerned with the protection of the environment.

Direct Citizen Action:

If a direct violation of environmental laws is witnessed, a letter sent directly to the European Commission will be acknowledged and if the complaint is validated, acted upon. Cases of this kind have been known to reach the European Court of Justice.

In this chapter we have examined some of the political directives that have been passed to guide industry and the consumer. Too many of the mistakes that we have made concerning the environment are as a result of doing too little too late.

We will now, in chapter 8, examine how independent organisations are taking the initiative to spear-head the task of protecting the environment. We also look at an example of how particular industries are taking it upon themselves to introduce their own 'green' policies, and thus beating the 'environmental legislation clock'.

(* Information retrieved from Ref: 33).

Chapter 8: The 'Green' Movement.

The Green movement encompasses the consolidated efforts by environmentalists, some industrialists and some politicians to promote, implement, and adhere to policies and practices to correct and safeguard against the indiscriminate destruction of our environment.

Broadly, the green movement is about education. Its greatest task is to make the public at large aware of how we are living at the expense of the environment, and how, collectively, we need to change things for the better.

(Illustration. Ref: 48). Greenpeace, an environmental pressure group, aims to influence public and political opinion by non-violent campaigning. It has publicised environmental issues such as the pollution of the North Sea from sewage, and industrial and domestic waste.

For years the environmentalists were the proverbial 'thorn' in the side of industry. Obstruction and demonstration were typically, the two lines of attack used in defense of the environment. However, as long as the law overlooked the mess that industry left behind, then the effects of even the most impassioned demonstration remained insignificant. Today the emergence of environmental awareness has completely reversed the roles and it is those industries that are on the defense.

The single greatest influence on any industry is the consumer. Similarly, the single greatest influence on politics is the voter. It is in the consumer and the voter that the environmentalists have found allies. Through education, the consumer is learning to become selective about his or her choice of product, as is the voter about his or her choice of political policies. Environmental considerations are no longer being seen as optional extras in political or industrial policies, they are instead becoming prerequisites.

On the other hand, the combination of public awareness towards, and the selling power of, environmentally friendly products, practices and policies have become the incentives for their introduction and implementation. Indeed, some countries and their respective industries are not only conforming to existing environmental policies, but are anticipating them. (32B. pp: 31).

The environment benefits from this both directly and indirectly. As long as one country or industry is willing to take the lead, with respect to the environment, others will be willing to follow so as not to lose out either economically or politically.

Because of the broad spectrum of issues covered by the term 'environment', different organisations are responsible for individual issues.

In the United States the organisational structure of the green movement is made up of three governing bodies; they are, the National Recycling Coalition, the Recycling Advisory Council and the U.S. Environmental Protection Agency, who collectively direct nineteen other bodies acting on behalf of the individual needs for the environment. (Ref: 43).

> The National Recycling Coalition (NRC) created the Recycling Advisory Council (RAC) to build consensus and provide national leadership and coordinating on issues effecting recycling and resource management. The RAC is a reflection of the coalition itself, founded on the belief that all parties must work together to develop and implement lasting solutions to today's waste management problems. Established by the NRC in 1989, the RAC is partially funded by a three-year grant by the U.S. Environmental Protection Agency (EPA).
> (Ref: 43).

In Ireland the Environmental Protection Agency Bill, 1990, is aimed at the issue of a central governing body. The new Agency will attempt to bring greater efficiency to environmental decision making through an integrated system of control which it will operate. It will not only regulate those industries with significant polluting potential but will also prescribe and aid the implementation of new technology to appease the environmental requirements of other major industries and complex activities.

The next phase is the EEA, a European Environment Agency, to govern the member states of the European Community, and ultimately a WEA, World Environment Agency.

With the establishment of these organisations being slowed down by bureaucratic 'red tape', some industries have taken it upon themselves to set-up their own organisations.

In Britain, a broad cross section of British companies and trade groups has come together to promote environmental business management techniques and more importantly, achievable development initiatives. Technology, Research & Enterprise for the Environment (T.R.E.E.), which was set up in 1990, has already established partner organisations in Austria, Denmark, Germany, Israel, Sweden, Switzerland and South Africa. (Ref: 45).

The techniques and ethics of T.R.E.E. were first articulated in Germany by the organisation BAUM (German Environmental Organisation). BAUM was also set up at the initiative of industry in 1985. It was the first joint endeavour of industry to promote the development and implementation of environmental awareness in industrial management. (Ref: 37).

In certain cases individual types of industry have taken up the initiative to establish organisations to combine efforts on their respective environmental fronts. One such industry is foam manufacture, whose problems we already discussed in chapter 3. One of its two respective organisations is PURCC, Polyurethanes Recycle & Recovery Council. The central aim of the PURCC is to find commercially viable ways to recycle and recover materials and energy from 25% of all polyurethanes produced each year, in the U.S. by 1995.

The European counterpart of PURCC is EUROPUR, the European Association of Flexible Polyurethane Foam Blocks Manufacturers. The priorities of their waste management policies can be summed up as follows:

1. Redesign.
2. Reduce.
3. Reuse.
4. Recycle.
5. Recover Energy.
6. Reject. (Ref: 42).

By setting up and encouraging these organisations we are finally accepting the responsibility of the welfare of our environment. The problems relating to the environment can no longer be ignored and it is only through organised efforts that these problems can be resolved. However, the need for a central governing body to coalate the work of these individual organisations is still of paramount importance.

At the moment a product or material that can be legally described as recyclable in one location, may not be allowed to make the same claim in another. Until uniform guidelines are universally adopted by industry and generally understood by the public, confusion will persist.

Conclusions.

There is no question that both production and manufacturing industries have been largely responsible for the defilement of the environment. This has developed either directly through the irresponsible disposal of untreated solid, liquid or gaseous waste, or indirectly by the manufacturing of materials and products which deplete the Earth's resources or prove incompatible with the Earth's environment.

However, as we have seen, the weight of the blame cannot singularly lie on the shoulders of industry.

While the various regulations passed to implement waste directives meet and match EC requirements more or less to the letter, all regulations concerning the obligations of the respective European Departments of the Environment and local authorities, are remarkably reticent. Stricter penalties must not only be introduced but implemented where pollution occurs. Additionally, greater incentives must be used to encourage other industries to examine and alter if necessary, their waste disposal practices and considerations.

On the other hand, the initiative taken by various industries to protect the environment, is not to relieve politicians of their responsibility to ensure regular tightening up of legal limits. Neither does it relieve politicians of their responsibility to develop the framework and conditions of the market economy in such a way that maximising success in business is only possible by ensuring maximum environmental acceptability of products and services.

Regarding the public sector, it is mostly ignorance as opposed to indifference that has become the catalyst of the environmental time bomb that we are sitting on. As environmental awareness grows it becomes easier to redefine the values of our environment. However, as long as the public at large cannot understand the damaging effects of our disposable society then the same public sector cannot be persuaded to change their lifestyles accordingly.

As we mentioned in chapters 5 & 8 a central governing body to monitor and control the production and disposal of waste is imperative. In addition to these tasks, such a body would also have to monitor how effectively National and European legislation is implemented. Thirdly, such a body would be responsible for the setting-up of a 'research pool'. Such a pool would examine source reduction, or alternative material substitution, as well as investigate existing and alternative disposal methods, or even allocate problem-solving responsibilities to various countries according to its technological capacities.

In chapter 6 we looked at the lead that Germany is taking to combat its problems of waste disposal. From the surface Germany's proposed policies are truly impressive. However, there is serious concern as to the rate that Germany is trying to implement its new policies and whether Germany has in fact accounted for the scale of waste it is now planning to recycle and reprocess.

Because other EEC member states are not in a position, politically, economically and socially to follow Germany on its environmental campaign, barriers to trade that were from the outset of 1992 supposed to be harmonised away, are now being built even higher.

However, the positive repercussions from Germany's initiative are that the EEC has no other option now but to speed up its pace of environmental reforms. Similarly, Germany's initiative has generated a new interest in the environment both as a marketable product as well as an urgent concern.

The move to establish new organisations whose single priority is the environment, can only be positive. Economic, social and political prosperity has sacrificed the stability of our environment for so long that it is losing its diversity and richness. A change in the economic and individual 'needs' as opposed to 'wants' is the only way to prevent the eventual extinction of our environment.

There is no single answer to the problems of the state of our environment, the diversity of our lifestyles has provided us with a diversity of problems. One indefatigable fact is that the ultimate control of our waste and its effect on our environment can only be achieved if the symbiotic relationship of humanity and its environment, becomes the single and consolidated goal of every government, industry, man, woman and child of this planet.

Appendix

(a) Dunlop first discovered and developed the technology of a graphite containing foam in Herwin, South Wales, in 1988.

(b) Expanding foam is much the same as rising yeast. Before the introduction of the 'Berg process' gravity prevented expanding foam from achieving its maximum expansion capacity, thus increasing the density and reducing the quantity of the foam produced.

(c) Polymerisation is the chemical process in which relatively small molecules combine to produce a very large chainlike or network molecule. In the case of foam manufacture, it is the process in which various foam 'ingredients' chemically combine and expand, similar to the reaction of yeast to warm moist air.

(d).Dr. Heinrich Von Lersner, President of the Federal Environmental Agency, Berlin.

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