Developing
A National Waste Strategy

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EXECUTIVE SUMMARY

Managing waste from cradle to grave, in all its forms from municipal to hazardous waste and engineering the solutions to the problems it can cause, is complex enough without the added factors of multiple stakeholder involvement, financial, political, social and behavioural issues.

A national strategy for waste management needs to address all of these issues through a series of policy objectives, aims and targets.

Most nations have established environmental policies in the area of sustainable development, energy production, transport, climate change and regional development. Waste management policies and strategies should be produced in parallel with these more established initiatives and possibly incorporating other concepts such as the proximity principle, producer responsibility and decoupling waste and economic growth.

The paper considers the step process in developing the strategy, building in a review system to ensure that the document reacts organically to the changing nature of legislation, practice and public understanding and involvement.

The first stage is to understand the size and scale of the problem. We need to understand the legislation defining the waste as well as having accurate data on all the waste streams present and into the foreseeable future. The data should be accurate and as comprehensive as it can be. We should be asking questions such as what changes in commerce in industry will do to certain waste streams and is it sustainable to carry on with some practices.

The decision-making framework is key and areas that require investigation include the robustness of the planning and development system, the rationale for decision-making on life cycle assessment and best practicable environmental option. More fundamental
issues such as will the licensing and regulation framework stand up to future scrutiny will also have a bearing on the strategy.

No strategy should be produced in isolation as it will not be successfully implemented unless it has the buy-in and support of the stakeholders. For that reason one of the early steps is to identify the stakeholders and involve them. They will be a diverse group including industry, government, public and environmental bodies but all will have a contribution to make.

The main body of the strategy document should address the particular waste streams and the options for their treatment and disposal. In the UK the focus has been on municipal solid waste however this should be widened to include the problematic or widely occurring wastes, including those that may at present fall outside of the definition.

An analysis of the options for waste treatment and disposal should bring together the future demand for facilities in terms of production and issues such as cost, location and environmental impact. All strategies should be explicit in identifying a policy to tackle waste growth and to maximising the amount of value recovered from waste through increased recycling, composting and energy recovery.

The relevance of elements of the strategy may diminish over time as particular objectives are met or overtaken by time, therefore a review process should be built in from the outset.

INTRODUCTION

There are many good reasons for developing a National Waste Strategy. One of the main drivers in Europe is the requirement within the Framework Directive on Waste and associated directives such as the Hazardous Waste Directive. Leaving aside this statutory responsibility a strategy will set out a long term vision for sustainable waste management and provide a framework for this to be implemented. It will offer a strategic overview for waste policy, outline the scale of the responsibilities and opportunities available and the tools, skills and resources that can be utilised to address the challenge and achieve the targets.

As far as the UK is concerned the national waste strategies have been developed within the context of the UK government sustainable development strategy. “A better quality of life” which has four main principles:

- Effective protection of the environment
- Prudent use of natural resources
- Social progress which meets the needs of everyone
- Maintenance of high and stable levels of economic growth and employment

All governments should see the effective protection of the environment as a priority and should have established systems in place to ensure that waste is managed responsible with the minimum risk to human health and the environment. Environmental impacts from waste generated can arise throughout the waste stream. We should strive to keep standards of environmental performance under review and to encourage reduction in waste generation through better product design and material use.

Effective implementation of sustainable development initiatives tells us that we cannot continue to afford to waste natural resources which are in limited quantities in the
environment. Waste management must be seen as an integral part of overall resource management and better use of resources includes waste reduction, reuse recycling, composting and energy recovery with a concurrent reduction in landfill.

Social factors have an impact on the type and amount of waste we produce, our purchasing patterns are dictated to some extent by our economic capacity and as a consequence waste production is inextricably linked with economic growth. Whilst there is evidence that this link can and will be broken the question remains whether it be in the foreseeable future?

As far as the UK is concerned the main objectives of developing a national waste strategy were to reduce the amount of waste taken to landfill, reduce the growth in waste production, realise the value of as much of the waste stream as possible and to set challenging but achievable targets for the above.

**SIZE AND SCALE**

The first stage in developing the strategy is to understand the size and scale of the issue. The parameters under consideration will include the legislative environment, the wastes themselves in terms of their quality (definitions) and quantity (the type and amount of waste which is produced).

As far as the legal framework is concerned this includes International Law and in the European context this will include European Union legislation. Generally, International and EU legislation will be implemented through national legislation. Similarly there are wider legislative considerations than waste and the environment though these may not be the principal drivers. Legislation of relevance will include transport, finance, planning and development control, public health and energy which may not, in the first instance, be viewed as having a direct impact on waste strategies.

One of the key issues in waste legislation will be the legal definition of waste. As far as the UK is concerned the definition comes from the Framework Directive on Waste, however, there are many statutory and non statutory definitions of waste which complicate this issue. For example, in the UK historically waste from the household has been termed domestic waste both in legislation and in common parlance. This waste then became known as household waste through the Environmental Protection Act 1990 and is further defined as municipal waste within the Waste Framework and related Directives from the EU. Similarly some commercial waste from premises such as shops and offices which is of a similar nature to household waste, and is generally collected in the same way as other municipal waste, is included in the definition.

Some wastes will always be the subject of some conjecture for example, organic waste from the agricultural industry when re-applied to land could strictly speaking be defined as waste but as it is part of an agricultural practice and of benefit to the land we need to ask should it be termed waste? Similarly some materials from mines and quarries and the scrap metal industry have been the subject of case law to establish their precise position in the waste stream. Many would claim that they are a valuable secondary resource which is already a useful part of the chain of utility. Whatever the legal definition or description of waste it is essential that accurate data on the amount and type of waste generated is known prior to the development of any national waste strategy. Generally we are aware of the contents of the average household waste bin, nevertheless this can change dramatically depending on social and economic status, geographic location, household
size, method of storage, provision of recycling facilities, type of household and there are seasonal variations. Table 1 shows the variation in municipal waste production from a number of countries and Table 2 the amount of waste produced from the various industry sectors in the UK.

**TABLE 1**

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>KG PER CAPITA PER YEAR</th>
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<tbody>
<tr>
<td>Denmark</td>
<td>700</td>
</tr>
<tr>
<td>Germany</td>
<td>600</td>
</tr>
<tr>
<td>Spain</td>
<td>500</td>
</tr>
<tr>
<td>France</td>
<td>450</td>
</tr>
<tr>
<td>Italy</td>
<td>400</td>
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<td>Hungary</td>
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<tr>
<td>Netherlands</td>
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<tr>
<td>Austria</td>
<td>200</td>
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<tr>
<td>Sweden</td>
<td>150</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>100</td>
</tr>
<tr>
<td>Turkey</td>
<td>80</td>
</tr>
<tr>
<td>United States</td>
<td>70</td>
</tr>
<tr>
<td>Japan</td>
<td>60</td>
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</tbody>
</table>

**Table 2**

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>ARISINGS (PER TONNE)</th>
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</thead>
<tbody>
<tr>
<td>AGRICULTURE</td>
<td>90</td>
</tr>
<tr>
<td>MINERS</td>
<td>80</td>
</tr>
<tr>
<td>DREDGED MATERIAL</td>
<td>70</td>
</tr>
<tr>
<td>MUNICIPAL SOLID WASTE</td>
<td>60</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>30</td>
</tr>
<tr>
<td>INDUSTRIAL</td>
<td>50</td>
</tr>
<tr>
<td>CONSTRUCTION &amp; DEMOLITION</td>
<td>110</td>
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</tbody>
</table>
THE DECISION MAKING FRAMEWORK

In order to design and deliver a truly integrated waste management strategy there are a number of key framework criteria that should be considered. The legal structure, the quantity and type of waste were mentioned earlier. Equally important are the various existing frameworks and principles including the planning structure, the regulatory framework and principles including the proximity principle, best practicable environmental option, producer responsibility, the waste hierarchy, the proximity principle and life cycle assessment.

For strategic waste policy to work effectively it must be developed against a backdrop of an efficient planning structure. For the Strategy to operate effectively regional and local frameworks need to be in place for the spatial development which addresses the range of issues including economic, social, environmental and supports the aims of the waste management strategy. Such development plans in a waste regime should inform the location of waste management facilities to support the strategy and deliver on targets for waste management within the period of the plan.

The licensing and regulation of waste management facilities support the strategy. The licensing system for those facilities is separate from but complimentary to the development planning system. The planning system addresses the acceptability of a proposed development in terms of the use of the land. The license on the other hand and the conditions attached to it ensure the waste operation which authorise it is carried out in a way that protects the environment and human health.

The proximity principle is based on the premise that waste should generally be disposed of at or as near to its place of origin as possible. This would ensure that wastes are not exported, there is an element of responsibility taken by those who produce the waste in the first place. Taken at face value the proximity principle does not consider the externalities of exporting waste, transportation costs, transferred pollution or economies of scale.

The best practicable environmental option (BPEO) is a tool to help us in the decision making process regarding sustainability and to some extent the proximity principle. It enables us to consider the merits of various waste management options in particular circumstances. It has been defined as the outcome of a systematic and consultative decision making procedure which emphasises the protection and conservation of the environment across land, air and water. The BPEO procedure establishes through a given set of objectives, the option that provides the most benefits and the least damage to the environment as a whole, an acceptable cost in the long term as well as in the short term. BPEO also encourages considering international strategic obligations, sustainable development initiatives and what is environmentally, economically and socially acceptable.
The waste hierarchy is a theoretical framework to be used as a guide for ranking the waste management options being considered as part of the BPEO assessment. The waste hierarchy is commonly shown as a pyramid structure with reduce, reuse and recycling at the top and landfill and final disposal at the bottom. It is a theoretical framework in that not all waste can be reused or recycled or composted therefore it should be used as a principle to consider these options first before consigning any waste initially to landfill or towards options towards the bottom of the hierarchy. BPEO enables us to factor in more than just the financial costs of waste management alternatives, environmental, social and economic issues can also be included, as well as the impact of externalities such as transportation, use of finite resources etc.

To assess fully this impact outside of the waste management system life cycle assessment has been developed, this enables us to look at those externalities and find an overall optimum environmental solution for managing waste without the risk that our decision may result in the worsening of the overall impact, therefore life cycle assessment is a systematic verification and evaluation of all the environmental benefits. These benefits result both directly and indirectly from product or function throughout its entire life from extraction of raw materials to its eventual disposal and incorporation into the environment, a cradle to grave assessment.

The fact that the planning licensing and regulatory regimes need to be considered along with important principles and philosophies such as BPEO and the waste hierarchy indicate not only the complex nature of the decisions that have to be made but also the interaction of the many issues, none of which can be seen or considered in isolation.

**TARGET SETTING**

To be effective the strategy needs to have a positive vision and set real objectives and targets which can be measured at intervals throughout the period of the strategy. It is
important that the targets are measurable and it may be necessary to make adjustments to them to reflect changing circumstances over the period. The strategy should seek to contain generic objectives which are; applicable to sectors of the industry, to a number of waste streams and involve more than one stakeholder. Some of those are listed below:

- Reduce the amount of waste produced.
- Maximise reuse, recycling and recovery of waste materials.
- Manage waste better to ensure a minimum impact on the environment and public health.
- Increase the supply of waste materials for composting, for use as a fuel and for secondary materials.
- Reduce the hazardousness of all wastes to improve its management.
- Promote more sustainable practices in resource consumption.
- Support industry in reducing resource use.
- Encourage the public to be more aware and involved in sustainable practices.
- Encompass all waste streams not only municipal waste.
- Encourage secondary resource use.
- Develop markets for recyclable materials

DRIVERS FOR CHANGE

There are a number of drivers that must be borne in mind when designing the strategy, these will influence the specific objectives and targets. The mix of these drivers or their relative priority will depend on the particular circumstances in each country, the structure of the waste management industry and the priorities within the objectives. Some of those drivers are considered here.

Fiscal instruments such as taxation can be a very effective driver in certain circumstances. Many European countries for example, have found that landfill tax has proven to be effective in diverting waste away from landfill towards other technologies, particularly other options towards the top of the waste hierarchy. It also has the effect of persuading waste producers to considering waste collection and disposal charges among their business decision making criteria, along with raw materials, energy, employment etc. Direct taxation of primary resources or carbon taxes on outputs are blunt but effective instruments. In order for these to be truly environmental beneficial and not perceived as simple revenue generators a ‘green’ alternative should be on offer. The UK is the first European country to introduce a system of tradable permits to encourage local authorities to limit the amounts of waste that can be sent to landfill. These permits benefit those authorities that have in place waste reduction methodologies and also alternative technologies for treating and disposing of wastes. Those in credit will seek to trade their surplus permits to the local authorities that have not implemented alternative schemes to landfill.

There is a subtle difference between the separation and collection of recyclable materials and the actual recycling of such. No material can be said to be effectively recycled until it is returned to use, therefore the establishment of sustainable markets for recyclable materials is essential. Direct intervention or financial encouragement can achieve this in the short term but this is not likely to be sustainable.

There is little likelihood of any targets within the waste strategy being achieved unless there is a degree of involvement from the various stakeholders. As far as municipal waste is concerned unless the public are aware and involved then the re-use, recycling and
reduce options towards the top of the hierarchy will not be achieved. Governments should look at a significant public education programme to encourage householders to base their purchasing decisions on environmental as well as financial reasoning. Given the right facilities and opportunities householders will recycle their waste. If this is coupled with a direct charging facility for municipal waste collection then waste outputs can be significantly reduced and recycling targets are more likely to be met.

STAKEHOLDER INVOLVEMENT

In order to develop and deliver an effective waste management strategy there are many sectors and groups which must be involved each with their own role and responsibility. They must contribute both individually and collectively.

Whilst the Government department responsible for waste and environment issues may be the author of the strategy, it requires buy-in from all sectors including the regulation agencies, the waste producers in commerce and industry and householders. Each one of us has an effect on the type and amount of wastes produced not only in our day to day activities but also in our commercial purchasing decisions.

Local authorities and municipalities have responsibilities for the collection, transport and disposal of municipal and other wastes, they have a significant role to play as does the community sector and the waste industry itself which is responsible for providing the facilities and services. A good authority will combine their strategic responsibilities for recycling and composting with a key role in raising public awareness and providing opportunities for householders and others to minimise their waste.

The national government have a number of roles to play to establish more sustainable waste management. Their principal role is introducing, monitoring and amending legislative and economic instruments which will result in more sustainable management of waste. They also have a role in coordination and encouragement for action across the industry and community through raising awareness, encouraging other stakeholders to be involved, managing partnership and lastly to take a proactive role in managing their own waste sustainably through implementing waste minimisation initiatives and green purchasing policies etc.

The regulating agency’s role is to regulate and monitor waste activities further down the chain from waste reduction, recycling and re-use. Their role is to protect the environment and human health and their more proactive role in promoting waste reduction, best technologies, gathering data and information which can be used by themselves and others in defining policies and strategies and implementing them.

Commerce and industry by their very nature will be waste producers, no matter how efficient the industrial process it will consume resources and produce waste materials. An efficient business will seek to reduce resource use to the absolute minimum without compromising the ability to produce the product, it makes good economic sense to reduce waste treatment and disposal costs. Business’s are encouraged to do this not only through bottom line economics but also it is in their best interests to promote themselves as being environmentally friendly or ‘green’ manufacturers in that they reduce resource use and waste production.
The community sector can undertake a very crucial and similar role to the municipalities in raising awareness and of collecting waste recyclables but in a less formal and certainly less statutory manner than the local authority. Community based initiatives are often more successful in persuading individuals through cooperatives and non profit organisation to take part in recycling programmes.

WASTE STREAMS

A sustainable waste management strategy can be as complex and as wide ranging as is appropriate for the circumstances. The minimum waste streams which should be considered are household/municipal wastes, industrial and commercial wastes, construction & demolition waste, agricultural and hazardous. Other waste streams which are subject to existing or forthcoming legislation (in Europe) and would benefit from being included; batteries, clinical waste, electrical and electronic equipment, end of life vehicles, oils, ozone depleting substances, contaminated soils and tyres.

Each of these waste streams should be considered individually because of the nature of the waste and in some cases the quantity of the waste as a proportion of the whole. They should also be considered in totality as many of these wastes could fit into more than one category and policies for storage, treatment, and disposal are common to more than one. What is essential across the gamut of wastes is that there are both firm estimates for the quantities in each of the sectors and existing treatment and disposal routes are known. Changes in environmental legislation, technical practice, policy direction, public opinion or political will may affect not only the quantity of waste concerned but also its definition or the acceptability of treatment methods. Many of the waste streams mentioned above are capable of being returned through the chain of utility into a useful product either through re-use or recycling. Legislation often ensures that these remain defined as waste, however there is a very positive and ongoing procedures for re-use of many of these materials such as construction demolition waste some agricultural wastes, glass, wood, paper and many others.

WASTE MANAGEMENT OPTIONS

The waste hierarchy is the initial point of contact for considering waste management options for most, if not all, waste streams. The hierarchy presents a preferential scale for consideration of the treatment of waste, the cascading theory of the hierarchy is that reduction of waste should always be the first opportunity, if that is not possible then recovery, recycling and various treatment technologies should be employed. Those treatments that utilise the energy product are preferable to straight disposal.

Sustainable policies and strategies from government, business and industry will always consider waste reduction first and indeed waste reduction is unique in that it is a consideration prior to the use of resources rather than post production of waste. Successful business decisions will involve employing the best use of all resources and thereby the reduction of the waste product. It has been estimated that regardless of the sector, for every one tonne of product ten tonnes of resources are utilised, this is hugely wasteful even given the secondary uses of some of those resources.
It is often thought that re-use has had its day and whilst we were more effective re-users in the past it still has a role to play. Returnable drinks containers, retreaded tyres and rechargeable batteries are good examples of continuing re-use initiatives. Refurbishment of white goods and electrical items occurs and research suggests that 80% of people in the UK are re-users to some extent.

Recycling is beneficial in terms of reduced material inputs, energy savings reduced emissions to land and air and promotion of public awareness but is dependent on an effective and comprehensive collection system, adequate reprocessing facilities and market demand for the end product.

Over half of all municipal waste production is biodegradable and generally suitable for composting. This simple statistic indicates the important role that composting will play in any strategy for waste management. There are good examples of home, centralised, community and large scale industrial composting. Each has its place and may utilise differing inputs and produce soil conditioner of varying quality it does have the value of using a waste material positively.

TABLE 3

Waste has an intrinsic energy value and its value as a resource and contributor to energy policy should not be overlooked. Many countries have a positive attitude to the role of energy from waste in an integrated waste strategy. Waste incineration plants which are simply disposal technologies are a thing of the past for all but hazardous wastes. Utilising the energy product from thermally treating waste either through electricity generation or heat provision locally is well established across the globe. What is becoming important is
the combination of a successful recycling policy which removes as much of the material as possible followed by thermally treating the residue and using the heat or energy produced.

The final resting place for waste materials after all of the options towards the top of the hierarchy have been exhausted will be landfill. Whilst many National Waste Strategies of the past were founded on, and exclusively relied upon landfill for all waste treatment and disposal, we are now better informed and other technologies have taken over. There is a strong argument that landfill will always play a part and that is true until zero waste is a reality. However its relative importance will reduce as we become more skilled at waste avoidance re-use and recycling as well as developing other treatment methods that use the waste as a resource.

**MONITORING AND REVIEW**

The strategy may well be developed and implemented at a point in time and many of the targets and objectives will reflect the policies and drivers of the day, however it is the start not the end of the process. Monitoring the implementation and achievement or otherwise of targets is important as is the consideration of the review. Reviews should take place at a specified time period (perhaps at 5 or 10 year intervals) when progress towards goals are reviewed to ensure that the course is a correct one to meet obligations and the goals themselves are realistic. The review will take into account costs, waste growth, new data, experience and any new vision. It is suggested that the review or monitoring group includes stakeholders as well as those tasked with meeting the objectives.

**CONCLUSIONS**

Waste management is often viewed by those outside of the industry (and by some inside) as a straightforward process of collecting, transporting and either recycling or disposing of a mix of materials, would that it was. The straightforwardness is complicated by financial, political, resource, scale, legislative and community issues. Consequently a strategy to deal with all of these issues must be similarly complex. The real skill comes in unravelling the complexity such that the strategy is achievable and fulfils the multiple objectives of the stakeholders, legislation, markets and resources within timescales and budgets.

Many strategies concentrate on municipal waste because of statutory responsibilities but the forward thinking ones will include all waste streams because of economies of scale, similarities between waste streams and the need to look beyond what we have to do, to what we can do in terms of utilising waste as a resource and meeting our sustainability challenge.

**ACKNOWLEDGEMENTS**

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REFERENCES


