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Industry drivers

I am worried about the direction in which the recycling industry is heading. We know waste will never disappear indeed it will only get worse or from another perspective will, for the foreseeable future, be in great demand. So inevitably we have to have rules and regulations about how to tackle it in the best interests of the environment, the economy and even our health. Waste is a valuable raw material which we should not squander but it can also be hazardous; the politicians and the lawmakers have had to intervene in this dilemma to provide some workable framework. Unfortunately there is no general agreement over such legislation, not even about the most basic definitions of 'when waste ceases to be waste', which is known as End of Waste legislation. Furthermore every nation rightly wants to protect its own interests and those interests range from doing the very best they can for the national environment aiming for the zero waste dream to being quite happy to profit from unscrupulous operators importing the most dangerous waste regardless of the impact on their citizens.

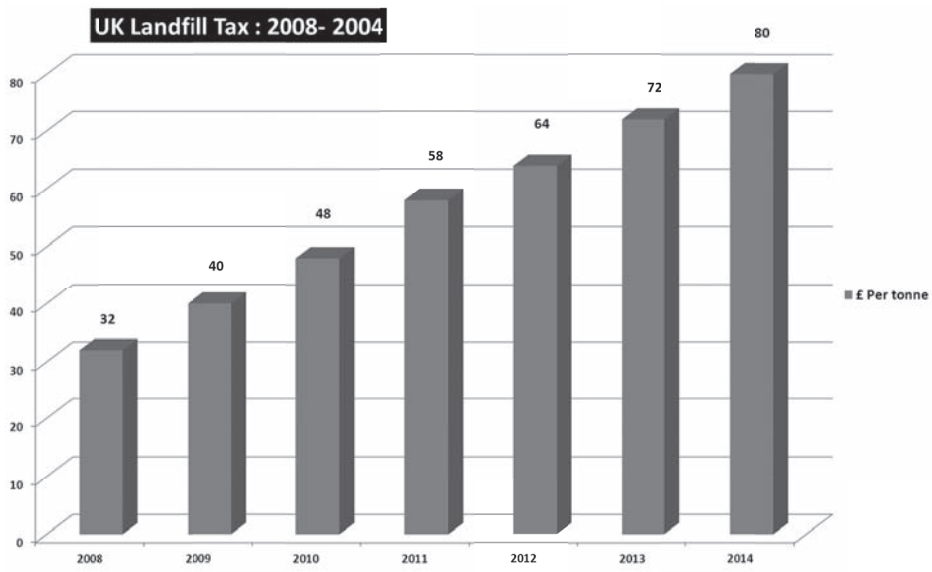
The drivers which propel the recycling industry are regulatory, industry, supply, market and, overshadowing them all, the concern about the depletion of our finite resources.

Regulatory. The most obvious regulation is the landfill tax which in essence is a tax on the disposal of waste designed to encourage waste producers to find alternative methods of disposing of waste such as recycling or composting. When the community waste collection programmes started, more and more waste was collected and it had to be treated; in the early 1980s we found ourselves facing mountains of waste paper. In Germany when they introduced regulatory controls they launched what was called the Green Dot Programme – the 'Grüner Punkt' in the 1990s. It was binding on all businesses that if they used packaging, they were responsible for recovering their own packaging. Similar systems were soon rolled out in other European countries.

Landfill tax applies to all waste disposed of in a landfill unless the waste is specifically exempt. The aim is to break the link between economic growth and waste growth so that most products should be either reused or their materials recycled. Failing that energy should be recovered from other wastes where possible which ideally leaves a small amount of residual material for landfill. This preference order of waste treatment has been labelled the waste hierarchy.

The various laws and directives have proved effective. In the UK for example the proportion of waste deposited onto/into land decreased by 11 per cent between 2004 and 2008 (from 171 million tonnes to 152 million tonnes). In contrast, the quantity of waste recovered of all grades has increased by more than 50 per cent, from 95 million tonnes in 2004 to 142 million tonnes in 2008. The aim of course is to do better; the revised EU Waste Framework Directive sets a recycling target of 50 per cent for household waste by 2020. In comparison, Germany already recycles over 70 per cent of its household waste. And it is largely the landfill tax which is driving this change. In the UK it was set to increase from £72 per tonne in 2013 to £80 per tonne in 2014.

Figure 4 UK landfill tax, 2008–2014 (£ per tonne)



The landfill tax had to be increased to provide a disincentive for the prevailing habit of dumping everything in a hole. As a result people started realising that it cost too much to dispose of their waste in the ground, which helped promote greater recycling, which is where the recycling industry comes into the picture;

sorting the waste paper, the organic waste, the tins, the plastic and the glass separately so everyone is able to get value from waste that would otherwise have been lost forever in a landfill. If *high-density polyethylene* (HDPE) plastic milk containers were not recycled then the price of virgin HDPE would become so high that the cost of milk would rise or we would soon have to buy our milk in some other form of cheaper containers.

Recycling makes economic sense: we are able to buy products more cheaply, we are extending the shelf life of finite resources and we are reducing the emissions of greenhouse gas; in short there are multiple benefits beyond the landfill issue.

Figure 5 Timeline of significant regulatory events (list not exhaustive)

Industry. As the recycling industry develops to meet the new laws a number of different systems have been introduced to collect and treat waste including drop-off centres, buy-back centres and kerbside collections and within those systems there will be mixed waste collection – everything into one bin, co-mingled – a separation of dry and wet/food waste, and full separation. To meet recycling targets in the UK, local authorities have turned to mixed and co-mingled waste collection methodologies which require the use of materials recovery facilities (MRFs). This has put pressure on the current MRF capacity. Given the UK's high kerbside recycling rates, the nationwide MRF recycling capacity (in 2006 estimated at 2.5 million tonnes per annum representing the combined tonnage of 82 facilities) will soon be filled because of significant growth in the collection of dry recyclables, driven by changes in collection trends and increased consumer participation in kerbside schemes. Unfortunately it is not just the capacity but the available technology in these MRFs which is an issue and herein lies the problem which is facing many countries – vast quantities of waste are being recycled and not all of it can find a market. We will return to this later in the chapter.

Supply. The lack and cost of finite virgin resources means the only way to fulfil our production needs is to recycle our waste or consume those precious

resources. It is generally acknowledged that consuming finite resources which are limited is destructive to our environment while recycling is more eco-friendly as well as being cheaper. It takes up to 24 trees to produce 1 tonne of paper using the Kraft chemical pulping process[35] and recycling 1 tonne of paper saves 2 tonnes of wood. WWF advocates zero net deforestation and forest degradation (ZNDD) by 2020 as a target that reflects the scale and urgency with which threats to the world's forests and climate need to be tackled.

It has been estimated that recycling half the world's paper would avoid the harvesting of 20 million acres (81,000 km^2) of forestland. While forestry statistics vary widely, there is consensus that consumption of paper has grown 400 per cent in the last 40 years. In 2007, it was reported that nearly four billion trees worldwide are cut down each year for paper, representing about 35 per cent of all harvested trees at the time.

If we didn't recycle then the cost of paper would be higher than current prices. If we didn't recycle the cost of the Coca-Cola we are drinking might be more because all the aluminium would have to come from bauxite. If we didn't recycle, the long-term supply of bauxite to make aluminium, the long-term supply of pulp to make paper, the long-term supply of iron ore to make steel and iron would probably have a limited shelf life. We have to extend the life of all those finite resources; therefore recycling is a necessity – an economic necessity and environmental necessity not simply an argument to cut down on landfill.

Running out of natural resources is not an idle threat. In China the National Development Reform Commission has officially designated 69 cities as being resource-exhausted; cities like Gejiu in Southwest China's Yunnan province, site of 24 per cent of the world's tin deposits first discovered during the Eastern Han Dynasty (AD 25–220). No more. The last 200,000 tonnes of tin deposits are forecast to run out in 20 years at the most. Continuous mining has not only plundered the supply but caused metal pollution and desertification. But the authorities are now fighting back. They have poured in state aid and through recycling turned the iron waste into an annual $654 million industry.[36]

Market. Waste is an internationally traded commodity and paper heads the list. Pulp and paper can be traded by global derivatives brokerage firms offering both over-the-counter (OTC) and exchange-traded transaction execution future listed on the Chicago Mercantile Exchange (CME).

By its nature only a fraction of the consumed paper material is recycled which, together with increased demand, implies that the need for recyclate material is always greater than the global supply. As a result, waste has become

35 A process that converts wood into wood pulp by treating the wood with a mixture of sodium hydroxide and sodium sulphide

36 *China Daily*/*Daily Telegraph* 23 October 2013

an international tradable commodity. For example, recycled white letter paper traded at £120–140 per tonne in January 2009, versus £160–170 per tonne in January 2010, and £240–260 per tonne in January 2011. This price trend is consistent with other types of recycled paper.

UK exports of recovered fibre have grown rapidly in recent years. The most rapid growth was in exports to Asia, particularly China, which grew from almost zero in 2000 to become the destination of 60 per cent of the UK's recovered fibre export in 2013. The export trend is expected to persist over the years as the prices offered by international mills justify the logistics cost. But the market is getting tougher because it is becoming more selective and this is the nub of the dilemma the world is facing – the balance between the economics of recycling and the pursuit of recycling driven by regulation as an end in itself through our desire to protect the environment and the planet's finite resources.

Governments set annual targets and every community collection programme is driven to achieve those targets. To reinforce them we have increasing landfill charges, but a question we have to ask is: how do these regulations impact on the countryside which may be sparsely populated? It does not become economically friendly for a waste management company to operate on that basis. In London, Paris or New York all the big companies are more than happy to collect but in other less densely populated areas obviously there is much less waste to collect and the economics of collection for a private company are not favourable. Some legislation from Brussels will be economically challenging. The EU Waste Framework Directive says that: from 1 January 2015, waste collection authorities must collect waste paper, metal, plastic and glass separately. It also imposes a duty on waste collection authorities, from that date, when making arrangements for the collection of such waste, to ensure that those arrangements are by way of separate collection.

The reason I mention this very specific example of collections in rural parts is that it is clear to me that different problems, locations and situations surely require different recycling solutions, and regulatory drivers are forcing various regions to promote unrealistic methodologies demanding multiple bins resulting in different collection dates. Where the population is small, producing say 300–400 kilos per person per year, it may make more economic sense for those areas to go to landfill or incineration. The conflict is economics versus environmental ideals.

In France and Sweden for example there is a market for 'environmentally friendly' wood chips for burning. One producer I spoke to said that the wood chips cost more than the coal but people still burn the wood chips because they argue it is more environmentally friendly. There is a danger that we go to great lengths to prove the environmental benefits of some recycling rather

than consider the economics. Recycling is necessary but we must not take the restricted view that everything must be recycled without proper consideration of the economics.

There is also the very specific problem for Europe as new member nations join the union, many of which have variable standards of waste collection and recycling tending in large part to rely on landfill alone. The Environmental Services Association (ESA) was quoted as saying that given the disparity in performance among current Member States, it would not be advisable to raise significantly existing targets.[37]

Recycling has got to be talked about alongside climate change. Recycling is such an important element and yet in some parts of the world we haven't even started recycling.

It must make more sense to focus our attention and energies on areas where there is mass consumption and no recycling rather than trying to hit zero waste targets in places like Switzerland where the cost of recovering that last tonne is too expensive to achieve. It is possible to go up to a certain level of recovering recycled waste, but thereafter every additional tonne and every additional percentage is not economically viable and yet we seem determined, even compelled by law, to try. Germany recycles about 74 per cent but for the country to reach 75 per cent would be extremely difficult. It would be easy to slip down to 72 per cent but trying to reach more than 75 per cent would not make economic sense.

The price that we get for a tonne of the recyclable material that we generate has got to take into account, along with the cost of collecting the material, the cost of bringing the material back to the sorting plant, the cost of sorting and baling it and the cost of trucking or shipping it to the ultimate reprocessor which could be in the UK, China or anywhere in Asia. Returning to my example of the sparsely populated area, if volume collected per week is only 10 tonnes it doesn't make sense to insist on elaborate recycling programmes if the financial and environmental expenditure exceeds the small profit margin the waste management company can make.

This is what has been dubbed 'Wastenomics'. We all acknowledge the importance of recycling but it should not be pursued with a missionary zeal which ignores basic economics, recycling for the sake of recycling, producing a product that cannot sustain such expenditure. I repeat the amount of money and energy we expend to achieve that last percentage of recycling can be saved and used to promote recycling in regions of the world where recycling is not even being looked at. To go from 0 to 50 per cent is much easier, 50–75 per cent is more difficult but 75–100 per cent is very difficult. We seem to be committed

37 Resource Association 10 September 2013

to a race in Europe to move from 75 to 100 per cent and the cost of moving into that last quartile is increasing rapidly.

There are consequences as recyclers calculate what can and cannot be afforded. For some sectors it is going to mean painful consolidation as Björn Grufman, BIR's President, explains based on his long experience of scrap metal recycling in Northern Europe. He warns some companies will not survive:

> With more than 30 years in the metal industry and mainly in the recycling sector, people may be surprised when I say that I have never before experienced such a dramatic reduction in availability of scrap. The financial crisis and the fast expansion of the product producing industry in the Far East have made the European industry experience a large over capacity. The necessary reduction in industrial production has also naturally reduced the availability of scrap metal.
>
> The lack of material has also resulted in margins being reduced. The obvious result of this reduction in both volumes and margins are of course very negative for the scrap industry. For many of us it is a question of survival.
>
> However, I remain an optimist. I believe the scrap industry in northern Europe has a bright future. As soon we have adapted to this new situation and we have made the necessary reductions which will inevitably mean the merger of several companies we will be able to develop the metal scrap industry with new ambition to serve all our customers, and enjoy a new, brighter future. I have no doubt that our industry has all advantages that will be important in securing that future.

We have experienced an extraordinary growth in waste collection which has been both a blessing in terms of the finite resources saved but a curse in handling capacity. In Europe we were not able to use all this material so it had to be exported outside Europe. Similarly in the UK and elsewhere new regulatory controls resulted in even more waste coming in which in turn led to the expansion of MRFs to create recycled products out of the community collection programme which in the case of paper could be defined as a usable product by a paper mill.

But the world is changing and over the years those paper mills are finding that the cost of production to them, which they quantify in terms of their yield factor – the fibre yield they are getting for the waste they are processing – is poor and the reason for that is quality, which as I have suggested is key. The original quality of the product coming out of MRFs was merely a necessity of handling all the waste that was suddenly being collected throughout the Western economies. Now we have the twin problem of rising waste collections

driven by new and more stringent targets combined with the insistence by end users of a higher quality of waste. In the UK alone we are collecting close to ten million tonnes of paper while in Europe the figure is well over 70 million tonnes. All this waste needs to be processed and needs to be used by paper mills but we cannot use all the paper we are recycling so it has to be exported and until 2012/13 we had a ready market in the Far East. That is now changing so the MRFs that we built to handle bulk waste and produce average quality recyclables are no longer up to the standard being demanded by the recipient countries.

The ability to find a home for low grade mixed paper is going to become a challenge. China, India, Indonesia, in fact all the traditional markets, are now very heavily quality focused while we in Europe are doing the opposite by trying to recycle increased volumes of collection with less focus on quality. In the next four to five years the operators of old style MRFs will have a serious problem in marketing their products because on the one hand they are too costly to handle and on the other they are producing a product which the end recipient is not going to buy because it is classified as non-usable waste. Every country is now bringing in a tough regime of quality control. The time is rapidly coming when we must establish an equilibrium between quantity and quality, when we must decide how much we should recycle and decide what percentage should be shifted away from recycling to incineration, landfill or whatever is effective. In fact I would say we have already reached that tipping point.

This has to be reconciled with the increasingly onerous directives and legislation. Countries like America, the UK and other parts of Europe are imposing their own tough export controls to ensure that no one is exporting waste that is not definable as having the right specification and that only material defined as not having reached the end of its valuable life should be recognised as raw material. This alone has caused disagreement in Europe where the EU has endeavoured to bring clarity and harmony. This is important because the lack of agreement raises legal uncertainty where interpretations are not always compatible from state to state when waste is moved from country to country which in turn affects potential investment in new treatments by waste companies. Changes in proposed end-of-waste (EOW) criteria led to protests by the Confederation of European Paper Industries (CEPI), for example, outside the European Commission's Brussels headquarters in September 2013. CEPI feared they would lose control over the quality of the raw material if unrecycled paper and packaging was declared 'End of Waste' and recycled by collectors rather than the paper mills. They said it would inevitably lead to deterioration in quality. Regrettably, the EOW regulations for waste paper are still pending ratification by the Parliament in Brussels.

The impact of this changing climate for MRFs could prove terminal. The ones that are unable to provide 100 per cent good material clear of contamination or those grades to be within allowable range will struggle to survive. When countries like China came in with their Green Fence controls MRFs not able to produce the correct standard could not market their product and they are now being forced either to close or increase investments in more mechanised sorting systems in order to produce a product which would have a market. If they cannot change the quality of what they produce then the waste will end up in incineration or for waste-to-energy purposes. In short it doesn't even need to go through a MRF. China is a market which no recycling nation can ignore – scrap was the top US export to China by value ($11.3 billion) in 2011.[38]

The UK and no doubt other countries as well will need modern MRFs which are able to remove from the sorting stream prohibited and contaminating material which in the past may have been included as acceptable. Plastic, wood, metal cans and clothing items have all got through in the past but now because the tolerance that is allowed is sometimes as low as 1 per cent or even 0 per cent, if it doesn't meet their criteria then the product is not going to be accepted.

This is a challenge for even the biggest operators who have to decide whether investing in new technology to upgrade an old style MRF is worthwhile. A good MRF running at about 10–15 tonnes per hour, working about 16 hours a day is only processing about 200 tonnes a day. Working 7 days a week this is about 1400–1500 tonnes, about 80,000 tonnes per year, which is good enough for a city like Northampton, UK, but the ability of an 80,000 tonne MRF to produce excellent quality recyclables and capture every bit of recyclable waste passing through it is not going to justify the levels of expenditure required to upgrade. Coupled with that, local authorities are tendering for the waste which they award to the highest bidder whereas in the past the waste management companies managed to get most of the collections at very low prices. So there is a cost factor for the baler: first for the money they pay the council and second for the cost of trucking it to the plant, putting the waste through the system and still coming out with a product which is within the tolerance limits. The total cost becomes so high and, with increasing investment costs and global competition, it becomes a challenge to provide the recyclable at the right price. This price itself is capped by the price at which the paper mill can sell the finished paper.

In the long term either MRFs will have to be extremely sophisticated or we will see a gradual demise of the production of the very low end of paper quality coming out of MRFs. Instead of producing it for recycling purposes they will still produce a grade at a cheaper cost but use it for RDF.

38 *The Guardian* 6 September 2013

Where are the drivers, the legislation and all the directives taking us? It is to the inevitable conclusion that all types of recycling, and within that I include incineration as well as landfill sites, will have to be used. It is the obvious conclusion when faced with a market which is ever more demanding, by laws which will only increase waste collection and by end users who are increasingly selective. When I say that recycling makes economic sense it only makes sense when we know we have the raw material, a conveniently located processing plant and above all a ready market for what we produce.

Talk of perpetuating landfills should not cause alarm because they would only be used for material which has passed every process, probably been recycled several times and has come to the end of its useful life and therefore represent a volume which I would expect to be very much lower than we saw 10–15 years ago. But logically it also means that landfill tax should not be so prohibitive that they could never be used. Switzerland has banned all landfill but that can only mean that they are sending their residual waste to someone else or burning it. The challenge is not so much that there is not enough land, although that is clearly true in certain countries such as Singapore or the UAE and Dubai where land is reclaimed from the sea and is very precious, but that the waste we are generating has a value in it and that value should be converted usefully to help the environment in terms of preserving its natural resources and at the same time making the cost of the end product cheaper.

Perhaps the last driver which trumps all others is the global economy. The financial collapse of 2008 changed everything and yet at the same time confirmed what we should have realised – low-quality commodities were no longer in demand. Roy Hathaway of the UK Department for Environment, Food and Rural Affairs, told a conference[39] that the quality of material would play an increasingly pivotal role in trade, with the market set to face short-term financial constraints. He said it was going to be the low-quality end of the spectrum which was going to be squeezed out by an economic downturn.[40] Single-stream collection worked in the beginning: between 1990 and 2003 China experienced a 68 per cent growth in demand for pulp and recycled paper grade, but that dropped to a projected figure of 33 per cent between 2003 and 2010.[41] China no longer has the unlimited supply of cheap labour to sort the contaminated waste and they are also producing their own waste and virgin products which they need to handle. China collected about 20 million tonnes of paper for recycling in 2011 – a big increase on the

39 WRAP Conference, 23 October 2008, Issue: Focusing on navigating the current economic downturn.

40 Container Recycling Institute Report: *Understanding economic and environmental impacts of single stream collection systems*

41 Container Recycling Institute Report: *Understanding economic and environmental impacts of single stream collection systems*

previous year.[42] Consequently fibre export into China will fall as the snapshot of the European paper trade with China shows (see Table 2).

Table 2 The changing trends of European fibre exports to China – a six month comparative snapshot

EU Country	2012	2013	
UK	1,905,771	1,579,675	DECREASE
Holland	1,172,998	797,581	DECREASE
Italy	622,272	477,270	DECREASE
Belgium	430,834	341,996	DECREASE
France	309,045	253,669	DECREASE
Spain	292,099	216,197	DECREASE
Germany	309,045	253,669	DECREASE
Ireland	90,389	102,805	INCREASE
Greece	56,266	50,118	DECREASE
Portugal	40,762	29,934	DECREASE
Norway	32,493	25,911	DECREASE
Turkey	11,415	4,687	DECREASE
Sweden	9,189	5,478	DECREASE
Poland	14,429	4,486	DECREASE
Slovenia	8,976	12,859	INCREASE
Bulgaria	2,942	3,613	INCREASE

We have to accept that the world has changed and that we all operate on a single planet. Rules and regulations have to make both economic as well as environmental sense and no one can operate in isolation pursuing their own idealistic path. It is not a crisis if we don't want to make it one but we have to use all the tools at our disposal to handle an unlimited raw material which can both help us as well as cause great harm through its misuse. We must not tie ourselves down with impossibly rigid legislation but we must recognise that waste is a constantly changing commodity which can be harnessed by innovative technology. It has almost become a force of nature, certainly a force created by human nature, and it is both volatile and valuable. Handle with care.

42 BIR – Recovered Paper Market in 2011