

# Recycling our Future

A Global Strategy

**Ranjit S. Baxi**



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# Acknowledgements

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I would like to acknowledge the support I have had over the last three decades from all my customers, contacts and friends in Europe, America and Asia.

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I have quoted liberally from various publications and I trust I have given due credit on every occasion. I do know however that we are all driving towards the same goal: a greater understanding and acceptance of all methods of recycling to save our rapidly depleting finite resources.

I dedicate this book to my late mother and father who supported and inspired me as I set out on my career. Above all I must thank my wife, Harvinder, and my children Jasmeet, Harmeet and Aneet for the strength and support that they have always given me as I built my company J & H Sales (International) Ltd.

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# Introduction

Dust to dust, ashes to ashes. There is a certain irony that man, the world's greatest polluter, has a most efficient in-built design which helps the body begin decomposing within days of being lowered into the grave and yet what he has created takes sometimes hundreds of years to disintegrate and even then it can 'live' on. Marine experts, for example, are convinced that we humans are consuming plastic when we eat fish because although all the plastic detritus that finds its way into the oceans eventually breaks down, it ends up as miniscule plastic pieces which release toxic chemicals (Bisphenol A and PS Oligomer) that the fish eat. Until we are able to build a natural obsolescence into everything we make with the same efficiency as our own self-destruct mechanism then there will always be waste.

Everything we do just to get through a normal working day contributes to the tonnes of waste material that has to be dealt with one way or another. According to the United Nations we produce more than one billion tonnes of domestic waste worldwide per annum which excludes manufacturing, construction, water supply and energy waste. In Europe alone if we include those waste streams the figure tops three billion tonnes.<sup>1</sup>

There is another phrase which might easily be applied to waste: out of sight, out of mind. Most of us believe that we are doing our bit 'recycling' our household waste into the multi-coloured bins which local authorities provide; we may even feel a sense of satisfaction which somehow justifies our filling the bins again the following week; and once that rubbish or garbage has been collected we do not want to know any more about it. Of course we are not recycling at all, we are merely pickers, the first link in a long chain of sorting and sifting before the real work of recycling begins and none of that must take place anywhere near our homes in case it offends our sense of smell. Then there is also the scandal about how much of our carefully sorted waste simply gets shipped off to far-flung destinations not to be recycled but to be dumped on poisonous, mountainous landfills where the poor and the desperate pick over them to scavenge a livelihood.

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<sup>1</sup> European Commission – Being wise with waste: the EU's approach to waste management

This book I hope will provide an insight for the layman into the workings of the waste industry which can be highly sophisticated despite its public image, and why it matters to every one of us that we know what is happening and what is at stake; to start thinking of the industry not as a disposer of waste but as a provider of resources.

We will be addressing common threads throughout the industry without dealing in fine detail with the intricacies of the various sectors – how to extract gold and platinum from plastic computer motherboards or the inner workings of an anaerobic digester. There may be unique problems related to certain sectors but looking across the globe, recycling can be divided into various broad groups: paper, plastic, glass, ferrous and non-ferrous, steel, textiles, tyres, plastics, electronics. These are the main branches of recycling, but this book is about the forces and drivers impacting the recycling business and what we must do together to overcome those hurdles rather than dwelling too much on the technology. There is nothing new about the need to recycle as my colleague, Dominique Maguin, former President of the Bureau of International Recycling (BIR)<sup>2</sup> reminds us: ‘Man has always reused materials...in the Bronze Age, men were recovering broken items to redesign and make new ones.’

I also present some challenges for the industry and the legislators who in their desire to develop a new technology or the pursuit of tighter regulatory controls lose sight of what we are trying to achieve. The uncompromising drive for zero waste or local authorities striving for that extra buck will not in themselves result in the protection of our dwindling finite resources or a reduction in toxic waste mountains nor will they help our industry.

If we understand exactly how the recycling system works, who is benefiting and who is suffering as a result of our consumption, then we will at least be better informed and perhaps take different decisions not only about what we consume but also how we deal with what we discard. In particular I would like to discuss the challenges of the present day rather than dwell on the history of how we came to the crisis we now face.

This is not a lecture about human wastefulness – that is for other people – but it is about practicalities; as long as we continue to behave as we have done for centuries we will have to do something about what we throw away. It doesn’t just disappear; it doesn’t all naturally rot away, so we will definitely have to devise new ways of tackling the problem which we have managed to do for centuries, from the first scavengers picking over waste dumped in the streets to today’s \$200 billion plus per annum recycling industry employing some 1.6

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<sup>2</sup> The Bureau of International Recycling is a non-profit organisation founded in 1948 under Belgian law. It was the first federation to support the interests of the recycling industry on an international scale and represents companies and national associations in more than 70 countries.

million people.<sup>3</sup> In fact some calculate that the value of the industry, including municipal, industrial recycling and waste to energy, is many times greater, perhaps as much as \$1 trillion a year with the potential to double by 2020.<sup>4</sup>

Many will be surprised that there is not even agreement about the best way to collect waste from our homes; we do it differently within a small country like the United Kingdom, we do it differently again in Europe and in America and elsewhere. The headlines are reserved for the next best thing – perhaps an innovative waste-to-energy technique – the investment money piles in and then it, too, is discarded for another system. But I would argue that our primary focus should be much earlier in the chain.

I have spent more than 30 years buying waste from companies that sort and pack it into containers and sell it on to people who do the actual recycling. The demands of the ultimate buyers, the mill owners for example who turn our waste paper and cardboard into usable product, change constantly and by that I mean daily; prices rise and fall as swiftly as the stock markets and the waste streams are many and varied, from whole ships and demolished buildings to a single battery or plastic bag. It may also come as a surprise to some that the very best quality waste is in short supply despite the waste mountains we all complain about and the apparent shortage of landfill sites. So curiously some waste is itself becoming a scarce commodity just like the finite resources we greedily consume and as such has a rising value.

What shocks me after so many years in this industry is how little people (who should know better) understand about waste: investors are hypnotised by technology without appreciating the basic requirement – quality; many in the industry seem to have little knowledge or firsthand expertise about the markets into which they are selling; governments and local authorities have for years failed to grasp the value of the one raw material which will never run out and seem willing to give away the potential profit by outsourcing the problem to contractors who can't believe their luck; and why do householders seem to be so willing to act as unpaid sorters on domestic picking lines in their own homes? When you screw up a ball of paper and throw it into your waste paper basket, pause for a moment and consider not only where that sheet of paper came from but about the journey it may be about to embark on. If you are careful about how you separate your waste paper it may soon be on the high seas heading for China, which accounted for 25 per cent of the world demand and 26 per cent of global production for all paper and board in 2012 retaining its position as the world leader for the fourth consecutive year.<sup>5</sup> And yet, times are changing.

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3 Bureau of International Recycling (BIR)

4 Bank of America Merrill Lynch 2013 report: *No time to waste – global waste primer*

5 *2013 Annual Review of Global Pulp & Paper Statistics* – Resource Information Systems Inc

The traditional dumping grounds of our waste, usually Eastern and African destinations, are saying no more as they too begin to favour quality over quantity. This is having an impact on the whole industry and will in time no doubt be felt at householder level as we adapt to new conditions in the global market.

There is much that needs to change as we consume our natural resources faster than they can be replaced as the world's population grows, becomes increasingly affluent and therefore ever more demanding and wasteful. Developing nations want to enjoy the high life just as much as the rest of us have done for years and who has a right to stop them? We can shout about the need for a zero waste policy but we must recognise and allow for growth. Legislation, one of the most influential drivers of what we do with our waste, is in disarray; someone described waste management generally to be in a state of anarchy. It is already late but we must start Recycling Our Future and we can only do that by understanding how the process works.

# I

## Overview

It is an easy enough challenge: how are we going to clear up the waste we create?

To err is human, so the short answer is that we can't or won't reduce our waste and there are a number of reasons for that beyond our human frailties. The world's population is growing, albeit at a slightly reduced rate, and perhaps more importantly the middle classes are expanding; people in the fastest growing countries in Brazil, the Near, Middle and Far East, and China as well as parts of Africa are becoming increasingly affluent so they too want to share in the good times; between 1980 and 2009 the world's average GDP per capita grew by 248 per cent from \$2,472 to \$8,599 and after a sustained period of growth there is reported to be a big increase in African billionaires predominantly in South Africa and Nigeria.<sup>6</sup> Even though the International Monetary Fund reported a cooling in the growing economies of the so-called BRIC countries (Brazil, Russia, India, China) they still predicted growth of 4.5 per cent in 2013/14.<sup>7</sup> So if we won't consume less what should we do with what we are throwing away?

Before we look at techniques there is another issue which is arguably more important: our natural resources are said to be declining faster than they can be replenished and the most obvious example is our trees. In the so-called electronic paperless world we are actually using more paper than ever before and without recycled product we would soon not have enough virgin stock to meet demand. By far the greatest volume in any landfill is paper. Everyone worries about the plastic packaging which wraps everything from a single apple to a whole refrigerator, but plastic does not take up much room in a typical landfill. Dig deep enough and there will be old newspapers and telephone directories which have not rotted away as we fondly believe but are actually perfectly readable sometimes years after they were dumped.

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<sup>6</sup> *Venture Magazine* listed 55 billionaires in Africa up from 16 in previous estimates, *Financial Times* 7 October 2013

<sup>7</sup> *Daily Telegraph* 9 October 2013

Into this mix we can throw the conflicting priorities of all involved in the recycling process which includes everyone from the householder to the end user or manufacturers of recycled products and their customers, with political bodies overseeing everything we do. As householders by and large we just want our dustbins emptied; it would be nice to know that what we have painstakingly sorted eventually gets recycled as opposed to being land filled but the priority is definitely that regular weekly collection.

The cities, councils and local authorities around the world responsible for collecting the waste, under constant pressure to save money, are inclined to go for the highest tender offer when they are looking for a contractor who will operate the service. Their priority is to have the waste collected efficiently, regularly and cleanly; what happens to the waste once the bins are emptied is largely of secondary importance so long as they are abiding by all the rules handed down from government. An alternative, less well known priority may be to make money. A spokesman for the UK's Department for Environment, Food and Rural Affairs (DEFRA) when asked about the vast increase in waste being sent abroad said:

Trade in recyclable materials is a global market and we want to see UK businesses make money from it to help boost our economy. We would like to see our own recycling industry grow so that we can grasp this opportunity with both hands.<sup>8</sup>

As a little aside, it is worth remembering that it is the householder who is providing much of the 'raw material' for this money-making opportunity.

However the contractors will have their own preference as to how the waste is collected depending on the technology in their waste recycling facilities – some will want a high degree of pre-sorting by the householder while others such as in some cities in America will be quite happy for all waste to be dumped in one 96-gallon bin for separation later.

The argument over single-stream collection continues. It is not good enough to say collection rates have increased, which is itself debatable in the long run, therefore single streaming is the answer. Unless the Materials Recycling Facilities (MRF) are capable of improving the quality of their output it will remain no more than another pile of junk, albeit one which has been partially sorted and prepared.

To have a single-stream system can only work if the facility is capable of producing high quality recyclates which probably means more investment in equipment at the MRF and more staffing, and I would argue that in many

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8 *Daily Mail* 4 September 2013

countries it should also mean more MRFs as well. The cost benefits are not clear cut. In some cases, in remote locations where it is impractical and uneconomic to have multiple collections, single stream may be the only sensible answer.

It is worth pausing for a moment to follow how we reached this present conundrum – single or dual-stream collection. In the late 20th century it began to dawn on people that we could not go on dumping our waste in landfills no matter how much land we thought we had; in Saudi Arabia for example they assumed they had plenty of desert to spare and drove out of town to dump their waste in the sand. Of course new prosperity has meant cities have grown and suddenly they found that they were running up against the landfills which now had to be ‘mined’ to make way for new buildings, so people began to recognise that the problem could not simply be buried.

In time as we became concerned about the ozone layer and greenhouse gas emissions, landfills became one of the targets and there was increasing talk of waste-to-energy. People had to be encouraged to recycle more so single-stream collection was pushed, but it doesn’t take much to work out that by mixing up everything from food waste and paper to glass and cans results in highly contaminated waste; this is supposed to be the raw material from which new products are made in the actual recycling process. This was also a time of rapid economic growth which saw a huge demand in particular for pulp and recycled paper in the Far East – quality was not the key issue but that attitude would change. In addition the tempting economies of single-stream collection did not necessarily stack up. A study in 2002 by Eureka Recycling in Minnesota into different collection methods revealed that single-stream collection resulted in 21 per cent more waste being collected but the lower collection costs were ‘outweighed by higher processing costs and lower material revenues.’<sup>9</sup>

But clearly not everyone is convinced. In 2013 in Montgomery, Alabama residents were told that they would soon be able to place all their waste in one bin which would be shipped off to a state of the art ‘dirty’ MRF which was being built at a cost of \$35 million. It was forecast that the city’s recycling rate would ‘skyrocket’ from its lowly 14 per cent. They were not alone. That same year the citizens of Minneapolis received their 96-gallon one-sort carts which could hold 200 lbs of waste that would be collected every other week. Others have been following suit.

However paper which is left outside overnight, even if it doesn’t rain, loses its value because of the moisture content in the air that it soaks up. If it is left for two weeks at the bottom of a 96-gallon cart covered in liquids and every other type of waste it will have a zero value to end users. And no matter how

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<sup>9</sup> Container Recycling Institute – Understanding economic and environmental impacts of single-stream collection systems. December 2009

carefully glass bottles are placed in a waste bin, when it is automatically tipped into a cart, crushed and then dumped at the MRF for recycling it will render the paper worthless for recycling because of glass and liquid contamination. But the counter argument is that if single-stream facilities can improve the technology to process the input at a lower cost, then this might be an answer.

An almost diametrically opposite approach is being taken by some councils in the UK who have begun introducing smaller 140 litre wheelie bins with a fortnightly collection, arguing that the tighter restrictions will ultimately lead to greater recycling habits by households.<sup>10</sup> It is an interesting approach which has provoked protest from those who say the new regime will simply lead to more fly-tipping. The counter argument is instead of having a 'right' to weekly collections there should be a responsibility to recycle and reuse more.

I referred to dirty MRFs. This sounds like a pejorative term but it is simply shorthand for mixed unsorted waste. I will look at the recycling process in more detail later but suffice it to say here that mixed, multi-stream waste recycling facilities with the benefit of all the latest technology are certainly part of the answer, but the reality is that there are not enough of them and simply bolting on a new piece of kit to turn a modest facility into a 'super sorter' will not solve our problems.

The Container Recycling Institute offers some useful statistics: in the USA there are more than 160 single-stream MRFs and 27 per cent of the US population participate in single-stream programmes. This worked well to meet the demand of the explosive growth in the Far East when volume and not quality of material was a paramount issue, but now they are getting picky. It costs \$5 to \$13 more per tonne to process material from single-stream systems than from more sophisticated and cleaner facilities so obviously that is a cost they want to avoid. Some 40 per cent of glass from single-stream processes ends up on landfill – something we have long wanted to halt – while 90 per cent of glass from dual-stream systems is recycled.

As for the optimistic hopes that waste recycling will 'skyrocket' in cities with 96-gallon carts, the facts do not seem to bear this out. An analysis of three single-stream and four dual-stream systems showed that the weighted average costs of recovery were virtually identical for both – 6.9 per cent and 7 per cent – and the cost savings were as little as \$0–3 per tonne.<sup>11</sup>

Collection is not recycling. Waste is only recycled when it can be returned to its original purpose or used in some other way and not end up perhaps as landfill cover, which is termed 'downcycling'. The aim is to achieve what is called

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<sup>10</sup> 'One in four local authorities is now supplying bins that are up to 50 per cent smaller than those previously given to households', *Daily Telegraph* 15 January 2014

<sup>11</sup> Daniel Lantz, *Metro Waste Paper Recovery*, Ontario 2008

closed-loop recycling where items like a glass bottle can be cleaned and remade into a glass container or fibre glass indefinitely – it will never see the landfill.

So we have to be practical and assess the costs and benefits of everything from new monster bins to state-of-the-art facilities. The rate of recycling has to increase across the board and it will certainly involve a combination of single-stream and dual-stream collections. Technology is advancing which will improve the quality of product emerging from single-stream collection methods but as the chart of one US study shows (see Figure 1), a big difference remains, with single-stream collection still resulting in a high number of rejects.

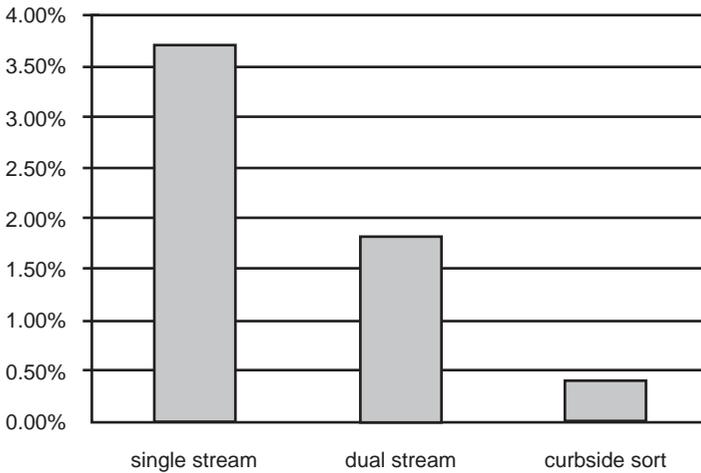


Figure 1 Percentage level of rejects from incoming material from various collections methods. Source: Targeted statewide waste characterization study (R.W. Beck, 2006)

There are other links in the chain which we will discuss but ultimately the waste ideally ends up at a reprocessing facility where the actual recycling takes place and the recovered fibre for example may be turned into boxes. The priority here is quality of recyclates and it is this priority which should be paramount and which is in fact increasingly determining how we manage our collections. Unless recyclables are free from contamination they will and are being rejected by the reprocessing companies who are looking to markets where collection quality is key; Europe is not at the top of this particular tree. In 2012 China, which imports 70 per cent of the world’s electronic waste and 12 million tonnes of plastic waste each year, imposed its Operation Green Fence campaign that set a limit of 1.5 per cent of allowable contaminant for each bale of imported recyclables and it wasn’t long before stringent controls were being applied to ensure importing and exporting companies were meeting the required standards.

Waste is an ongoing problem as well as being an asset from which some can profit. It is generated continually whether we are living in towns and cities or in the country; around the world everyone is generating waste. Historically the problem was dealt with simply by dumping what we didn't want in landfills which were no more than holes in the ground and before that of course we just threw it out into the streets. Waste has always come from multiple sources: commercial industry, households and hospitals and from industries producing toxic and hazardous waste. Furthermore all that waste was mixed together completely unsorted, leaching into the ground and surrounding soil. In the last 30 or 40 years the world realised that we have a finite source of the raw materials that are used to make products so we had to consider recycling or rather a more sophisticated method of recycling than picking over the dumps, although this continues today in some parts of the world. Since the 1970s we have increased the amount we recycle but we are not keeping up nor do we always focus on the most important priority: the quality of the recyclates we are sending to the end user. But recycling is helping in reducing the use of natural resources and consumption of energy compared with the production processes using virgin material (see Table 1)

*Table 1*

| Energy Savings |       | CO <sub>2</sub> Savings |      |
|----------------|-------|-------------------------|------|
| Aluminium      | > 95% | Aluminium               | >92% |
| Copper         | > 85% | Copper                  | >65% |
| Plastic        | > 80% | Plastic                 | >58% |
| Paper          | > 65% | Paper                   | >18% |
| Steel          | > 74% | Steel                   | >90% |
| Zinc           | > 60% | Zinc                    | >76% |
| Lead           | > 65% | Lead                    | >99% |
|                |       | Tin                     | >99% |

One of the challenges today is for the waste generator to understand how the end user of that waste can best utilise it with the minimum cost on all sides. The aim of course is for 100 per cent usage of what we send to a reprocessor, but if we don't supply it in the right format largely free from contaminants then the waste will either have to be retreated or thrown in a landfill. Every country

in the world has to recognise the importance of quality and make it a universal priority. Only by understanding where the waste is going, what specification is required and by adjusting our ability to deliver that level of quality can we truly make recycling work efficiently.

We also need to minimise logistics, in other words once the waste is collected it should ideally go to one point where the entire treatment of that waste takes place. Too often waste is taken to what is known as a transfer station where it may only be sorted, not even treated, and from there it is sent to further processing plants. This defeats the object of the exercise, it increases costs through transport, wastes energy in fuel and adds to the pollution of the planet. This is not recycling as it should be conducted but having said that big efforts are being made – the question is how effective are they.

We have endeavoured in the last 10 or 20 years to do more. Initially the challenge was the apparent scarcity of the finite raw material; however, despite apocalyptic warnings oil is still plentiful because we are extracting and using it more efficiently and we are even growing more trees than we are cutting down by a factor of 20<sup>12</sup> – it is just that we are felling trees which should be protected such as in the Amazon Rainforest.

Post-1995 and especially post-2000 the price of non-ferrous metal – copper, aluminium, platinum – increased dramatically so it became more important for those industries to look for alternative sources to supply the raw material. In particular lead, zinc, copper and nickel will face shortages between 2014 and 2030.<sup>13</sup>

In the paper industry the price of pulp from our trees also increased tremendously post-1995 and therefore more and more paper mills were gearing themselves to using waste paper (paper for recycling) as well as pulp. Eventually the processors realised that they could not go on taking in poor quality material which required further processing because their own costs kept rising. In other words we have not been supplying them correctly because of the contamination that results when recyclables are mixed with other material which should not have been there. If steel cans are mixed with copper that will result in contamination of the copper batch because the copper mill will not want steel in their loads. Likewise there is a big demand for aluminium drinks cans but these often get mixed with hairspray cans. Hairspray cans are a classic example of iron cans (ferrous metal). The aluminium mixed with ferrous is contaminating the batch so there has to be a separation of the two. With more and more material coming in the form of contaminated fibre (mixed ferrous and non-ferrous material), the end user is increasingly demanding 100 per cent clean material that can be

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<sup>12</sup> *The Skeptical Environmentalist*, Bjørn Lomborg 2001

<sup>13</sup> *France Green Tech Magazine*

used directly. This emphasis on quality has increased dramatically in the last five years (to 2013). It should be acknowledged however that the most powerful driver here is the margin that the recycler expects to make, not necessarily, if at all, the more altruistic reaction to diminishing finite virgin resources. Recycling after all is a business and a transition is happening where the buyer not the seller of waste material is in charge. Nevertheless everyone recognises that we have to deal with the waste we create and if we are going to do something we might as well do it to the best of our ability.

So rather than ask ourselves: how do we recycle more, perhaps the question should be how do we recycle better? We should certainly be recycling more because around the world we have still not been able to reuse all the waste that is generated. It is estimated that global municipal solid waste generation levels alone are expected to increase to approximately 2.2 billion tonnes per year by 2025.

The ultimate challenge and the greatest risk is that we must protect the finite natural resources of our planet earth. For example there are different varieties of trees used to make pulp for paper production which accounts for 35 per cent of all felled trees. Recycling one tonne of paper saves up to 31 trees, 4,000 kWh of energy, 1.7 barrels (270 litres) of oil, 10.2 million Btu of energy, 26,000 litres of water and 3.5 cubic metres of landfill space.<sup>14</sup> Or to put it another way one tonne of pulp equates to about 357 reams of the photocopy paper that we use every day. If we relied on forests for all our pulp we would soon run out of land for agricultural purposes or to build hospitals, schools and homes. The World Wide Fund for Nature (WWF) claims that if we maintain current resource use we will need two planets by 2030! So obviously there is a limit to the amount of land available for forestry purposes even though we are now cultivating trees that can grow to full size in five years.

Today we are using some 400 million plus tonnes of paper per annum in a global population of about seven billion, but if we look at the anticipated population figure in 2045 of nine billion,<sup>15</sup> just on that basis alone paper production will need to increase by 30 per cent. On top of that within our current population not everybody is able to get a newspaper or has a book to read, or has enough exercise books to write on at school. As their percentage increases the demand for paper will also increase. We have limited land, limited number of trees and if we don't recycle we will not be able to supply the 400 million tonnes we need today or meet the demands of an increasing population. Remember of course that within the 400 million tonnes we use today about 200

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<sup>14</sup> Bureau of International Recycling (BIR)

<sup>15</sup> In May 2011 the UN Populations Division raised its projections, estimating that there would be 9.3 billion people in 2050, and 10.1 billion at the end of the century.

million tonnes of waste paper is used in its manufacturing; 200 million tonnes of waste paper generates roughly 160 million tonnes of recycled paper. Therefore if we didn't recycle we would only have 240 million tonnes of paper so there would be a shortfall or we would have to use more pulp. What we already use today and take for granted would not be available. A sobering thought maybe when we glance down at our overflowing waste paper baskets.

There is another factor to add to the equation: the growing 'middle class' which grew by 55 per cent from 3.1 billion to 4.8 billion people between 1980 and 2009, representing some 71 per cent of the world's total population. Those in the high income class almost quadrupled earnings from \$9,467 to \$37,264 and grew to 1.1 billion people. If we stick with our paper example, the 400 million tonnes is meeting the requirements of the existing lower, middle and upper classes of today. When more people move into the middle class the demand for luxury paper and reading material increases; more people go to universities and the demand for new text books also increases. Even with the benefit of computers, iPads and Kindles which people can use as a substitute for paper-based reading the demand for paper will certainly increase. Just as the demand for reading and writing material increases so too does the demand for soft drinks which increasingly are packaged in cartons and the base product for those cartons is a form of paper.

While I have focused briefly here on paper the same principle applies to every other raw material which will be in ever-increasing demand as the world population grows and becomes more affluent and acquisitive. But I return to the question of quality. To save and recycle our products we have to give careful consideration to the first step in the process – the collection. Here the industry, the regulators and the local authorities cannot agree on this most elementary and yet essential link in the chain.

As I have suggested it is important, even vital, to keep one's eye on where the waste product is going to end up. I consider that the failure to understand this presents one of our greatest risks. As far as plastic and aluminium cans are concerned they can be treated and the aluminium cans will separate regardless of collection method, but paper is only of any use if it is in a dry state. The moment paper is contaminated with liquids, and some of these liquids can colour the fibre, then the end use for that paper is lost as a result and it can no longer be recycled for making paper. Single-stream or one bin collection points render paper unusable.

The idea of single-stream collection came about in the 1990s when there was a push to keep waste out of landfills and to increase collection rates as we have mentioned. But that drive was then superseded by multi-stream collection when there was a greater awareness about recovering valuable raw materials