

Future of Waste





The Global Challenge

Global waste production is predicted by some to double over the next twenty years. Much of this will be due to increased urbanisation and greater waste generation per capita as emerging economies grow. While some regions are aiming at creating zero waste ecosystems, others are yet to truly recognise the scale of the challenge we face.

Waste results in many problems. It smells bad, looks bad and attracts vermin; it releases harmful chemicals into the soil and water when dumped and into the air when burned; around 4% of our GHG emissions are currently from waste decomposition; and no one has really yet come up with a solution for how to dispose of some of the most toxic nuclear and industrial waste in a sustainable manner.

On average in Europe, each of us produces over 500kg of domestic waste each year. On top of this we generate huge quantities of construction debris, industrial effluent, mine tailings, sewage residue and agricultural waste. Rich countries spend some \$120 billion a year disposing of their municipal waste alone and another \$150 billion on industrial waste.

In the next decade, can we develop a practical and achievable global strategy for sustainable resource use? Making waste prevention the norm in a global society dominated by consumerism will demand the creation of a zero waste society - but can we actually achieve zero landfill and move towards this goal? It will mean simultaneously developing the appropriate infrastructure, service provision and approaches to facilitate behaviour change in multiple particular environments. It will also require us to genuinely decouple economic growth and waste generation on a global scale.

Enabling the appropriate treatment of hazardous wastes (including toxic, radioactive, clinical and biohazard materials), particularly close to or in densely populated, urban areas is a major issue. In particular, we will need to address the unethical shipping of hazardous wastes to developing countries and the subsequent adverse health effects suffered by those who handle and treat these wastes.

As economic growth has traditionally led to more waste, to prevent the future doubling in global waste predicted by some, we need to understand what are the projected increases in waste volumes in emerging nations? What will be the associated attitudes towards waste management and what infrastructure and service provision needs to be put in place and where? We must devise sustainable and practical approaches to deal with the (inevitable) increasing volumes of waste from 'emerging nations', their attitudes towards and ability to manage their waste responsibly.

Last, but certainly not least, we need to change all individual behaviours and attitudes and get consumers and organisations to buy products made from recycled materials and/or sustainable sources: Easier in some countries than in others.

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Options and Possibilities

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Over the next decade, the increasing global population and the increasing economic growth of many emerging nations will create more waste. As well as putting a huge strain on resources such as fresh water and energy, another billion or so people added to the planet in the next ten years will certainly demand more and so create more waste. This will include more food and energy waste; more household waste; increased electronic wastes facilitated by lower prices, new products and more choice; and more hazardous waste from industry generally and an increase in nuclear energy specifically. To try and counteract this we will see less packaging waste due to regulation and more biodegradable packaging; more pressure to reduce the environmental impacts from waste; increased complexity in the waste stream and an increase in concerns regarding the health effects of waste treatment. These are all visible trends today that will continue going forward.

What is less certain are a number of political, environmental, global economic and technological factors. Political motivation and resource policy directions are very unpredictable, especially after a downturn where the economics of waste recycling have become less viable than before. In addition, we don't yet understand the impacts that global warming will have on governmental decisions that impact waste management - what is the connection between waste generation / treatment and climate change? Can some waste materials be used to generate sustainable energy in order to address future energy needs? The impact and implications of increased resource use on society, the economy and the environment are likely to be global and significant but the details are not yet fully clear. Although some point to examples such as Switzerland where there are currently high levels of waste recycling occurring due to local conditions, it is not certain that this will be sustained. At the same time, whether, or to what extent, waste quantities continue to rise in the developed world is not certain. Also, we don't yet know how rapid will be the uptake of sustainable and smart technologies, such as nano-materials, which will in theory result in less waste. Despite an increase in hazard, high use of rare metals in IT hardware such as phones and PCs will increase but waste quantities may reduce.

We have the options of accelerating the development of Zero Waste concepts, creating better sustainable technologies, and facilitating better geographical spread of these technologies, but this needs investment. This is investment in appropriate infrastructures, service provision and new approaches to facilitate behaviour change in particular environments. We also have the option of creating new accredited global standards for management, treatment and disposal of waste, but this needs cooperation between companies and countries. There are many things we could do to fundamentally change direction and create less waste, but some question what we will actually do.



Proposed Way Forward

By 2020, I believe that we can make a significant impact on the waste problem by taking some clear steps. And I would aim high: we need major changes.

First off is the development of practical integrated sustainable waste management solutions that are clearly aimed at the creation of a zero waste society. This will mean the simultaneous development of the infrastructure, service provision and behavior change to enable the core elements to be aligned. This won't be politically attractive but will be necessary. Within all environments we need to develop truly sustainable waste practices, policies and strategies. This will mean moving waste management in line with a reduced carbon economy; developing appropriate and low environmental impact collection systems for small re-useable/recyclable items (WEEE); and adherence to approaches that satisfy regional self-sufficiency, proximity principle, sustainability appraisals, etc. This includes sustainable management of minerals and aggregates; prevention of food waste, and facilitating resource recovery from wastes, as well as addressing imminent resource depletion of key materials such as the rare metals used in IT hardware.

Second is the development of mass low-cost sustainable technologies for waste treatment / transformation and pollution prevention on a global scale. We need to develop technologies and systems for the global prevention of pollution from the handling and treatment of wastes, especially waste waters and industrial effluents. This will require concepts such as green chemistry and engineering to become mainstream rather than niche using appropriate

incentives and / or legislation. But can we develop mass low cost sustainable technologies on a global scale? This will require substantial knowledge transfer. Better technologies offer money-making opportunities and, in themselves, require less change to current practice than the infrastructure and behavior pathway. However, although zero waste strategies will be a popular concept, many in business and industry will resist it just as unleaded petrol was initially rejected. Therefore the technology route should not be backed in isolation - we need the technologies and the integrated waste management solutions together.

While these are the two main issues, there are also a number of additional actions that will have a quick, short-term impact. These include increased enforcement, education and awareness for organisations and businesses in how to manage their waste, especially from those not conflicted by commercial gain; expansion of alternate weekly collection systems in developed countries (e.g. recyclables weekly, residuals fortnightly); further legislation and / or economic disincentives on excessive packaging; and higher involvement of both big business and the third sector in re-use and recycling. We also need to accelerate the willingness of individuals and organizations to buy products made from recycled materials and / or sustainable sources.

Can we develop mass low cost sustainable technologies on a global scale?

Impacts and Implications

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There will be several direct consequences from seeking a credible move towards the zero waste society:

- Economically, increased costs are inevitable: Changes in feedstock for manufacturing, for example, will probably increase costs initially until the market adjusts and the use of recycled materials becomes the norm. However given the long-term impacts of not taking this route, most forward thinking organisations should see the benefit and the return that will be achieved on the necessary investments.
- Socially, both to enable a zero waste pathway and as a result of it, there will be significantly greater public awareness / knowledge of both waste management issues and also of the adverse health / environmental consequences of poor environmental management. However without a fundamental, behaviour change towards a more environmentally sustainable way of life, any economic investments stand less chance of having impact.
- Technologically, we will see an increased use of "smart products" to track, monitor and manage waste, as well as new nanotechnologies and low carbon technologies that create less waste. Increased investment, to ensure all that waste streams can be processed, will also eventually drive a move towards mass low cost sustainable technologies.

Until recently most people in the waste industry had assumed that it was impossible to reduce the amount

being produced and were concentrating on better use. But lately that assumption has been challenged. For one thing, the pace at which the rich world churns out rubbish has been slowing. Between 1980 and 2000 the amount of waste produced by the OECD countries increased by an average of 2.5% a year. Between 2000 and 2005 the average growth rate slowed to 0.9%. That was just ahead of the rate of population growth, but well behind the rate of economic growth. The OECD describes this as "a rather strong relative decoupling of municipal waste generation from economic growth"

Reducing the amount of waste being produced makes a great deal of sense. Some are trying to persuade consumers to throw away less. One tactic is to make households pay by volume for the rubbish they generate, rather than through a flat fee or through local taxes. Many places in Europe, America and Asia have adopted "pay-as-you-throw" schemes.

Whether through such changes in consumer behaviour, increased financial investment or the development of new technology and policy, the world is in desperate need of a shift towards the zero waste society. Such a shift will not only benefit us by addressing the growing waste challenge, but will also have a positive impact on how we potentially generate our energy, how we grow and use our food and how we manage our water supplies.



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